Evaluating Consumer Price Perception: a mental accounting and frame dependent perspective

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ABSTRACT

In this thesis, we evaluate consumer purchase behaviour from the perspective of *heuristic* decision making. Heuristic decision processes are quick and easy mental shortcuts, adopted by individuals to reduce the amount of time spent in decision making. In particular, we examine those heuristics which are caused by framing – *prospect theory* and *mental accounting*, and examine these within price related decision scenarios. The impact of *price framing* on consumer behaviour has been studied under the broad umbrella of *reference price*, which suggests that decision makers use *reference points* as standards of comparison when making a purchase decision. We investigate four reference points - a retailer's past prices, a competitor's current prices, a competitor's past prices, and consumers' expectation of immediate future price changes, to further our understanding of the impact of price framing on mental accounting, and in turn, contribute to the growing body of reference price literature in Marketing research. We carry out experiments in which levels of price frame and monetary outcomes are manipulated in repeated measures analysis of variance (ANOVA). Our results show that where these reference points are clearly specified in decision problems, price framing significantly affects consumers' perceptions of monetary gains derived through discounts, and leads to reversals in consumer preferences. We also found that monetary losses were not sensitive to price frame manipulations.

Key words: heuristic, reference price, price framing, reference points, mental accounting, prospect theory

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AUTHOR’S DECLARATION

“I declare that, except where explicit reference is made to the contribution of others, that this dissertation is the result of my own work and has not been submitted for any other degree at the University of Glasgow or any other institution”.

Signature ___________________________________

Printed name ________________________________

ABBREVIATIONS

ACT	Assimilation contrast theory
ALT	Adaptation level theory
CCP	Competitor's current prices
CPP	Competitor's past prices
ERP	External reference price
ERPs	External reference prices
Exp	Expectations
IRP	Internal reference price
IRPs	Internal reference prices
MAP	Mental accounting principle
MAPs	Mental accounting principles
Nexp	Non-expectations
PEH	Price expectations hypothesis
TUT	Transaction utility theory
Vs.	Versus

CHAPTER 1

INTRODUCTION

This chapter provides a background to our research. Firstly, we introduce the concept of reference price, which is the most important building block for our study, and describe the theoretical rationale behind reference prices that helps guide this present research and the resulting studies. Secondly, we present the motivations for our study and explain the research objectives. Lastly, an overview of the structure of this research wraps up our introductory presentation.

Literature on consumer behaviour suggests that consumers make purchase decisions from both actual and perceived price points of view known as reference price (Kalyanaram and Winer, 1995). The concept of reference prices can be illustrated using the simple example below:

Laura plans to stop by the store to pick up some apple juice. She had seen an advert during the week promoting the store brand. Although she is open to any particular brand, the price of the store brand seems like a good deal to her. She hopes the sale price in store is the same as in the advert because she plans to pay no more than the previously advertised price.

Researchers have varied in their conceptualizations of reference prices. Most studies assume that reference price is based on memory of past prices and consequently modelled reference prices as a weighted average of past prices (Lattin and Bucklin, 1989; Kalyanaram and Little, 1994; Krishnamurthi, Mazumdar and Raj, 1992; Mayhew and Winer, 1992). Other papers assume that reference price is a function of past prices and contextual factors such as deal proneness of the consumer, frequency with which the brand is sold on discount (deal), store characteristics and price trend (Kalwani et al. 1990; Winer, 1986). An alternative view is that because most people may find it difficult to remember past prices paid for products, reference prices are formed at the point of purchase based on current prices of particular brands (Hardie, Johnson and Fader, 1993; Rajendran and Tellis, 1994). Notwithstanding, the conceptualization most commonly accepted of reference price views it as brand-specific based on a summary of a brand's past prices (Briesch et al. 1997). These diverging views of reference prices show that reference price is a 'complex, multi-faceted construct that no single conceptualization can fully capture in its entirety' (Chandrashekaran, 2012).

There have been a considerable number of studies on reference prices ranging from topics of interest such as reference price formation, how reference prices affect consumers' purchase decisions, and specific price cues that affect reference prices. In most of these studies, reference prices have been broadly grouped into two categories: internal reference prices (IRPs) and external reference prices (ERPs). The former, refers to price comparisons consumers utilize during purchase decisions, which are stored within the memory, and are based on a consumer's perception of an actual price, or some other pre-identified price concept such as: aspiration price (Klein and Oglethorpe, 1987); previously paid price (Kalwani et al. 1990; Mayhew and Winer, 1992; Rajendran and Tellis, 1994); fair price (Thaler, 1985); recalled price (Gabor and Granger, 1964); reservation price (Scherer, 1980; Bearden et al. 1992); expected price (Winer, 1986; Raman and Bass, 1987; Lattin and Bucklin, 1989); expected future price (Jacobson and Obermiller, 1990); normal market price (Urbany and Dickson, 1991); highest and lowest prices (Biswas and Sherrell, 1993); and contextual prices (Rajendran and Tellis, 1994).

External reference prices, on the other hand, have been described from a contextual point of view as other prices in the store which are in the same product category at the particular time of purchase (Rajendran and Tellis, 1994). Mayhew and Winer (1992), likewise, pointed out that ERPs were provided by stimuli present within the purchase environment. These stimuli could be point of purchase shelf tags containing information about 'suggested retail price', or the actual unit price of another product against which the price of a similar good is compared.

1.1 RESEARCH MOTIVATION

a) A review of the literature on reference prices shows that most of the research has focused more on IRP than ERP. In a recent research by Grewal and Lindsey-Mullikin (2006) on search intentions, they found that one of the factors affecting searches on shopping bots was the number of competitors in the marketplace offering similar products, and that where there was a platform providing product and pricing information for numerous competitors, individuals were likely to limit the quantity of product searching. Although empirical evidence suggests that ERP decreases search behaviour (Blair and Landon, 1981), an evaluation from a retail/advertising point of view has not received much attention. We considered the possibility that the introduction of competitor prices and the availability of alternative vendors in purchase scenarios would influence how consumers' perceived changes in prices and would induce a higher perception of value or of having made a good ‘deal’.

Of particular interest is the general consensus based on empirical evidence which suggests that ERP plays a more significant role in price evaluations than IRP (Mayhew and Winer, 1992). However, to the extent that both IRP and ERP played reasonable roles in purchase behaviour, neither one alone is capable of explaining consumer purchasing behaviour as both could together. Thus, our study extends prior related research on reference prices by looking at both IRP and ERP within a retail pricing context. We examine which of these two types of reference prices has the most impact on consumers’ perceptions of gains (derived from price discounts) and losses (associated with price increases). This is done using experiments to evaluate the relative attractiveness or unattractiveness as the case may be, of changes in prices (retailer's and competitors' prices) presented in absolute terms (British pounds) versus percentage terms.

b) It is important to position this current research against three relevant studies: Chatterjee, Heath, Milberg and France (2000), Heath, Chatterjee and France (1995), and Mazumdar and Jun (1993). Whilst there have been a number of studies’ investigating price promotion, as far as we know, only the afore-mentioned three studies have empirically investigated the effect of reference prices in decision scenarios involving single and multiple price changes, and in relation to *decision heuristics*. Decision heuristics are those mental shortcuts employed by individuals in the process of decision making to enable them arrive more quickly at a solution.

The specific heuristic investigated in the previously mentioned studies above is mental accounting, and it is attributed to Thaler (1985). Mental accounting refers to the tendency for decision makers to mentally segregate or compartmentalize their resources or money based on pre-defined categories such as the intent or use. The key defining characteristic of mental accounting decision making is the lack of transferability between mental accounts. For example, money could be spread across several types of mental accounts such that money in one account cannot be substituted for that in the other. It is pertinent to note that of these papers, only the studies by Heath et al. (1995) and Chatterjee et al. (2000) considered the tendency for the framing of ERPs to change consumers purchase preferences based on Thaler's (1985) proposed principles of mental accounting. These mental accounting principles (MAPs), which we discuss at greater length in the following chapter, provide suggestions on how decision makers prefer to experience different combinations of monetary gains and losses.

Mazumdar and Jun (1993) investigated price changes within a product bundle versus single purchase type scenario. They examined the differences in consumer evaluations of single price gain and loss against multiple price gains and multiple losses. They also considered the impact of the relative magnitude of product prices on consumer evaluations of changes in prices. Heath et al. (1995) looked at mixed losses, mixed gains, multiple gains and multiple losses within the context of a retailer's past prices. They utilized percentage frames in evaluating their hypothesis that Thaler's (1985) MAPs were frame dependent. Chatterjee et al. (2000) investigated the impact of decision makers' varying need for cognition in mixed gains and mixed losses pricing scenarios. Empirical results from the last two papers pointed to the possibility that MAPs were frame dependent and the authors were of the opinion that there might be a need to re-evaluate the sensitivity of *Prospect Theory's value function*[1] to the way in which deviations from reference points are framed. In particular, Heath et al. (1995) as a proposed extension to their research suggested looking into price constructs other than retailer's past prices, in order to proffer an expanded perspective of how consumers perceive information relating to changes in price. This proposed extension forms the basis for this current research.

We carry out experiments to test the robustness of Heath et al. (1995) results and in turn, MAPs. In addition, we also extend prior related research (Chatterjee et al. 2000; Heath et al. 1995; and Mazumdar and Jun, 1993) on external reference pricing, mental accounting and consumer decision making. More definably, we provide extensions in two different ways. The first innovation is that, we address an important gap in the literature on reference prices in general and in the study by Heath et al. (1995) in particular by providing a more elaborate look into the impact of reference points on price perception. We tested four price constructs which served as the reference points against which retailer's current prices are evaluated. They are - retailers' past prices, competitors' current prices, competitors' past prices, and expected prices. Chapter 4, which is the first of our three core chapters, investigates reference prices from the perspective of a retailer's past prices. In the remaining two core chapters 5 and 6, we present our extension to extant literature. In Chapter 5 we consider competitors' current and competitors' past prices while Chapter 6 considers consumers' expectation of price changes and its effect on mental accounting principles.

[1] Prospect Theory is attributed to Kahneman and Tversky (1979). The value function is used to reflect the desirability of decision outcomes under prospect theory. We discuss this in greater detail in the following chapter.

The second extension is that our study evaluates the frame dependence of *reference dependence*[2]. To investigate this, we conduct experiments to determine how the framing of changes in prices in absolute versus percentage terms influences consumers' perception of price. In the current context, suppose that negative deviations of a retailer's prices are perceived as losses (price increase) and positive deviations as gains (price decrease), we analyse the impact of price framing on consumers' perceptions of changes in prices and their resultant purchase decisions. Changes in prices are described using absolute, dual and relative price frames. The results we obtain are indicative of the importance of price promotion framing in purchase decisions.

1.2 RESEARCH OBJECTIVES

Whilst our study objectives are related to that of Heath et al. (1995), they are distinctly different. The broad objective of this thesis is to empirically investigate the impact price framing and reference points have on mental accounting principles (MAP) as defined by Thaler (1985), and consumers' ensuing purchase decisions. We examine four reference points namely: retailer's past prices, competitor's current prices, competitor's past prices and consumer's expected prices. In our analysis of expected prices, we consider decision scenarios where consumers' expectations of changes in prices are explicitly stated as well as scenarios where expected changes in prices are implicit.

1.3 STRUCTURE OF RESEARCH

The rest of this research is arranged into chapters as follows. In Chapter 2 we provide a review of the four streams of literature which form our research and explain how they are linked. These are *literature on reference pricing*, *literature on mental accounting*, *literature on reference dependence*, and *literature on framing effect*. Chapter 3 presents our research methodology, the within-subjects design of experiments employed in this thesis, and the structure of questionnaires developed for all the experiments carried out. In addition, we also present the specificity of our research objectives and our research hypotheses. In Chapter 4 we consider our first reference point, retailer's past prices. Chapter 5 investigates our second and third reference points - competitor's current and

[2] Reference dependence (Kahneman and Tversky, 1979) proposes that individuals' do not make decisions from an absolute wealth perspective but in terms of gains and losses relative to a reference point which is defined over a value function.

competitor's past prices. Chapter 6 explores the effect of consumers' explicit and implicit expectations of changes in prices on price perception and consumer preferences. Finally, we round up with conclusions and limitations in Chapter 7.

CHAPTER 2
LITERATURE REVIEW

In this chapter, we present the four main concepts which are the building blocks for this thesis. These are reference prices, reference dependence, mental accounting and framing effects. A brief discussion on price promotion and popular price signal cues employed in advertising follows; thereafter, we explain the connection between the four concepts above and this present research.

2.1 BACKGROUND TO STUDY

There are four streams of literature pertinent to our research: literature on *reference price*, which identifies internal reference price and external reference price as the two main types of reference prices; literature on *mental accounting*, which suggests that consumers' tend to separate their activities, which could be financial or non-financial, into accounts that are non-transferable; literature on *reference dependence,* which states that consumer choice alternatives are evaluated in terms of gains and losses, against a common reference point, and that changes in the reference points often result in preference reversals; and literature on *framing effect,* which examines how different re-descriptions of equivalent decision scenarios could produce changes in consumer choice preferences.

This chapter is organized as follows. We begin by examining reference prices from a wider viewpoint. To start off, we explain the theories associated with reference price and the fundamental frameworks developed for reference price. This is followed by a brief discussion on the empirical research on reference prices and the effects of reference prices. We round off our presentation on reference prices with a summary of Thaler's (1985) transaction utility theory and explain how it is influenced by reference prices. Next, we consider the concept of mental accounting and Thaler's (1985) proposed principles for combining monetary outcomes. Thereafter, we highlight Kahneman and Tversky's (1979) prospect theory, value function and reference dependence. Framing effect is addressed next followed by a general discussion of research on price promotion. We conclude this literature review with an exposition on the link between our study and the four key concepts discussed.

2.2 THEORIES ON REFERENCE PRICE RESEARCH

A generally accepted conceptualization of reference prices views reference prices as the past prices of a brand (Briesch et al. 1997; Kalwani et al. 1990; Kalyanaram and Winer, 1985). This conceptualization also forms the basis for one of the theoretical frameworks on reference prices[3]. Further to this premise, Rajendran and Tellis (1994) proposed that reference prices can be temporal or contextual. Temporal reference price indicates that consumers find a way to 'assimilate or adapt' past prices of brands leading to an expectation of 'lower discounted prices' from a store that is prone to frequently discounting its prices. In contrast, contextual reference price refers to the tendency for consumers to evaluate product prices by making comparison with other products in the store.

Reference prices have been categorized into two main types namely, internal and external reference prices. *Internal reference prices* (hereafter, IRPs) are those standards of comparison stored within a consumer's memory and are derived from a consumer's past purchase experiences (Biswas and Blair, 1991; Monroe, 1984; Urbany, Bearden and Weilbaker, 1988). *External reference prices* (hereafter, ERPs) on the other hand are other prices in the store which are in the same product category at the particular time of purchase (Mayhew and Winer, 1992; Rajendran and Tellis, 1994).

Research on ERPs has been focused within a retail advertising context. Studies vary from that of Blair and Landon (1981), Liefeld and Heslop (1985), Urbany, Bearden and Weilbaker (1988) which found evidence that ERP 'decreases search behaviour, increases estimates of retailers' regular prices and increases the perceived values of the offering', to that by Inman et al. (1990), Dickson and Sawyer (1990), Grover and Srinivasan (1989), and Guadagni and Little (1983) which found that consumers reacted more strongly to the promotional signal of ERPs than to the size of the actual discount or amount saved. Overall, research on reference prices has focused more on IRPs than ERPs.

2.2.1. Theoretical frameworks on Reference Price

Four different theoretical frameworks were developed so far for the general concept of reference price: *Range Theory* by Volkmann (1951), *Adaptation Level Theory* (ALT) by

[3] This framework is known as Adaptation Level theory.

Helson (1964), *Assimilation-Contrast Theory* (ACT) by Sherif and Hovland (1964) and *Prospect Theory* by Kahneman and Tversky (1979).

Range Theory is based on sensory perception and it proposes that the range of values from which a stimulus is judged will determine the perceived value of any one stimulus in range (Janiszewski and Lichtenstein, 1999). When applied to behavioural pricing, the theory suggests that people tend to remember prices paid for products and they use the range of these remembered prices to set upper and lower boundaries based on their price expectations. The perception of a market price is therefore based on where it falls within this range. Although range theory has received very little attention in literature, there is considerable evidence (Nunnally, 1978; Sherif and Hovland, 1971) that the range of stimulus values influence price judgements and perceptions.

Adaptation Level theory suggests that a stimulus is evaluated based on past and present stimulation and all forms of new judgments are perceived relative to an adaptation level or reference point (Kalyanaram and Winer, 1995). The adaptation level for an individual will then be a 'function of the frequency of the distribution of values for a specific category', i.e. 'a function of the magnitude of the series of stimuli, the range of stimuli, and the dispersion of stimuli from the mean' (Ibid.). From a pricing context, prices are perceived as high, low or neutral based on the identified adaptation level price for that product. Monroe (1979) interpreted this theory to imply that consumers are constantly conscious of an adaptation level price for product categories against which current market prices are evaluated, and often, the reference price and sale prices are concurrently evaluated against one another. As such, an advertised reference price is evaluated by comparing it with internal standards, and its accompanying sale price.

Assimilation-Contrast theory proposes that people tend to form 'attitudinal' frames of reference. Consumers internalize a range of prices also known as latitude of acceptance, and prices assimilated into this range are considered acceptable while prices outside the latitude of acceptance stand out. Biswas (1992) further expounded that 'assimilation may result in shifts in internal reference prices toward the external reference price thereby affecting price perception.'

The fourth framework known as Prospect Theory by Kahneman and Tversky (1979) became very recently associated with reference price. Our analysis of reference prices in this current research employs this framework and will be discussed extensively later in this chapter.

2.2.2. Empirical research on Reference Price

Two dominant research questions have yet to be satisfactorily resolved in literature on reference prices.

1) How is reference price formed?

2) What are the specific price cues that affect reference prices? Are reference prices more significantly affected by consumers' memory of past prices paid (IRP) or by other prices in the same product category (ERP)? What are the ways IRP and ERP affect reference pricing decisions in general?

Although a number of researchers have looked into these questions from varying angles, most of them have focused on the latter question. For example, Hirschman (1979) was of the opinion that the omission of mode of payment from research on reference prices was a possible variable of influence and its omission would give the wrong indication that there were no significant differences between modes of payment and reference prices and where any differences were evident, these were so negligible as to not influence consumer purchasing behaviour. Heath et al. (1995) showed through their study that reference prices tend to be modified by the manner in which the consumer incorporates a discount. The study by Mayhew and Winer (1992) suggests that comparisons between prices and coupons affected reference price decisions.

The following three points which capture the effects of reference prices on consumer choice were proposed by Kalyanaram and Winer (1995). These are known generally in marketing research as empirical generalizations on reference prices. They are:

1) That reference price has a significant effect on consumer demand based on the comparison of current reference price to the current observed price. A number of studies evaluating the various conceptualizations of reference prices back up this generalization (Kalwani et al. 1990; Kalyanaram and Little, 1989; Kalyanaram and Little, 1994; Krishnamurthi et al. 1992; Lattin and Bucklin, 1989; Mayhew and Winer, 1992; Rajendran and Tellis, 1994; Raman and Bass, 1988; Rinne, 1981; Winer, 1989).

2) That past prices is the means through which internal reference prices are channelled by consumers. For example, Kalwani et al. (1990) found that past prices were invaluable predictors of reference prices. Dickson and Sawyer (1990) however argued that consumers found it difficult to recall past prices paid in stores since most of the time multiple items are purchased. They carried out an experiment in a store which required consumers to recall the prices of items they had placed in their shopping baskets. 21% of the participants

could not recall prices in their shopping baskets while only 47% could recall the product prices. Despite theoretical studies to the contrary, significant empirical evidence shows that consumers consider past prices when reference prices are formed. For instance, Rajendran and Tellis (1994) compare contextual (current prices) and temporal (past prices) reference prices against choice models and posit that consumers' decisions and the choices they make are better explained by both types of reference prices as opposed to individually. Likewise, Briesch et al. (1997) compared choice models where reference prices are assumed to be formed by current prices and past prices alone and found the best-fitting model to be that in which reference prices were formed from previous encounters with brand prices.

3) Reactions to increases or decreases in price vary relative to the reference price. The reaction to the former by consumers is stronger than to the latter. Based on the studies carried out (Bell and Lattin, 1993; Hardie et al. 1993; Kalwani et al. 1990; Kalyanaram and Little, 1989; Kalyanaram and Little, 1994; Krishnamurthi et al. 1992; Mayhew and Winer, 1992; Putler, 1992), Kalyanaram and Winer (1995) discovered that prices above the reference price were perceived as losses while those below were perceived as gains.

In a different direction, Rajendran and Tellis (1994) focused on an aspect of the first research question which had previously not been considered in reference price research. Were there factors independent of prices that influence the formation of reference price? As an extension to Hirschman (1979), Rajendran and Tellis (1994) further investigated the impact of mode of payment on reference prices. This was based on the hypothesis that since consumers had to choose among different possible methods of payment such as cash, check, debit or credit card, then mode of payment should influence the formation of reference prices. Empirical evidence from their studies showed that the mode of payment did influence the formation of reference prices - a consumer's perception of the fair price for a product was 'significantly higher' when payment was made with a credit card than when made with cash. Rajendran and Tellis (1994) concluded that reference prices was a lot more than the relationship between prices but rather, the relationship between prices and other price-related variables.

It is important to note that although there is undeniable empirical evidence backing up the concept of reference prices, and extant literature on reference pricing has made extensive efforts to validate the idea of reference price formation, there is no clear evidence that consumers do form reference prices in purchase situations. Evidence from prior research only supports the notion that consumers behave like they form reference prices.

2.2.3. Effects of Reference Prices

Recent research shows that there has been increased interest in the effect of reference price on brand choice. Kalwani et al. (1990); Kalyanaram and Little (1994); Mayhew and Winer (1992) and Winer (1986) conducted studies along this line of research by including a positive (gain) and negative (loss) difference between the reference price and the purchase price of a brand' with the general consensus in literature suggesting that reference prices exert a huge influence on consumer brand choice.

Notwithstanding, a few discrepancies relating to how consumers evaluate reference prices have been identified in literature. These are: a) discrepancy between past prices paid, expected prices[4], fair prices and potential transaction prices observed in store, and (b) difference between posted regular prices and the potential transaction prices. Mayhew and Winer (1992) proposed from their study using scanner data that both discrepancies affected brand choice simultaneously and not as separate components which had previously been the perspective in literature.

It is therefore not surprising that the effect of reference prices on price perception has been the subject of much debate. Critics of reference pricing argue that advertised reference prices are often inflated by retailers which contribute in distorting consumers' perceptions of the savings actually being offered by the adverts as well as the general market price (Blair and Landon, 1981; Liefeld and Heslop, 1985). Berry et al. (1995) term the practice of these exaggerated reference prices "strawman pricing" and argue that they 'destroy the meaning of regular prices, reduce consumer trust and invite government intervention'. Similar criticisms following this line of argument are that discount prices make consumers sceptical of sale prices because they perceive the lower selling price as opposed to the initial price as the "true price" of the product. Discounts have also been reported to undermine consumers' perceptions of the quality of a product.

On the other hand, those in support of reference prices argue that it increases perceptions of value (Compeau and Grewal, 1998) and provides useful information. They generally agree with the critics that reference pricing involves some inevitable form of exaggerated price promotion but that consumers have learnt to evaluate reference price claims and protect themselves from deception (Blair and Landon, 1981).

[4] In chapter 6 of this thesis we investigate the discrepancy between reference prices when conceptualized as expected prices compared with past prices.

These criticisms encouraged some experts to advocate the use of alternative strategies such as everyday low price claim (e.g. retail stores like Morrison's in the United Kingdom) which are said to provide a straight forward means of conveying value to consumers and are less likely to undermine quality (Ortmeyer et al. 1991).

In the following section, we consider Thaler's (1985) *Transaction Utility Theory* (hereafter TUT). According to TUT, discounts provide acquisition utility or standard economic value because it lowers the amount consumers pay to receive the same product benefits. Discounts also provide transaction utility which is the perceived merits of a deal (Darke and Chung, 2005).

2.2.4 Reference Prices and Transaction Utility Theory

Two types of utility are associated with consumer purchase transactions (Thaler, 1985): acquisition utility and transaction utility. Acquisition utility represents the economic gain or loss derived from a purchase transaction and is equal to the difference between the utility of the purchased product and the price of that product (Lichtenstein and Bearden, 1988). Thaler (1999) defines it as the value a consumer would place on a product if it had been received as a gift, minus the price paid for it.

Transaction utility on the other hand is the difference between a product's actual price and the consumer's IRP for that product. That is, the consumer's subjective regular price for that product. Therefore, to the extent that reference prices can be affected by contextual factors such as the purchase environment, transaction utility can also be modified.

Price discounts are the primary source of TUT. Transaction utility in particular can be increased using price promotions. If the consumer's IRP is higher than the selling price of a product, then the consumer's transaction utility increases and this translates into a positive transaction utility which the consumer perceives as a gain; and where the selling price is higher than the consumer's reference price, it is perceived as a loss. The following example, adapted from Lichtenstein and Bearden (1988), shows the impact of reference price on TUT. If a consumer's internal reference price for a car is £1500, and the retail price of the car is £1700, transaction utility theory predicts that the consumer would be unlikely to buy this car. If however the retail price is reduced, the consumer will be more likely to buy the car because the total utility of the consumer will increase as a result of an increase in acquisition utility.

From a different view point, Lichtenstein and Bearden (1988, p. 190) proposed that if the consumer were to increase his internal reference price while holding the retail price constant, the retail price will appear more attractive because there will be an increase in the total utility of the consumer due to an increase in the consumer's transaction utility. Another example, adapted from (Ibid.), suggests that where a retailer advertises a product as 'was £1,999 and now only £1,299, a potential buyer who initially had an IRP of £1,200 would increase his reference price in the direction of the previous retail price of £1,999, thereby making the current price of £1,299 seem acceptable and lead to a higher willingness to pay. The same principle also applies where the consumer's IRP is higher than the retailer's current price (Ibid.).

Thaler (1985) uses the following example to illustrate negative transaction utility.

"You are lying on the beach on a hot day. All you have to drink is ice water. For the last hour you have been thinking about how much you would enjoy a nice cold bottle of your favourite brand of beer. A companion gets up to go make a phone call and offers to bring back a beer from the only nearby place where beer is sold (a fancy resort hotel) {a small run-down grocery store}. He says that the beer might be expensive and so asks how much you are willing to pay for the beer. He says that he will buy the beer if it costs as much or as less as the price that you state. But if it costs more than the price that you state he will not buy it. You trust your friend, and there is no possibility of bargaining with the (bartender) {store owner}. What price do you tell him?"

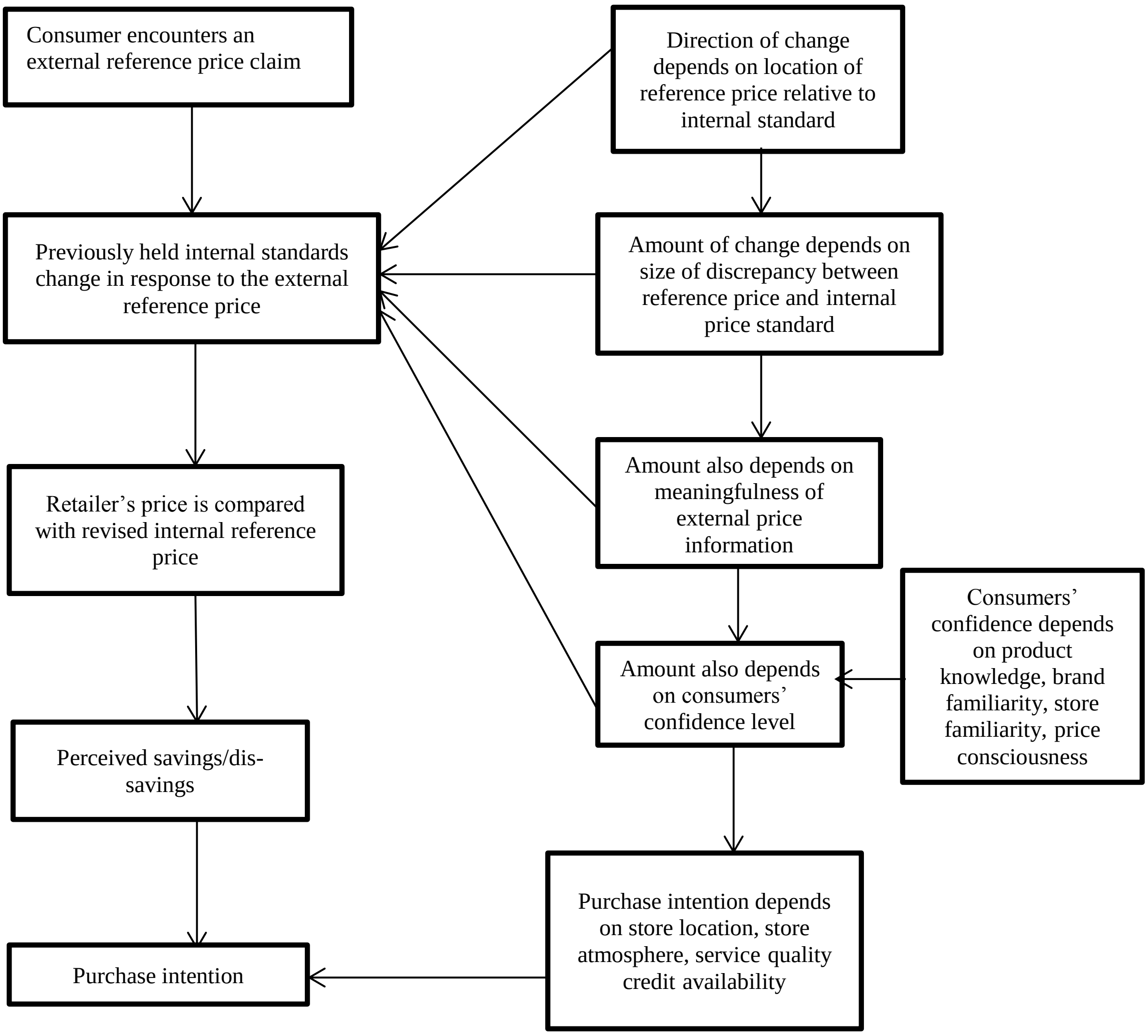
Thaler tested two versions of the scenario above. In one scenario, the beer is available for purchase from a resort hotel while in the other, the beer is sold by a grocery store (see phrases in parentheses and brackets). The median results obtained ($2.65 for resort and $1.50 for the grocery store) show that consumers had a higher reference price for the beer from the resort compared with the beer from the grocery store. Transaction utility comes into play here because the consumer who is willing to pay a higher price for a resort beer, will derive negative transaction utility from the same brand of beer if the retail price at the grocery store was higher than the consumer's reference price for it.

A number of studies have examined the effect of price discounts based on Thaler's (1985) TUT. For example, in the studies by Lichtenstein and Bearden (1989), and Urbany et al. (1988), the discount frame is manipulated using either the initial retail price or a suggested retail price. The current price is however held constant (e.g. retail price $29.99 versus 'was

$39.99'). Darke and Chung (2005) describe this pricing manipulation as one in which acquisition utility is kept constant while the transaction utility is varied.

The figure below adapted from Biswas and Blair (1991) shows the perceptual process of the effects of reference prices. It captures a typical consumer's mental evaluation of a price signal from the moment s/he enters the store to the final decision to make the purchase or for-go. We make assumptions regarding some of these processes in the course of this research and these will be expanded as we progress.

Figure 2.1
Perceptual processes of reference price effects



Source: Adapted from Biswas and Blair (1991)

2.3 PROSPECT THEORY AND THE VALUE FUNCTION

Prospect theory was proposed by Kahneman and Tversky (1979) as an alternative to the descriptive model of expected utility theory by von Neumann and Morgenstern (1944) due to its shortcomings in adequately predicting decision making under risky conditions. Values are assigned to gains and losses and not final wealth unlike expected utility theory.

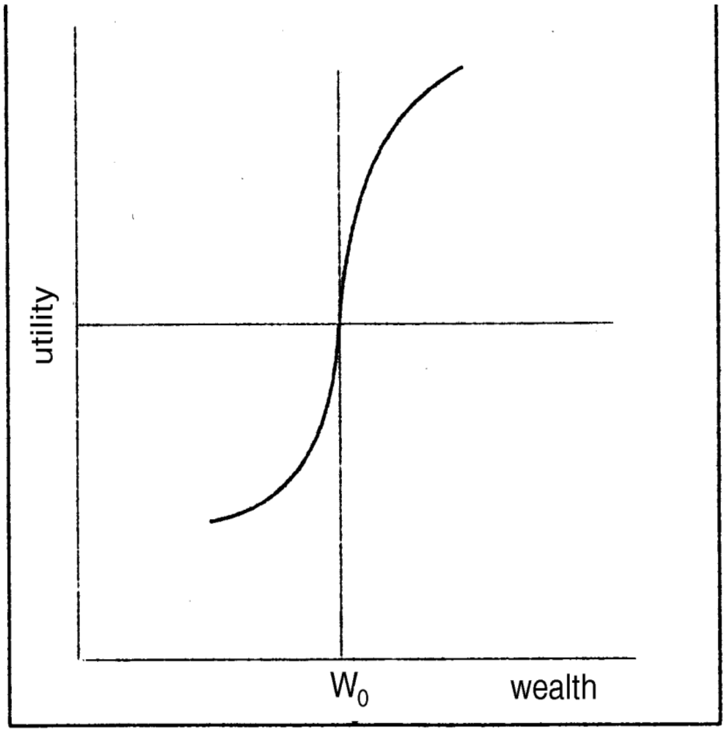
The value function (v*) (depicted in figure 2.2) defines value in terms of gains and losses in relation to a reference point (starting point) with a zero value (Tversky and Kahneman, 1981), and is defined over uni-dimensional and uniattribute outcomes. As a descriptive framework, prospect theory emphasises comparison between value and perceived changes in value. Three features are associated with the value function:

1) The value function is defined in terms of gains and losses relative to a reference point. For example, someone who earns a current salary of £100,000 but whose salary next year will be £90,000 will view the salary difference of £10,000 as a loss i.e. a negative outcome relative to a status quo (reference point) and not as a salary of £90,000 i.e. a positive outcome in absolute terms. This shows that individuals are more sensitive to perceived changes in reference point than absolute levels. This characteristic of the value function is known as **reference dependence** and is a focal point of our study.

2) It is S-shaped with the concave area defined for gains and the convex for losses and gets progressively flatter the higher the amount of gains gets and progressively flatter as losses increase. The nearer gains or losses are to the status quo, the more sensitive people are and the farther equal gains and losses are from the status quo, the less sensitive people are. For example, the difference between a gain of £0 and £100 is more significant than the difference between a gain of £500 and £600. This characteristic is termed as diminishing sensitivity.

3) It is steeper for losses than gains and this is because a loss is assumed to have higher impact than a gain of the same magnitude. For example, the loss of £100 is more hurtful in comparison to the pleasure derived from a gain of £100. This is also known in literature as loss aversion.

Figure 2.2
A Hypothetical value function



Source: Levy, M and Levy, H (2002, p. 1336)

2.3.1 Stages in the decision making process

Based on prospect theory, two phases are identified in decision making (Kahneman and Tversky, 1979; Tversky and Kahneman, 1981). Kahneman and Tversky (1979) proposed the term 'decision frame' to describe a decision maker's construction of problems involving choice. Each decision problem comprises the acts, outcomes and contingencies leading to a definite choice. They further suggested that the decision frame depends partially on how the problem is presented, and partially on the 'norms, habits and personal characteristics of the decision maker'.

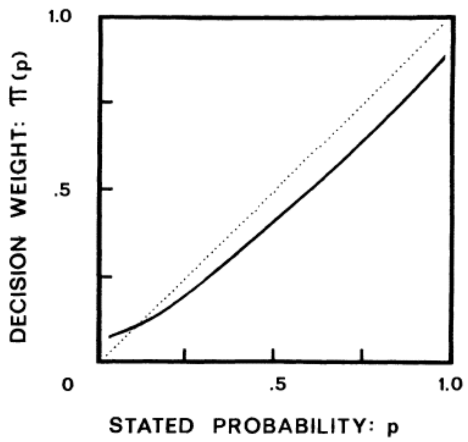
The first phase is the framing or editing phase. In this phase, the acts, outcomes and contingencies relating to a decision problem are re-described or reframed into a simpler format (Rowe and Puto, 1987). The framing of problems in form of acts implies alternatives from which a choice is made; outcomes are choices described as positive or negative deviations from a neutral reference point or status quo. The framing of outcomes usually follows after problems have been framed into acts. Contingency framing links the implications of outcome framing to act framing. In other words, contingency framing is dependent on both acts and outcome framing.

Reference dependence is the central feature of the editing phase. Decision makers make comparisons between simplified problems or the outcomes they face with deviations of these outcomes from a given reference point. This reference point is sometimes known only to the decision maker. The coding of the outcome as a gain or loss therefore depends on how it compares with the status quo (Kahneman and Tversky, 1979). For the purpose of this study, our analysis of decision making in a price related context deals with the framing of outcomes.

The evaluation phase is the second stage in decision making and it is made up of two stages. In the first stage, the decision maker evaluates the problem using the value function (Kahneman and Tversky, 1979). Here, the decision maker assigns values to the reframed problems or outcomes based on the difference between the reference point and the size of the positive or negative deviations from it, and makes a choice based on which has the largest value. The S-shape of the value function then implies that after the second phase has been completed and a value has been assigned, the decision maker is more inclined to be risk averse for outcomes coded as gains and risk seeking for outcomes coded as losses i.e. decision makers would prefer to go out of their way to avoid a predictable loss by taking greater risks, than go out of their way to achieve a predictable gain.

In the second stage of the evaluation phase, decision weights are applied to assess the consequence of events on the value previously assigned to each outcome using a weighting function (figure 2.3 illustrates this). Kahneman and Tversky (1979) emphasize the fact that these decision weights are not probabilities which strictly add up to one but are derived from choices individuals make between outcomes. Prospect theory further predicts that decision makers tend to irrationally overweight outcomes with low probabilities and underweight certain outcomes. For example, an individual whose probability of having a terminal illness in his lifetime moves from 0% to a 1% likelihood of this outcome occurring would assign a higher weight to this outcome than if his probability of having a terminal illness increased from 50% to 51%.

Figure 2.3
A hypothetical weighting function



Source: Kahneman and Tversky (1979, p. 283)

2.3.2 Reference Dependence

Earlier, we explained the two phases of decision making under prospect theory. For the purpose of this research, we focus on the first phase which involves the framing of decision outcomes and implies the dependence of a decision maker's perceptions of value on deviations from his status quo. This is known as reference dependence. Based on this definition, reference dependence is necessitated by the inclusion or suggestion of a reference or starting point within a decision problem.

Kahneman and Tversky's (1979) paper, in which they developed prospect theory as an alternative model for decision making under risk, employed decision problems with explicit and definitive reference points. Where a reference point is unknown or open to interpretation, framing effects are evident in the choices made by the decision maker. Furthermore, extant literature on framing effects provides significant empirical evidence of the importance of reference points in the evaluation of consumer choice (Hack and Lammers, 2011).

In their analysis of decision making in the absence of risk, Tversky and Kahneman (1991) make the assumption that a decision maker's reference point was synonymous with his reference state which is normally consistent with his 'current position and affected by aspirations, expectations, norms and social comparisons'.

Literature on reference points encompasses interest areas such as factors that constitute a reference point; how individuals adapt their reference points dynamically and the conditions that influence this adaptation; shifts in the location of reference points (Bolton and Ockenfels, 2000; Heath et. al. 1995; Hoeffler et. al. 2006; Koszegi and Rabin, 2007; Puto, 1987), to mention a few. However, there is limited research available on how reference points are formed.

2.4 MENTAL ACCOUNTING AND CONSUMER DECISION MAKING

The concept of mental accounting (Thaler, 1985) has to do predominantly with framing. Decision makers mentally 'frame' their money, resources, problems, transactions, to mention a few, such as to derive what they perceive as maximum level of satisfaction or utility, or the minimization of loss. Research shows that decision makers tend to mentally segregate or compartmentalize items, resources, or money based on pre-defined categories such as the use of such items or its purpose. For example, money could be spread across several types of mental accounts such that money in one account cannot be substituted for that in the other. A decision maker could have numerous mental accounts for the uses of money such as groceries, entertainment, or transportation. Based on these compartmentalizing, a consumer may spend £30 on tickets to a concert when the money is taken out of the groceries account and not the entertainment account. Mental accounting violates the normative economic principle of fungibility which implies ease of transferability or substitutability of one thing for another.

Thaler (1985) applied Kahneman and Tversky's (1979) value function to mental accounting to describe how decision makers code or perceive outcomes involving gains and losses in decision making. Thaler's MAPs were made possible by introducing price as an attribute into the value function. Where price becomes the reference point, it serves the same function as reference price. As it applies to consumer choice, decision problems are perceived in terms of monetary gains and losses relative to a reference point. He described decision makers as pleasure seekers who tend to look for the best ways to combine their activities to generate the most happiness. Working with joint outcomes, x and y, he came up with four principles with which a decision maker with a value function would code or frame combinations of x and y to get maximum utility/value. These have come to be known generally in literature as mental accounting principles (MAPs).

2.5 THE FRAMING OF OUTCOMES

Outcomes are the end result of any action. Thaler (1985) applied the concept of mental accounting to consumer choice to investigate how decision makers code their monetary gains and losses. He applied the value function to joint or combined outcomes and by extending the reference point characteristic of the value function to include price, he proposed four ways decision makers prefer to frame combinations of outcomes. These are known as mental accounting principles (hereafter, MAPs).

According to Thaler (1985) a decision maker faced with two joint outcomes ‘x’ and ‘y’ would choose combinations of x and y that provides the highest level of utility. Such an individual then has to choose between a joint evaluation of x and y given as v (x + y) and a separate evaluation given as v (x) + v (y). In the first alternative where the outcomes are jointly evaluated, such an individual is said to have integrated outcomes and in the second option, the outcomes are said to be segregated.

Given the preceding, Thaler’s (Ibid.) are derived as follows:

a) A multiple monetary gain is where x>0 and y>0. These would be combined such that v (x) + v (y) > v (x + y). Faced with such an outcome, an individual will prefer to segregate multiple gains.
b) A multiple monetary loss involves 2 outcomes –x and –y, where – x>0 and – y>0 (-x and –y both remain positive)[5], and would be combined as v (-x) + v (-y) < v {- (x + y)}. Here, integration of losses will be preferred since the utility derived is greater.
c) A mixed gain given as x and –y such that x > y. This would be coded as a net gain and combined such that v (x) + v (-y) < v (x - y) and integration is the preferred choice.
d) A mixed loss given as x and –y with x < y. This is coded as a net loss. Where the loss is larger than the gain, the outcomes will be combined such that v (x) > v (x – y) – v (–y) and the choice will be to segregate. Thaler (1985) termed this ‘the silver lining principle’. However, where the loss is small relative to the gain (e.g. £30, –£40), then the decision maker would prefer integration because gaining £30 will be valued less than having the loss reduced from £40 to £10 since the loss is almost cancelled out by the gain.

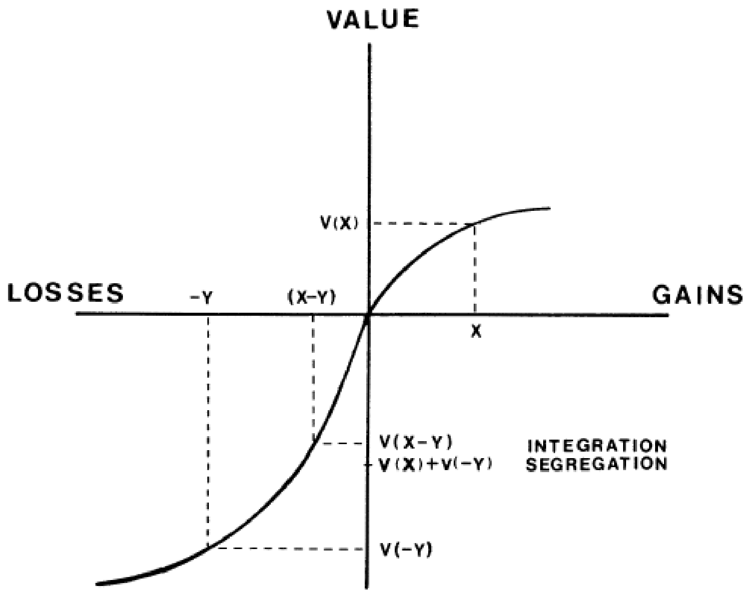
[5] This description of monetary loss is not considered in terms of negative prices. Rather, in terms of negative monetary deviations from a specific reference point. For example, a 5% decrease in one’s annual income following a bad economy will be considered as a loss in comparison with the previous income.

Figures 2.4a and 2.4b further illustrate the preferences to integrate or segregate mixed losses. Figure 2.4a shows the preference for integration when the loss is small relative to the gain. However, where the loss is larger than the gain, segregation will be preferred as shown in figure 2.4b.

In summary, Thaler's (Ibid.) mental accounting principles (MAPs) are:

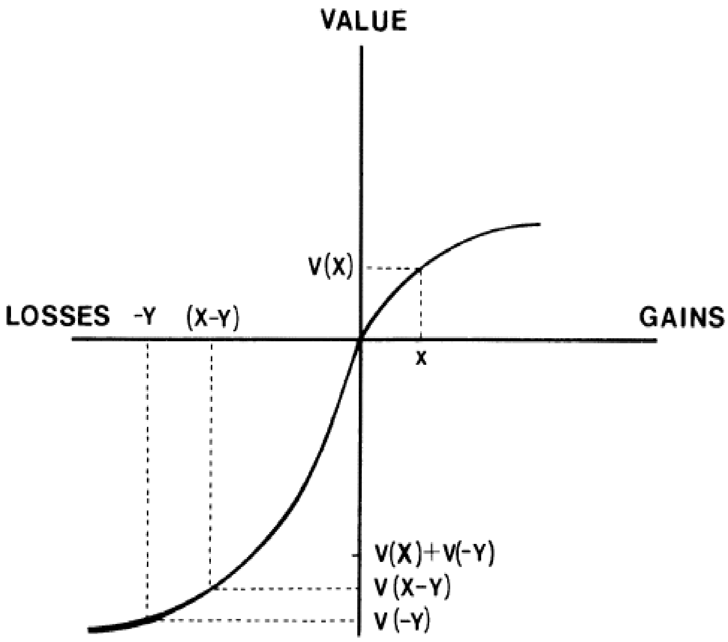
a) Multiple Gains (2 gains of same or different magnitudes) should be segregated.
b) Multiple Losses (2 losses of same or different magnitudes) should be integrated.
c) Mixed Gains (a large gain + a small loss) should be integrated.
d) Mixed Losses (a large loss + a small gain) should be segregated.

Figure 2.4a
The value function indicating preference for integration of mixed losses.



Source: Thaler (1985, p. 203)

Figure 2.4b
The value function indicating preference for segregation of mixed losses (silver lining)



Source: Thaler (1985, p. 203)

To summarize our presentation so far, we have looked at reference prices, prospect theory's value function, reference dependence, and mental accounting principles. There have been numerous studies on consumers' perceptions of gains and losses in decision scenarios involving risk using Kahneman and Tversky's (1979) prospect theory as a foundation. This is due mainly to the close link between prospect theory and decision frames. Building on prospect theory and the associated literature presented in this current chapter, the goal of this thesis is to present an empirical analysis of the way consumers evaluate reference prices in relation to their purchase decisions in the absence of risk. More specifically, we examine the impact of both internal and external reference prices on decision makers' perception of monetary gains and losses in riskless choice. Internal and external reference prices serve as our reference points.

In the next section we look at the last stream of literature – framing effect, and examine how it relates to prospect theory.

2.6 FRAMING EFFECT

The term *'Framing Effect'* or equivalency (see Tversky and Kahneman, 1986) is attributed to Tversky and Kahneman (1981). It refers to the general tendency for decision makers to change their choice preferences based on the description of decision scenarios. There has been considerable research interest in understanding framing effects because it indicates that slight differences in the way decisions, events or outcomes are presented could affect the final choices that decision makers take. Kahneman and Tversky (1984) suggest that framing effect is evidence of irrationality in individuals' decision making because it violates the normative *principle of invariance* which states that one's decision should be independent of the particular way a problem or situation is described.

In literature, framing effect has been portrayed in two ways. The first deals with the same re-descriptions of pairs of problems and the second to different descriptions of pairs of problems that are economically equivalent. The following example from Tversky and Kahneman (1981) is regarded as a classic in studies on framing effect and it illustrates the second way framing effect has been presented in literature.

Problem 1: You pay $10 for a ticket to see a play. When you get to the theatre, you discover that you have lost your ticket. The seat was not marked and the ticket cannot be recovered. Would you buy a new ticket?

Problem 2: You go to see a play that costs $10 per ticket. When you get to the theatre, you discover that you have lost a $10 bill. Would you buy a ticket?

When presented to subjects, a higher percentage indicated their willingness to buy tickets in problem 2 rather than problem 1. Although both problems are not exact re-descriptions of the same problem, an equivalent monetary value ($10) is involved in both scenarios. We see framing effect reflected in the choices of respondents due to their dissociation of the lost $10 from the lost ticket. There has been no wide criticism of this principle in literature (Frisch, 1993). Rather, there has been an increased need for understanding the underlying processes of consumer decision making because according to Tversky, Sattath and Slovic (1988), 'if different elicitation procedures produce different orderings of options,' individual preferences of decision makers would be lacking in precision.

2.6.1 Framing effect versus reflection effect

It is important to note the distinction between framing effect and reflection effect. Framing effect refers to the tendency for decision makers to reverse their preferences as a result of the re-editing of the decision problem. Outcomes in framing conditions are either positive (gains) or negative (losses) and more importantly, the final outcomes presented in the decision frames are exactly the same. Also, in framing effect, a loss condition (or gain) could be framed to seem like a gain (or loss) but the reframing of the condition does not change it from being a loss (or gain) {Fagley, 1993}. Otherwise stated, the loss (gain) outcome remains the same. The decision problem is only phrased so as to give the impression that the other domain 'gain (loss)' is involved. An example of this can be seen in the theatre ticket illustration from Tversky and Kahneman (1981) presented above in which the lost ticket costs $10 and a $10 bill was also misplaced.

In reflection effect (Tversky and Kahneman, 1981), the preferences of decision makers are also reversed but as a result of differences in the outcomes of the decision problem. In other words, the outcomes are framed to actually involve the other domain (gains versus losses and vice versa) but having the same relative size (Fagley, 1993). To illustrate, imagine decision problems in which a decision maker is faced with a gamble of a certain gain of $40 over a two-third chance of gaining $60 and a certain loss of $40 over a two-third chance of losing $60. Here, we see the decision problem framed in terms of gains versus losses and a difference in the signs of the outcomes (+$40 versus -$40). In studies evaluating examples similar to the one just given, majority of the subjects preferred a two-third chance of losing $60 over a certain loss of $40. In the gains domains, subjects also preferred a certain gain of $40 over a two-third chance of gaining $60. Reflection effect, like framing effect is explained using prospect theory's value function. From the example of reflection effect above, the subjects indicate preferences showing risk seeking for losses and risk aversion for gains. They would rather choose a two-thirds chance of losing nothing as opposed to a certain loss of money.

To recap, framing effect (Tversky and Kahneman, 1981) presents a decision problem involving a loss (or a gain) as though it were a gain (or a loss), and which in essence describes reference dependence. Reflection effect (Tversky and Kahneman, 1981) on the other hand, includes both the gain and loss outcomes within the decision frame. As an extension to Thaler's transaction utility theory (see page 13), the framing of a possible purchase in terms of gains or losses and which conveys utility when perceived as a gain and disutility when seen as a loss is framing effect.

2.6.2 Types of framing effects

The existence of framing effects has been documented in literature on medical and clinical decisions, perceptual judgements, and bargaining behaviours, to mention a few. Despite this breadth of application, the search for a deeper understanding of the processes that underlie framing effects has been limited (Levin et al. 1998).

Different types of framing effects have been considered from the broad umbrella known as *Valence Framing*. Valence framing refers to the use of a descriptive frame in casting the same critical information in either a positive or negative light. It is often treated as a relatively homogenous set of processes which are usually explained using Kahneman and Tversky's (1979) prospect theory.

Studies on framing effects have used different underlying mechanisms related to valence framing with three being most predominant in literature: risky choice framing, attribute framing and goal framing. *Risky choice framing* introduced by Tversky and Kahneman (1981) is the most closely associated form of framing effect. Research that has ensued over the years on risky choice framing have been modelled following the original example of the *Asian disease problem* by Tversky and Kahneman (1981) in which respondents were told to choose between options framed in terms of lives saved (gains) or lives lost (losses) with both options having a risky and riskless component. The risk level to the options was defined in terms of probability of success or failure of proceeding with that choice while the riskless option was a definite guarantee of success or failure. The *Asian disease problem* by Tversky and Kahneman (1981) is illustrated below. The numbers in parenthesis indicate the number of subjects who chose that option.

Problem 1(N = 152) {Gains Frame}

Imagine that the U.S. is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimates of the consequences of the programs are as follows:

If Program A is adopted, 200 people will be saved. (72 percent)

If Program B is adopted, there is 1/3 probability that 600 people will be saved, and 2/3 probability that no people will be saved. (28 percent)

Which of the two programs would you favour?

Problem 2 (N = 155) {Loss Frame}

Imagine that the U.S. is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimates of the consequences of the programs are as follows:

If Program C is adopted 400 people will die. (22 percent)
If Program D is adopted there is 1/3 probability that nobody will die, and 2/3 probability that 600 people will die. (78 percent)
Which of the two programs would you favour?

Tversky and Kahneman found a reversal in the choices of respondents between the two problem frames. Where the choices were framed as gains, majority choice showed a risk aversion because saving 200 lives was more favourable than the risky option of equal expected value (a 1/3 chance of saving 600 lives). In the loss frame however, the majority of respondents were risk taking. 400 people dying was not acceptable compared with a 2/3 probability that everyone will die. They concluded that decision makers tend to be risk averse in gains and risk taking in losses. This finding, though consistent with the second phase (evaluation) of decision making as proposed by prospect theory's value function (Kahneman and Tversky, 1979), shows inconsistency in the choices of decision makers between the 2 equivalent problems when defined over gains and losses.

The second category of studies under valence framing is attribute framing. Under *attribute framing*, a characteristic of an object or event serves as the focus of the framing manipulation and is presented either positively or negatively. The final classification of valence framing, *goal framing*, involves the framing of the goal behind an action or behaviour either in terms of the advantages or disadvantages of participation in the action or behaviour under evaluation. These three categories of valence framing have been differentiated in framing manipulation studies based on methodology as follows a) what is framed b) what is affected by the defined frame and c) how framing effects are measured.

The table below from Levin et al. (1998) summarizes the classification of valence framing based on research methodology in literature.

Table 2.1

Summary of methodology on valence framing

Frame type	What is framed	What is affected	Measurement of effect
Risky choice	Set of options with different levels of risk	Risk preference of decision makers	Comparing choices for the risky options
Attribute	Attributes or characteristics of an event or object	Evaluation of items	Comparing the ratings of item attractiveness
Goal	Consequence or goal of a behaviour	Impact of persuasion	Comparing adoption rate of the behaviour

2.6.3 Preference reversals in decision making

Empirical research on framing effect has shown that the evidence of framing effects in decision making often leads to reversals of preferences or choices which is as a result of shifts or changes in reference points. Preference reversals lead to changes in perceptions of value (Chen et. al. 1998) and consequently, somewhat irrational preferences.

Preference reversals in decision making have generated a considerable number of empirical interests with studies focusing on framing decision problems in terms of gains and losses or in a positive or negative light (e.g., McNeil et al. 1982; Neale and Bazerman 1985; Schelling, 1981; Thaler, 1980; Toland and O'Neill 1983; Tversky and Kahneman, 1981, 1987).

There have also been considerable criticisms of framing effect studies. The predominant one is the claim that in the studies carried out, the decision frames are enforced on the subjects (Elliott and Archibald, 1989). They opined that in evaluating decision problems in the real world, decision makers formulate or choose the alternative frames on their own because the relevant alternatives available are often unknown to them. Elliott and Archibald (1989) further argue that not only does allowing decision makers the independence to choose on their own encourage independent problem resolution as well as foster imaginative decision making, but also, their eventual choices may differ from similar experimental conditions in which the decision frames are imposed on them. We are however of the opinion that the rationale for the above criticism defines framing effect. This is because the deliberate manipulation of re-descriptions of the same decision frames elicits preferences that are different from those in which the alternative decision frames are realistically and cognitively generated. Given that there are countless possible alternative decision frames available to the decision maker, then it is difficult to predict how any individual will frame any given decision or choice. Consequently, the final choice of the decision maker will be context dependent.

Since their 1981 classic example describing framing effect, there have been a number of studies on risky choice framing designed to evaluate the choice reversal in Tversky and Kahneman's Asian disease problem. The typical framing manipulation follows the use of hypothetical decision scenarios describing two problems as either riskless (a sure gain/loss) and the other as a risky choice based on specified chances of occurrence (probability). The methodology employed in some of these studies on framing has been a comparison of the proportions of choice (mode) across the frames utilized. Other studies conducting experiments within a pricing context have looked at means and still others have proffered new descriptive models to explain the impact of reference prices on price perceptions.

It has been argued that Tversky and Kahneman's (1981) Asian disease problem from which framing effect was first proposed, and Thaler's (1985) experiments from which mental accounting principles were formulated, were only partially presented and tended to be ambiguous. Researchers investigating framing effect are of the opinion that where decision problems are more clearly defined and unequivocally presented, the framing effect reported and Thaler's (Ibid.) proposed MAPs could possibly change or be reversed (Kuhberger, 1995) and suggested that prospect theory was lacking as a descriptive theory of cognitive decision making. In particular, Heath et al. (1995) were of the view that reference states were omitted from the experiments from which Thaler's (1985) MAPs were formulated with the term reference states synonymous with the previously explained term reference points.

2.7 CONTEXTUAL BACKGROUND ON PRICE PROMOTION

There has been considerable research interest directed at how product prices influence consumer price judgements and choice decisions. Most of such studies have focused more on how consumers evaluate the price of a single product, while a few (Mazumdar and Jun, 1993) have evaluated prices of multiple products in some decision scenarios. In general, price has been found to be one of many factors responsible for purchase decision as consumers choose to buy products based on other standards such as brand, colour, packaging, size etc. the organization of which is determined by each individual's perceptual processes (Gupta and Cooper, 1992; Monroe, 1973).

Along this line of research, some studies have shown that purchase decisions made in the store were often based on the prices of other products in consumers' "mental shopping baskets" and not just on the price of a single product (Gupta and Cooper, 1992). Other papers claim that since consumers tend not to evaluate the product prices individually, a particular store may be visited frequently from a consumers' perception of total savings from that store as opposed to individual savings. Mulhern and Leone (1991) term this as 'viewing a retailer as a bundle of products'.

Other research also suggests price certainty or uncertainty as a significant factor affecting consumers' perception of what acceptable prices of products under consideration should be. Where price uncertainty tends to raise consumers reference prices by increasing the upper limit of the acceptable range of prices, price certainty has the opposite effect (Mazumdar and Jun, 1993). They asserted that price uncertain consumers were likely to view a price increase in an unfamiliar product as a small loss and any corresponding reduction in the value of the product from its price increase would be viewed as small. This is however not the case for price certain consumers. Their results showed that price uncertainty will have a higher impact on multiple price changes on a specific product than a single price change of the same equivalent amount would. The rationale for this being that price influences purchase decisions because it indicates the cost of purchase and when used as a criterion for assessing quality or value, price may serve either to make the product more or less attractive (Monroe, 1973).

Two problems confront the retailer in the process of price promotion. The first problem is by how much to decrease prices i.e. the size of the discount. The second difficulty the retailer faces is how to communicate that there has been a decrease in prices. Olson (1973) (quoted in Bitta et al. 1981) suggested two signal cues utilized in advertisements. Cues are those stimuli within the consumer's purchase environment and which the consumer is conscious of. These signal cues are: price cues and semantic cues. The use of reference prices versus discounted prices comes under price cues while semantic cues are the ways the price discounts are communicated to the consumer for example, 5% off, £15 off, now half price, was £35.99, now £30.99.

The retailer may communicate the value of the price discount being offered in form of the relative savings to the consumer (usually through percentage frames) or the absolute savings (currency denominated) (Berkowitz and Walton, 1980). Studies have shown that decision makers make product quality judgements from product prices (Monroe, 1979). Therefore, if a price discount is too big, consumers may become sceptical about the quality of the product; on the other hand, if the discount is too low, consumers see very little difference between the discounted prices and the ERP. In that instance purchase decision may be affected by other factors such as product design, size, colour, purpose, brand familiarity and brand loyalty.

A few other studies consider consumers' perceptions of price and price discount to be significantly affected by brand name. Dickson and Sawyer (1984) were however of a different opinion. They suggested that a well-established product brand name is generally perceived to be a high quality by consumers and this perception will not be affected by the size of a price discount. They were of the opinion that such individuals will be more open to accepting regular price claims of a name brand as well as any discount on it as opposed to that for a store brand. The reason according to them being that store brands are generally evaluated differently and when a store brand is discounted, its perceived price as well as perceived quality goes down in a consumer's evaluation.

From an alternate howbeit parallel view point, Jacoby and Olson (1977) opined that price has both objective external properties and subjective internal representations both of which are derived from price perception and which has various meanings to consumers. Based on this, a £35 calculator might be coded cognitively as expensive by some consumers and relatively inexpensive by others. Similarly, Chen et al. (1998) found from studies conducted that consumers' perceptions of price differed between high priced and low priced products. A price reduction in absolute terms for high priced products was perceived as more significant than when framed in relative or percentage terms. For example, a price discount captured as £50 off as opposed to 25% off. The reverse was also found to be true for the lower priced products as price reduction in percentage terms seemed more significant. Their results provided evidence that store advertisements and price promotions were deliberately designed to affect individuals' perceptions of price. For example, a local appliance store would advertise price reduction on a refrigerator in absolute terms and in percentage terms for a radio.

2.8 RESEARCH ON PRICE PERCEPTION AND MENTAL ACCOUNTING

Earlier in chapter one, we presented a brief summary of the three studies relevant to our current research (Chatterjee, Heath, Milberg and France, 2000; Heath, Chatterjee and France, 1995; and Mazumdar and Jun, 1993). In this section we discuss these studies in greater detail with a view to emphasizing the main contributions of our present research.

The study by Mazumdar and Jun (1993) was the first of the three papers and it utilized a product bundle versus single purchase type scenario. They investigated the differences in consumer evaluations of single price gain and loss against multiple price gains and multiple losses. They also investigated the impact of the relative magnitude of product prices on consumer evaluations of changes in prices. They found evidence supporting the robustness of MAP in their study.

The second study is by Heath, Chatterjee and France (1995). They examined mixed losses, mixed gains, multiple gains and multiple losses in past price decision scenarios. Their use of percentage frames was designed to capture the frame-dependent tendencies of MAPs. They found evidence supporting the robustness of MAPs in the absolute frames of mixed gains and mixed losses. In the percentage frames of the same outcomes however, they found that MAPs were reversed. Where MAPs predicted integration of mixed gains and segregation of mixed losses, subjects in their study preferred segregating mixed gains and integrating mixed losses. In the multiple gains and multiple losses scenarios they tested, they found that percentage frames increased the tendency to segregate multiple gains and integrate multiple losses as predicted by MAPs. These suggested that MAPs were reinforced in the percentage frames of the multiple gains outcomes. Overall, they found that the use of price frames where prices were stated in non-absolute terms either reversed MAPs or reinforced them.

The last study is by Chatterjee, Heath, Milberg and France (2000). They investigated the impact of decision makers' varying need for cognition on the principle of desired wealth in mixed gains and mixed losses pricing scenarios. They found that while MAPs tend to hold generally, MAPs also tend to be reversed across situational and individual contexts. For example, they found that in individuals who apply low cognitive efforts to decision making, MAPs was reversed in the percentage frames. This suggests that MAPs were affected by the contexts surrounding a decision frame.

Based on these results, Heath et al. (1995) and Chatterjee et al. (2000) both suggested that there might be need to re-evaluate the sensitivity of the value function to the way in which deviations from reference points are framed.

Consequently, further research is necessary to understand the impact of frame manipulation on MAPs. As our main contributions to these papers therefore, first we investigate the robustness of MAPs based primarily on the results of Heath et al. (1995). Then, we examine 2 additional contextual variables within a price-related environment.

The impact of external reference price discrepancy on price perception and MAPs, which we review in chapter 5, and in chapter 6, we analyse the discrepancy in IRPs based on conceptualisation and evaluate how frame manipulation affects consumer perception based on these conceptualisations. Thus, this thesis extends the previous studies and addresses a gap in past research.

2.9 LINK BETWEEN EMPIRICAL LITERATURE AND OUR STUDY

In this chapter we have discussed the four streams of literature relevant to this research. To recap, we will re-emphasize the following important points from our presentation so far.

1) Prospect theory suggests that decision makers are risk averse in monetary outcomes involving gains and risk seeking in those involving losses (Kahneman and Tversky, 1979). A characteristic of the value function known as *reference dependence*.
2) In formulating the MAPs, Thaler (1985) extended his analysis of *mental accounting* to incorporate compound outcomes measured in the unit of their prices. As a consequence, he introduced *reference price* as an attribute in the value function and from that evaluation, proposed the transaction utility theory (TUT). This implies that reference dependence underlies mental accounting and TUT.
3) Built into reference dependence is the underlying principle that changes in reference points leads to preference reversals. Furthermore, a shift in the reference state/point of a decision frame can reverse a decision maker's preference in favour of gains over losses and vice versa.
4) The use of reference points permits *framing effect* to affect choices. Hence, the framing of a problem usually involves the suggestion of a particular reference point.

Our focus in this present analysis is to investigate the applicability of prospect theory's reference point analysis to consumers' purchase decisions within a retail advertising context by looking directly at reference dependence. We evaluate reference prices along the same dimensions as Thaler (1985) and apply the concept of reference dependence to joint outcomes. In addition, we investigate the impact of price frames on consumers' perceptions of price and determine whether framing effects are elicited in terms of reversals of Thaler's (1985) mental accounting principles, and how these would affect consumers' purchase intentions. Otherwise stated, we evaluate to what extent consumer preferences in price related scenarios are reversed when faced with mixed gains, mixed losses, multiple gains and multiple losses decision scenarios.

Our analysis of framing effect is from a riskless choice perspective as opposed to the risky choice view which permeates the literature on framing effect. Two reasons are identified for our riskless choice analysis: 1) we agree with Levin et al. (1988) that the inclusion of risk to a decision frame increases the difficulty and complexity of evaluating the actual effect that frame itself (alone) has on choice, and 2) our research objective of contribution to the literature on framing effect. This is due mainly to the observation that in so far as there have been many studies on framing effect in riskless choice, we also noted that they have not been as extensive as those evaluating framing effect in risky choice.

Internal and external reference prices, which we previously discussed, serve as reference points and are framed as: consumers' recall of retailers' past prices, and also as increases and decreases in competitors' product prices. Price increases indicate losses while price decreases indicate gains and these are captured using three price frames. These changes in prices are conveyed in our experiments through the use of ‘percentage-off’ price frames across all decision outcomes. A review of literature shows that this manner of framing price discounts is commonly used in research (Chen, Monroe, and Lou, 1998; Heath, Chatterjee, and France, 1995). We expected that percentage frames will affect MAPs by either reversing preferences or increasing the tendency to choose a preference. We term the latter preference reinforcement.

Accordingly, the objective of this study is to investigate the frame dependence of reference dependence, mental accounting principles and price perception in the domains of mixed gains and losses, and multiple gains and losses.

In the next chapter we present our specific research objectives and discuss our methodology.

CHAPTER 3
METHODOLOGY

In this chapter we discuss our research methodology. We begin with a more detailed look into our research objectives and the corresponding hypotheses connected to each objective. Thereafter, we present the design of our experiments, data collection and analysis. Overall, our goal is to employ methodology carefully structured to facilitate comparison with previous research and evaluate the effect of varying price frame on the robustness of MAPs.

3.1 RESEARCH OBJECTIVES

The overarching objective of this research is to empirically investigate the impact of both price framing and reference points on mental accounting principles (hereafter MAPs) as defined by Thaler (1985), and evaluate consumers' ensuing purchase decisions. These are investigated within hypothetical purchase scenarios involving price changes. Price increase on a product is defined as a loss while price discount on a product is coded as a gain.

In order to investigate price framing effects we incorporated three price frames[6] into our survey questions. These were absolute, relative and dual frames where the latter two frames expressed price change in terms of percentages and with the only difference between them being the omission of the final price after the price change in the relative frame.

Three concepts are central to our analysis of the framing of price deviations from reference points. They are: reference states, reference prices (internal and external) and expected future prices[7]. It is important to note that this current chapter considers in particular, the methodology employed in two of our three core chapters, chapters 4 and 5. Chapter 4 examines internal reference prices (hereafter IRPs), and chapter 5, which is an extension of chapter 4, discusses external reference prices (hereafter ERPs). In our investigation of price expectation in chapter 6, although we utilized Thaler's (1985) concept *of reference outcomes* to model our conceptualisation of expected prices, we also adopted a slightly different approach from previous studies (Jacobson and Obermiller, 1990), which is that

[6] These three price frames are utilized only in the questionnaires for chapters 4 and 5. Consumers' expectations of future prices are examined based on either expectation of lower/higher prices. We examine these across two price frames in decision scenarios: absolute frame and relative frame.

[7] Our evaluation of price expectations is based on the claim that researchers may possibly have misrepresented one of the conceptualisations of internal reference prices, (fair prices), as expected prices to consumers (Rajendran, 2009).

we consider expected future prices as *immediate in time and place*. This topic and the methodology employed are presented more extensively in our final core chapter.

In addition, we did not conduct any test on ambiguity. However, in the pilot tests carried out, respondents were asked to indicate if they found the questions complex, easy to understand and lacking in obscurity. Responses suggested were incorporated into the questionnaires used in the main experiments.

Specifically, our set research objectives are:

1) To identify the impact of percentage price frames on MAPs.
2) To show that reference states and reference prices significantly affect consumers' perceptions of price and the value consumers place on price promotion.
3) To examine the effect the framing of internal reference prices (hereafter, IRPs) as expected prices would have on consumers' perceptions of gains versus losses. In addition, we identify which of our two conceptualisations of IRPs, a retailer's past prices and expected prices, had the most significant impact on price perception relative to price frame.

These key areas of interest are presented in table 3.1 below.

Table 3.1
Main areas of interest

<table>
<tr><td colspan="4">Areas of interest</td></tr>
<tr><td>Framing Effects</td><td colspan="3">Reference Points</td></tr>
<tr><td>Frames</td><td>Reference States</td><td colspan="2">Reference Prices</td></tr>
<tr><td>Absolute
Relative
Dual</td><td>A Retailer's Past Prices
A Competitor's Current Prices
A Competitor's Past Prices</td><td>External
A Competitor's Current Prices
A Competitor's Past Prices</td><td>Internal
A Retailer's Past Prices
Expectations
Non - expectations
Expectations</td></tr>
</table>

3.2 RESEARCH HYPOTHESES

This current study presents the results from four experiments designed to test the robustness of MAPs under price framing conditions. Our goal is to evaluate to what extent consumer preferences and purchase decisions are affected by the use of percentage frames. Thaler’s (1985) MAPs to segregate or integrate monetary outcomes are grounded on what combinations of monetary outcomes produces greater utility (for gains), or the most minimization of disutility (for losses). Consumers are proposed to respond to perceived changes/deviations from a reference point.

<u>Research Objective 1: The impact of percentage price frames on MAPs.</u>

The theoretical rationale behind hypotheses 1 and 2 are based on the following:

a) Extant literature suggest that in some purchase decisions, the indication that there has been a promotion (promotion signal) and not the actual size of the discount itself could significantly affect consumer choice. For example, Dickson and Sawyer (1988) carried out a poll of shoppers in a supermarket immediately after these consumers had each placed a promoted product in their shopping baskets. They found that less than 15% of the participants knew the actual amount of the associated price cut (see also Guadagni and Little, 1983 and Grover and Srivivasan, 1989).

In a different study, Mckechnie (2007) showed that while the size of a discount had a non-significant effect on consumers' perceptions, semantic cues on the other hand had a significant effect on utility. Similarly, Krishna et al. (2002) also found that where discounted prices are presented in percentages and consumers do not calculate the exact value of the discount, percentage frames lead to an increased perception of value and stimulates consumer choice. These studies provide evidence for the important impact semantic cues have on consumers' price perceptions.

Accordingly, to the extent that consumers respond to promotional signals and not the actual size of a discount, and percentage frames affect consumer choice, it should also affect perceptions of current product prices and Thaler's (1985) predicted MAPs. We therefore propose that framing changes in prices in **relative terms,** where the actual size of the price change is omitted, will affect the MAPs for gains and lead to an increased tendency to segregate gains. **For mixed gains,** we expect that the relative price frame will enhance the perception of value by signalling a price promotion, and lead to the tendency to maximize utility, not by cancellation as proposed by MAPs, but by a reversal of the predicted MAP of integration to segregation. In addition, we expect the tendency for segregation to increase **in multiple gains** and for consumers to respond to the multiple price promotion signals (i.e. number of discounts) thereby, increasing the tendency to segregate and reinforce the MAP for multiple gains.

b) Previous research also indicates that the manner in which consumers both assess and process price promotions affects their perceptions of the discount value offered (Chen, Monroe, Lou, 1998; Grewal et. al. 1996). Common to this perspective is the general agreement that using percentages to convey a price promotion tends to enhance the size of a price discount especially in lower priced products (Heath et al. 1995; Chatterjee et al. 2000) and percentage frames also make price increases comparatively small (Heath et al. 1995). Similarly, Mckechnie et al. (2007) found that consumers derive significantly higher levels of utility when price promotions are expressed in percentage for large sizes of discount.

Other related studies posit that discount sizes have a positive effect on perceptions of value (Berkowitz and Walton, 1980, Compeau and Grewal, 1998, Grewal, Monroe and Krishnan, 1998, Bearden and Weilbaker, 1998). For example, Krishna et al. (2002) found that framing could affect how consumers evaluate the value/size of a price discount and in turn, the subsequent purchasing decision.

Therefore, to the extent that percentage price frames affect perceptions of the size of a discount or changes in prices, it should also affect the perceptions of the products current price and Thaler's (1985) predicted MAPs for combinations of monetary outcomes. Accordingly, we propose that MAPs will be significantly affected when price changes are framed using the **dual frame** which communicates the percentage discount and the corresponding value of the discount. More specifically, since, the actual value of the price change will be evident from the price frame, we propose that **for mixed losses**, percentage frames will make the loss seem small relative to the gain thereby, reducing the utility derived from the gain, and increase the tendency to minimize the unpleasantness of higher prices through integration and not segregation as predicted by MAPs. Likewise, **for multiple losses**, percentage frames should make the losses seem smaller thereby negating the need to pool losses (making them a larger whole) and lead to a reversal of the MAP for multiple price increases.

Nonetheless, although we expect these underlying factors to alter MAPs, we do not examine MAPs based on individual differences and situational factors and these are held constant throughout our study.

Based on the above discussion, the following hypotheses are proposed:

H_1: Percentage frames will reverse MAP for mixed gains and losses.

H_2: Percentage frames will reinforce MAP for multiple gains and reverse multiple losses.

In summary, we propose the following changes to MAPs:

a) Mixed gains would be segregated.
b) Mixed losses would be integrated.
c) Multiple gains would be segregated.
d) Multiple losses would be segregated.

These hypotheses are tested across all three of our reference points: a retailer's past price (chapter 4), competitors' past and competitors' current prices (chapter 5), and expected prices (chapter 6).

Research Objective 2: The impact of reference states on consumers' perceptions of price.

The basic assumption of reference dependence is that decision makers utilize some form of reference point in evaluating a choice and that deviations from said reference point often leads to reversals of preferences.

In Tversky and Kahneman's (1991) analysis of reference dependence under riskless choice, they used reference states and reference points interchangeably. As such, we inferred that reference states and reference points are synonymous and we utilized both concepts in our study.

We addressed the research question - where reference states are clearly stated, would Thaler's (1985) mental accounting principles still hold? This research question is based on the study by Heath et al. (1995) [8] which suggests that the reference states were not clearly stated in the experiments from which the mental accounting principles were derived and that the inclusion of unambiguous reference states could affect MAPs.

Applying the above assumption to price related scenarios, we analyse the effects of price framing on consumer purchase decisions where reference points and reference states are interchangeably described to represent deviations from the status quo. In our experiments, we classified reference points into two broad categories: reference states and reference

[8] See chapter 2 for the discussion of the study by Heath et al. (1995).

prices[9]. We investigate differences in individuals' perceptions of price when faced with previous prices of a retailer they are familiar with and the retailer's sale prices at the time of purchase. Consumer's familiarity with the retailer's product is incorporated into the questionnaire. More of this will be discussed in the section for research design.

We propose that when consumers evaluate a given retailer's selling price, their perceptions would be influenced when they compare that price with the retailer's past price(s) (see chapter 4). We also investigate the impact of reference states further in chapter 5 by comparing the differences between consumers' perceptions when they utilize competitors' current prices and competitors' past prices as standards of comparison. This leads to the test of the following hypotheses:

H_3: Comparison of a retailer's current prices with a retailer's past prices will affect the consumer's perception of prices.

H_4: Comparison of a retailer's current prices with a competitor's current prices will affect the consumer's perception of prices.

H_5: Comparison of a retailer's current prices with a competitor's past prices will affect the consumer's perception of prices.

<u>Research Objective 3: The impact of expectations on consumers' perceptions of price</u>

A different conceptualisation of internal reference prices is the focus of our final research objective. We consider the effect of expected prices on price perception. Previous studies show that a decision maker's expectation of a price change and the actual change in price obtained could influence how gains and losses are coded (Puto, 1987; Thaler, 1985).

Price discounts are generally recognised as the predominant form of price promotion, a fact which consumers are not only aware of, but often expect. Where such price promotions fail to meet up with consumers' expectation, they could have a negative impact on their purchase decisions (Hardesty and Bearden, 2003). Thaler (1985) describes the effect of expectations on decision making as a reference outcome[10].

As previously indicated, chapter 6 of this thesis considers the impact of price expectation on consumers' perceptions of price as predicted by MAPs. For the purpose of further comparison, we define all responses based on expected prices as the 'expectations frame'.

[9] The literature review chapter discusses reference prices in greater detail.

[10] This is covered in Chapter 6 of this research.

Similarly, responses from questionnaires used in chapter 4 are collectively defined under the broad frame, ‘non-expectations frame’. Results from these two frames are then analysed to identify which conceptualisation of IRP has a more significant impact on MAPs.

Furthermore, in order to investigate the impact of percentage frames on MAPs, we design questionnaires with a retailer’s future prices as the reference point. Deviations from this reference point are incorporated into the questionnaires as the consumer’s expectation of changes in the retailer's prices. Consequently, we evaluate to what extent MAPs are affected when changes in the retailer’s prices and the consumer’s expected prices are presented in percentages terms.

Lichtenstein and Bearden (1988) propose that external reference prices (ERPs) are able to adjust consumers’ IRPs up or down such that a retailer’s current prices could be perceived as acceptable or non-acceptable. Although the internal reference price (IRP) evaluated in their paper was not expected prices, we anticipate that similarly, the suggested retailer’s prices would affect consumers’ IRPs when defined as expected prices. Therefore, to the extent that percentage frames are able to affect MAPs, and ERPs can adjust IRPs, we expect MAPs to hold across the gains and losses outcomes of our experiments. With this background, we propose that expected prices will neutralise the impact of percentage price framing and overall, consumers’ perceptions of price changes will be consistent with Thaler’s (1985) MAPs.

This distinction allows the test of our sixth hypothesis:

H_6: Expected prices will have a neutralising effect on percentage frames such that MAPs will not be significantly affected.

3.3 RESEARCH DESIGN AND DATA COLLECTION

A common approach to the study of heuristics and irrationality in consumer decision making is the use of hypothetical decision scenarios within questionnaires. In particular, previous research on mental accounting from a price-related perspective have asked respondents to imagine being in a hypothetical scenario where they make choices based on how they would respond in the event of a real life situation. Empirical justification for the use of hypothetical scenarios shows that most people behave in the manner hypothesized in these surveys. As Kuhberger et al. (2002) suggest, 'the core process of real decision making consists of imagining and evaluating hypothetical options, and this core process is the same for hypothetical decisions.' In essence, a prerequisite to decision making lies in the rational resolution of hypothetical decisions.

In keeping with the aforementioned approach, we replicate the classic decision scenarios adopted by Thaler (1985) which evaluate the framing effect in multiple events. We use decision scenarios similar to Thaler's (1985) original approach in which 2 hypothetical men face financially equivalent situations. One of the men makes one purchase decision while the other makes two decisions. For the purpose of comparison across studies, our study adopted the ‘couch and chair’ purchase scenario from Chatterjee et al. (2000), and Heath et al. (1995).

Post graduate students in the Adam Smith Business School at the University of Glasgow were offered cash-prize incentives to participate in the study. Three hundred post graduate students participated in the survey. We carried out three studies[11] with four experimental conditions in a repeated-measures design. Respondents were then randomly assigned to four conditions based on outcome type (Mixed Gains, Mixed Losses, Multiple Gains and Multiple Losses) and reference point (Retailer’s past prices, competitor’s current and past prices). The survey was completely anonymous and no information was collected based on name, gender, age or ethnic background. Of the 300 respondents, 247 useable responses were collected.

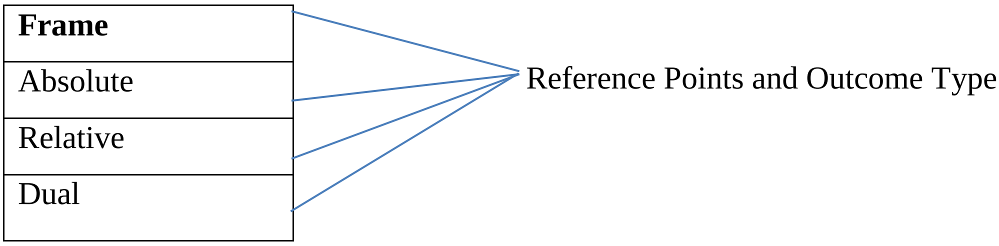
3.3.1 Design

Independent Variables. Our hypotheses revolve around how the manipulation of price presentation affects consumer purchase decisions and perceptions of price. To examine this, we present changes in prices across each of the reference points[12] and each outcome type using 3 price frames with “frame” as our independent variable as shown in Figure 3.1.

[11] This applies only to studies in chapters 4 and 5. The specific design for chapter 6 is discussed in that chapter.

[12] For the independent variable ‘expectations’ we examine price presentation across just 2 frames: absolute and relative. By taking out the dual frame, we hoped absence of the final price after the change in price and the inclusion of the reference outcome would further encourage the elicitation of preference reversals.

Figure 3.1
Specification of variables



Dependent Variables. Each of the reference points was varied based on outcome type and with “outcome type” as dependent variables. These are shown in table 3.2 below.

Table 3.2
Structure of research

Reference Point	Outcome Type	
	Mixed	**Multiple**
Retailer’s Past Prices	Gains Losses	Gains Losses
Competitor’s Current Prices	Gains Losses	Gains Losses
Competitor’s Past prices	Gains Losses	Gains Losses
Expectations	Gains Losses	Gains Losses

In each of our studies, we employ two conditions: the control conditions and the treatment conditions. In the first condition, we replicated the decision scenarios from Thaler’s (1985) experiments which evaluated combinations of joint monetary outcomes. We chose these scenarios because a) they led to the origination of Thaler’s (1985) MAPs, b) according to Heath et al. (1995), the reference states were ambiguous, and c) prices frames were not manipulated.

Consequently, we introduce reference states into our treatment conditions and evaluate the impact of varying price frames. Each respondent is assigned to 2 control conditions (one for gains and one for losses) and 3 forms of price presentation (frame) for each outcome type. The questionnaires were grouped based on the structure in table 3.3 below.

Table 3.3
Classification of questionnaires

Group/no of respondents	Outcome Type	Reference State
A (48)	Mixed Gains Mixed Losses	Retailer's past prices
B (45)	Multiple Gains Multiple Losses	Retailer's past prices
C (33)	Mixed Gains Mixed Losses	Competitor's current prices
D (38)	Multiple Gains Multiple Losses	Competitor's current prices
E (39)	Mixed Gains Mixed Losses	Competitor's past prices
F (44)	Multiple Gains Multiple Losses	Competitor's past prices

Table 3.3 shows the distribution of our participants across all the outcome types investigated. Respondents were randomly assigned to each group such that the same respondent was evaluated based on one form of outcome gain or outcome loss but not all four outcomes.

3.3.2 Questionnaire

In order to examine the generalizability of possible effects from Heath et al. (1995) in comparison with the proposed MAPs, we presented subjects with decision problems which were equivalent formally and in arrangement to those employed by Heath et al. (1995) and Chatterjee et al. (2000) but slightly different in content with particular regards to the size of discount, prices of the retailer across outcomes and the decision problems utilized in the studies evaluating competitor prices.

The questionnaire was constructed such that each decision scenario could be as easily understood as possible by each respondent. This was in a bid to reduce fatigue and practice effects due to the within-subjects design. Instructions were also given before the commencement of the survey and participants were encouraged to ask questions as needed.

From the 2 pilot studies done, each questionnaire takes approximately 15 minutes to complete. In addition, respondents from the pilot studies had indicated the lack of complexity to the questionnaires but with the suggestion to make the survey questions slightly more interesting. We endeavoured to accommodate this suggestion as best we could.

Respondents were asked to determine which of 2 hypothetical men in hypothetical decision scenarios they thought would be relatively happier (Gains) or unhappier (Losses). The purchase of the couch alone represents a single outcome indicating the MAP of integration while the purchase of the chair and couch represents two outcomes indicating segregation.

In the following section, we present some decision scenarios from our questionnaires to illustrate price presentation across the 3 price frames. Scenario A shows the change in price in absolute terms, B shows the price change using the dual frame, and C utilizes only the relative frame. All the decision scenarios used in our experiments are presented in detail in the Appendixes.

3.3.3 Measures

Subjects were given booklets containing 8 scenarios. The first four scenarios described the gains outcome while the last four presented the losses outcome. The control condition was the first of each set of four scenarios. Participants were asked to evaluate each scenario on a 15-point scale as follows:

Scale of 1 to 7 – Mr. A is happier than Mr. B (with 7 being highest level of happiness).
Scale of 1 to 7 – Mr. A is unhappier than Mr. B (with 7 being highest level of unhappiness).
At midpoint 8 – Mr. A and Mr. B are equally happy.
At midpoint 8 – Mr. A and Mr. B are equally unhappy.
Scale of 9 to 15 – Mr. B is happier than Mr. A (with 15 being highest level of happiness).
Scale of 9 to 15 – Mr. B is unhappier than Mr. A (with 15 being highest level of unhappiness).

Scenario A (Absolute frame)

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair. On getting to the store, Mr. A finds that the originally priced £1300 couch has been reduced to £1250; Mr. B finds that the originally priced £300 chair has been reduced to £200 while the price of the couch which had originally been £1000 had been increased to £1050.

Scenario B (Dual frame)

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair. On getting to the store, Mr. A finds that the originally priced £1300 couch has been reduced by 4% to £1250; Mr. B finds that the originally priced £300 chair has been reduced by 33% to £200 while the price of the couch which had originally been £1000 had been increased by 5% to £1050.

Scenario C (Relative frame)

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair. On getting to the store, Mr. A finds that the originally priced £1300 couch has been reduced by 4%; Mr. B finds that the originally priced £300 chair has been reduced by 33% while the price of the couch which had originally been £1000 had been increased by 5%.

3.3.4 Evaluation of expectations as a reference point

Respondents in groups A and B only received an additional booklet containing four scenarios, 2 for each outcome type. There were no control conditions and price changes were presented using 2 frames.[13] The same instructions discussed above applied to these scenarios.

3.4 DATA ANALYSES

In order to investigate the impact of price framing on MAP and consumers’ purchase decisions, descriptive analysis and a repeated measures analysis of variance (ANOVA) was conducted using SPSS 21. Additionally, pairwise comparison was done to show exactly which pairs of levels differed where the test results were significant.

[13] See chapter 6 for a more elaborate discussion.

We take the mean of the 15 point scale (1-15) for each decision scenario as the indicator of consumer preference for the coding of all monetary outcomes (mixed gains, mixed losses, multiple gains and multiple losses) in the experiments conducted.

Although the between-subjects design is peculiar to studies on framing effects, our decision to use a within-subjects design to manipulate price frame is twofold.

First, the practice of decision makers using price as an indicator of choice is arguably best studied conceptually by a repeated measures approach over several prices (Monroe and Dodds, 1988). This is because the experimental situation created is analogous to purchasing encounters in the real-world where several different choices are examined at various prices. As a result, within-subjects designs will continue to have an important role in consumer behaviour research.

Finally, although the use of a repeated measures design has been criticized as being 'potentially artifactual as subjects responding to several prices sequentially may guess the true intent of the researcher and respond accordingly' (Sawyer, 1975), one significant advantage it has over the between-subjects design is that it controls for variability due to individual differences, and is thereby more likely to produce larger effects than between-subjects designs. For these reasons therefore, we adopt a within-subjects approach as a complementary analysis to existing literature.

However, with these identified limitations in view, this research also adopted the linear mixed model (LMM) and the Wilcoxon signed-rank test (paired samples) for data analysis.

3.4.1 Assumptions

No measures were used to check manipulations on the dependent variable or the depth of price changes. We also did not test the measures of brand familiarity which is an integral constituent of our studies. Rather, we assumed based on the general consensus in literature, that since three groups of people are generally affected by price promotion, the retailer making the changes in prices, the consumers who patronize the store and the retailer's competitors, that 'store patronage' was synonymous with brand familiarity. As such, brand familiarity can be said to be experiential. In view of this, store patronage/brand familiarity was incorporated into our questionnaires.

3.4.2 Limitations

Although numerous empirical studies on marketing and consumer decision making increasingly justify the use of hypothetical decisions, the use of which is similarly replicated in our present study, our results may not be generalizable. Further research is needed to extend the empirical work on this literature.

Further, due to the within subjects experimental design of our study, and the associated evaluation of consumer price perception using both the dual and relative price, it is entirely possible that subjects will be able to identify that the overall gains and losses across the percentage frames do not vary and hence, adjust their preferences based on what they think the researcher is investigating.

3.5 GENERAL DISCUSSION

The objectives of this current research were to: a) investigate the impact of percentage price frames on MAPs, b) show that reference states and reference prices significantly affect consumers perceptions of price and the value consumers' place on price promotion, and c) examine the effect the framing of internal reference prices as expected prices would have on consumer's perceptions of gains and losses.

Six hypotheses are evaluated across our 3 core chapters as follows: hypotheses 1 and 2 in chapters 4, 5 and 6; hypothesis 3 in chapter 4, and hypotheses 4 and 5 in chapter 5; and finally, hypothesis 6 is tested in chapter 6.

Price frame manipulation using percentage frames were expected to influence MAPs thereby resulting in reversals of the MAPs for mixed gains, mixed losses, and multiple losses. We also expected percentage frames to reinforce the MAP for multiple gains.

Data were collected primarily using questionnaires and the results were analysed using repeated measures analysis of variance (ANOVA). Linear mixed model analysis and Wilcoxon signed-rank test were performed to further assess the aforementioned objectives.

In the following chapter, we discuss our first reference point, a retailer's past prices.

CHAPTER 4

THE IMPACT OF FRAMING CHANGES IN A RETAILER'S PRICES ON MENTAL ACCOUNTING PRINCIPLES

In this chapter, we introduce our first reference point, a retailer's past prices. We consider retailer's past prices as an internal reference standard employed by the consumer and against which the retailer's selling prices are evaluated prior to purchase. We replicate the previous study by Heath et al. (1995) although our study is based on a different set of assumptions and research hypotheses. We experimentally examine the robustness of their results and in turn the generalizability of MAPs. For this present analysis, we assume that the internal reference price of the consumer is based on recall of the retailer's previous prices and that decision makers are familiar with the retailer's prices based on past price cues from visiting the store. By presenting negative and positive deviations of the retailer's past prices as gains (price decrease) and losses (price increase) respectively based on Kahneman and Tversky's (1979) Prospect Theory, we evaluate the impact of price framing on consumers' perceptions of value. Our results provide justification for the importance of price framing in marketing.

4.1 THEORETICAL BACKGROUND

The concept of internal reference price is a multidimensional construct which has however also been unanimously described as ambiguous (Gabor, 1977). This is due to the numerous conceptualisations of internal reference price (hereafter IRP) proposed in marketing literature based on definition and application (see table 4.1). Examples of such definitions of reference prices are: last price paid, a weighted average of past prices, aspiration price, expected future price etc. It is however largely accepted that internal reference prices are individual-specific, not stimulated by the environment and are memory based.

A few studies have looked into how consumers form reference prices (Biswas and Blair, 1991; Kalwani et al. 1990; Klein and Oglethorpe, 1987; Rajendran and Tellis, 1994; Rowe and Puto, 1987; Puto, 1987). In some of these papers, reference price was defined in terms of the past prices paid by consumers, with particular emphasis on the timing of the last purchase and the ability of the consumer to recall the price at the time of the purchase. This is because as previous research has shown, the most recent experience of price a consumer has is much more significant than a long past in-store experience (Klein and Oglethorpe, 1987; Mazumdar et al. 2005). Mazumdar et al. 2005 were also of the opinion that past prices observed or encountered by consumers played the most significant role in the formation of IRP. Nevertheless, empirical evidence is yet to account for how reference prices are formed precisely.

Table 4.1
Conceptualizations of internal reference price in research

Study	Main conceptualization	Other conceptualizations	Theoretical framework
Chandrashekaran, 2001	Normal price	Fair price, reservation price	None associated
Alford and Engelland, 2000	Lowest, average and highest price	-	Social judgement
Janiszewski and Lichtenstein, 1999	Expected price to pay, most and least willing price to pay	-	Adaptation level versus Range theory
Slonim and Garbarino, 1999	Expected price to pay, most price willing to pay	Fair price	Adaptation level theory
Chandrashekaran et al. 1996	Price most would pay, normal price	Fair price	None associated
Bearden et al. 1992	Normal, expected average prices	Fair price	Transaction utility theory
Biswas and Blair, 1991	Lowest, highest, average price	-	Adaptation level theory and Assimilation contrast theory
Lichtenstein et al. 1991	Lowest and normal prices	Fair price	Adaptation level theory and Assimilation contrast theory
Lichtenstein and Bearden, 1989	Lowest and normal prices	Fair price	Adaptation level theory and Assimilation contrast theory
Urbany et al. 1998	Lowest and normal prices	-	Adaptation level theory and Assimilation contrast theory
Liefeld and Heslop, 1985	Ordinary price	-	None associated
Thaler, 1985		Fair price	Prospect theory

Studies on internal reference price formation have been addressed from two main perspectives. One stream of research has focused on modelling the formation process using consumer panel data (Briesch et al. 1997; Gurumurthy and Winer, 1995; Winer, 1986), while the other takes a behavioural approach and uses experimental data from laboratory studies to assess reference price in relation to price promotion (Alba et al. 1999; Kalwani and Yim, 1992; Kalwani et al. 1990; Mazumdar et al. 2005; Mayhew and Winer, 1992; Urbany, Bearden, and Weilbaker, 1988).

It is important to position our research against two relevant studies within the behavioural stream of research: Chatterjee et al. (2000) and Heath et al. (1995). The first study investigated the impact of IRP on purchase decision given decision makers' varying levels of need for cognition. Heath et al. (1995) showed through their study that internal reference prices tend to be modified by the manner in which the decision maker incorporates a price discount and that price framing affects consumers' purchase decisions.

We are interested in experimentally evaluating the discrepancy between the actual product price and the price the consumer had previously observed in the store and thus expects to pay (implicitly). More specifically, we define internal reference price as past prices of a retailer derived from a consumer's most recent visit to the store. We incorporate a context dependent perspective to our studies in the form of percentage price frames which capture the changes in the retailer's prices. This allows us to evaluate IRP from the theoretical framework of prospect theory and mental accounting principles (MAPs).

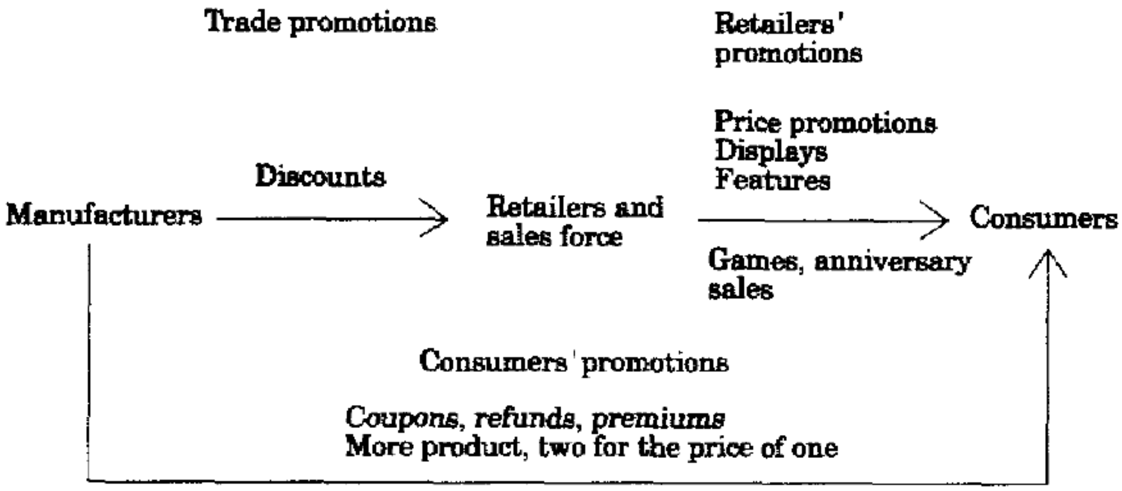
In this present chapter, we analyse the robustness of MAPs by evaluating the previous findings of Chatterjee et al. (2000) and Heath et al. (1995). We take another look at the impact of price frame manipulation on MAPs in order to assess the generalizability of the results from the aforementioned studies. In the next two chapters, we provide extensions to research on reference prices, reference dependence and price framing by considering two contexts not addressed by extant literature: the impact of external reference prices (ERPs), specified in terms of competitor's prices, on consumers' purchase decisions in chapter five, and in chapter six we investigate the differences between consumers' purchase decisions when their internal price standards are defined as expected future prices and when described as past prices. In other words, we compare two IRPs and the discrepancies in their effects on consumers' purchase decisions based on Kahneman and Tversky's (1979) prospect theory, and also examine the implications for MAPs.

4.2 RESEARCH ON RETAIL PRICE PROMOTION AND CONSUMER BEHAVIOUR

The use of sales promotion is an undeniable tool utilized in marketing and employed by most retailers. Sales promotion has been defined as those temporary methods utilized by firms, retailers and companies to increase their profitability by making their goods and services more appealing to consumers through the provision of some form of incentive, or by encouraging the expectation of some additional benefit to the consumers as a result of their purchase decisions (Boddewyn and Leardi, 1989).

The most universally accepted classification of sales promotion is based on three categories (see figure 4.1): retail promotion, trade promotion and consumer promotion. Retail and trade promotions are those between businesses who trade with one another. Both types of promotions are very similar because they could be targeted at retailers and manufacturers who do business together; while those aimed at encouraging the consumer to purchase particular products are consumer sales promotions.

Figure 4.1
Natural typology of sales promotion



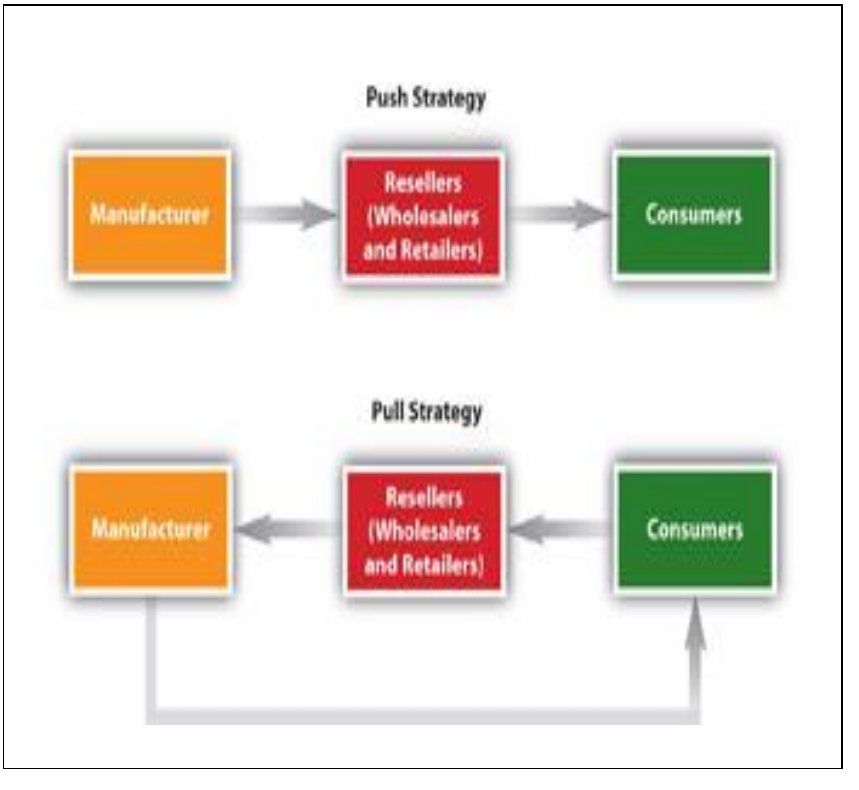
Source: Pierre Chandon (1995)

Some of the ways sales promotions have been done vary from price-tailored promotions such as price discounts, coupons, vouchers and rebates to non-price promotions like premiums, sweepstakes, free offers, prizes etc. For the purpose of this research our focus will be on consumer sales promotions with particular emphasis on price discounts from which consumers derive monetary savings (transaction utility).

Two dominant promotion strategies are employed by companies: a pull strategy and a push strategy (see figure 4.2). Pull strategies are employed when companies promote their goods or services in order to 'pull' customers to make purchases. A push strategy, on the other hand, is where businesses promote their products to other businesses thereby using them as the means to create awareness for their products or 'push' their products to the final consumer. A push strategy could be between manufacturers and retailers using price discounts with the expectation that the retailer will push the manufacturer's products to the final consumer. A product is being promoted using price discounts when it is offered for sale at a temporary price which is lower than its 'normal' price. Often, these price cuts are communicated to the consumers either through price signalling cues in-store, or through newspaper advertising or retailer-specific newsletters.

Studies on brand choice (Blattberg, Eppen, and Liebermann, 1981; Gupta, 1988; Neslin, Henderson and Quelch, 1985; Shoemaker, 1979; Ward and Davis, 1978; and Wilson, Newman, and Hastak, 1979) provides evidence to show that price discounts are usually linked with increases in product purchases, and often times, switching of brands. In particular, consumers who are 'deal-prone' have been found to exhibit very little loyalty to brands in their quest to achieve the highest levels of utility (Montgomery, 1971; Schneider and Currim, 1990; and Webster, 1965).

Figure 4.2
Outline of a push versus pull strategy

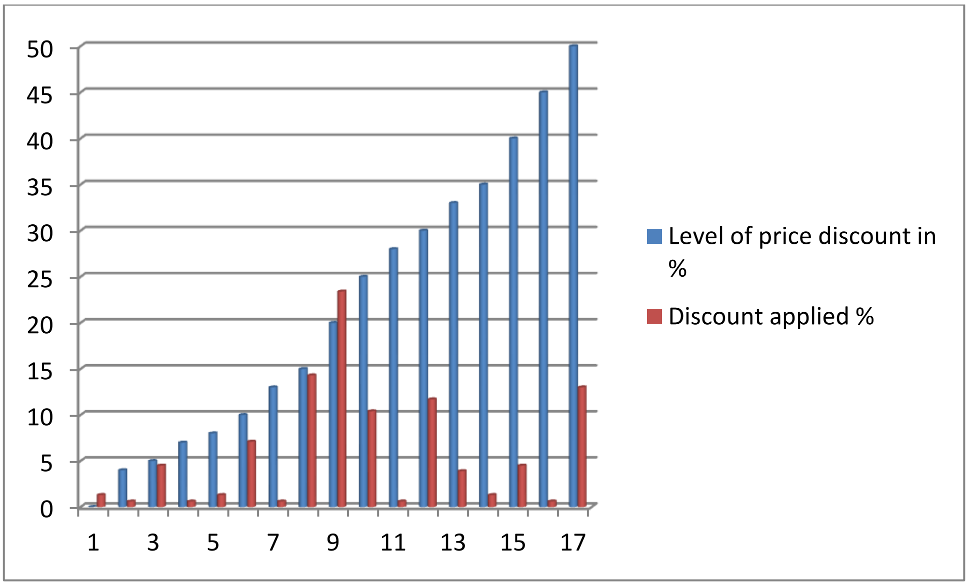


Source: Tanner and Raymond (2011). Marketing Principles

At the same time, price discounts do not always lead to increase in sales. Retailers have to decide just how much to reduce prices because consumers frequently associate price promotion with the quality of a product. Where the price discount is too high and perceived as questionable, consumers infer that the promoted product is of low quality which discourages purchase especially with brand-conscious consumers. Etgar and Malhotra (1981), Monroe and Petroshius (1981), Olson (1977), Rao and Monroe (1988), all found that the tendency for relatively low prices to be perceived as indicative of low product quality was even more pronounced with price uncertain consumers who had to rely only on the price information available to make a purchase decision. The reverse is however obtainable where high quality is inferred from high retailers' prices. For consumers who derive affective reactions from prices, higher prices would be indicative of high product quality particularly where price is the means of making comparison. Where alternative information is available in making a purchase decision however, empirical evidence suggests that the price-quality inference is less pronounced (Rao and Monroe, 1988).

Most of the experiments conducted on price promotion have employed price discounts between 10% and 40% with 20% being the ballpark of most discounts (see figure 4.3).

Figure 4.3
Distribution of price discounts in sales promotions



Source: Simon-Kucher & Partners (2011)

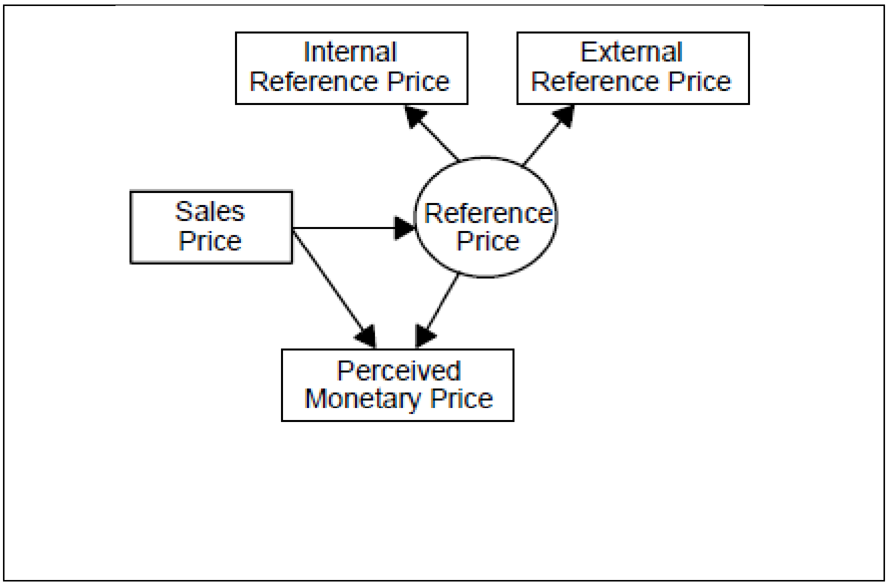
Uhl and Brown (1971), and Della Bitta and Monroe (1980) suggest that, within this range, it is not unusual to expect a concave relationship between the expected retailers prices and levels of price discounts.

Retailers could also target price promotions at non-users of some of their products. Accordingly, consumers who are not familiar with a specific brand and are not brand-conscious could be encouraged to make a purchase. Bultez (1975) found that price decreases generally motivate consumers to buy products they will not necessarily have purchased for the purpose of 'building up their home inventories'. However, such consumers' may be unlikely to continue buying that product at the end of the price promotion as this would imply higher prices. As empirical evidence shows, consumers react differently to increases and decreases in prices of products. Uhl and Brown (1971) found that where price changes (increases and decreases) varied from 5% to 15%, consumers were significantly more sensitive to increases in prices.

Conversely, Bultez (1975) suggested that because consumers were more sensitive to decreases in prices, they tend to frequently purchase certain brands which they then become familiar with and they tend to be loyal to. As a result, increases in prices will not have a huge impact on their purchase decisions.

Figure 4.4 shows a conceptual model of how consumers' perceptions of monetary savings are formed based on reference prices and the potential sales prices.

Figure 4.4
Conceptual framework of the formation of perceived savings through discounts



Source: Pedrajaiglesias & Yagüe Guillén (2000)

From figure 4.4, Pedrajaiglesias and Yagüe Guillén (2000) describe the process of consumers' perception of a price discount as beginning at the point of encountering a retailer's discounted selling price which could be through the use of price signalling cues or promotional advertisements. A few other factors are considered to affect consumers' perceptions of a price promotion and partly determine if the resultant discounted price would be judged as high or low pre-comparison with reference prices. These are: semantic cues that indicate the price discount for example 5% off, £15 off, now half price, buy 3 for 2 (Lichtenstein, Burton and Jarson, 1991); the individual characteristics of the consumers (Sorce and Widrick, 1991); and time available to search for other prices of products within the same category (Park, Iyer and Smith, 1989).

4.2.1 Short and long term effects of sales promotions

The debate on the short term and long term effects of temporary price cuts is an ongoing one in marketing literature. On one side, the research shows that price promotions considerably increase retailers' sales leading to increase in profit margins, and encourages the switching of brands between top brand and low brand products (Blattberg et al. 1995; Bronnenberg and Wathieu, 1996). On the other side, the research shows the possible differences in the impact duration of price discounts. In this regard, Dekimpe et al. (1999) found that the long-run benefit derived from sales promotion had more to do with cost-related factors.

Studies on brand switching view brand loyalty as the main determinant of long-run profitability since for established brands, the increase in sales as a result of sales promotion would only be temporary since consumers are encouraged to make immediate purchase decisions and so in the long-run, there are seldom permanent effects of promotions on sales (Ailawadi and Neslin, 1998).

Additional research along this line indicates that where a consumer's prior purchase of a product was due to a promotion, the chances of continued purchase of that brand by the consumer was very low (Guadagni and Little, 1983; Shoemaker and Shoaf, 1977). The most obvious explanation for this finding though, arguable, is that the consumer's evaluation of the brand post promotion is lower than when the promotion was ongoing.

Research into post promotion low brand evaluation suggests that a consumer who makes a purchase during a sales promotion would attribute that purchase to the on-going deal as opposed to brand loyalty (Dodson, Tybout, and Stemthal, 1978; Doob et al. 1969; Scott, 1976). Where the purchase is made at full price however, the attitude would be different. Where companies carry out sales promotion for the predominant purpose of targeting new customers, the above explanation would be a cause for concern to them as the new customers would only take advantage of buying at reduced prices before returning to their preferred brands.

In a different study by Luxton (2002), sales promotions are effective in the long term because they afford retailers the opportunity to counter the strategies employed by their competitors. Where sales promotions are targeted at existing consumers, it could have detrimental impact on the brand in the long run since the existing customers make purchases at both reduced and normal (higher) prices and they may become more price-sensitive. It is left to the retailers then to justify their higher prices and brand image through advertising and manipulations of the retail environment within the store. For example, display tactics of not placing premium brands in close proximity with those associated with lower quality (Wakefield and Inman, 1993).

Furthermore, when sales promotions are too frequent, consumers learn to anticipate future price cuts. As a result, they might choose to delay making purchases when retailers' prices are back to 'normal' and wait instead until prices are promoted again as expected. Given the foregoing, we see the effect of consumers' past experiences on their future purchase decisions and which affect the retailers' profitability in the long-run. Notwithstanding, promotions have a substantial effect on purchase decision and sales.

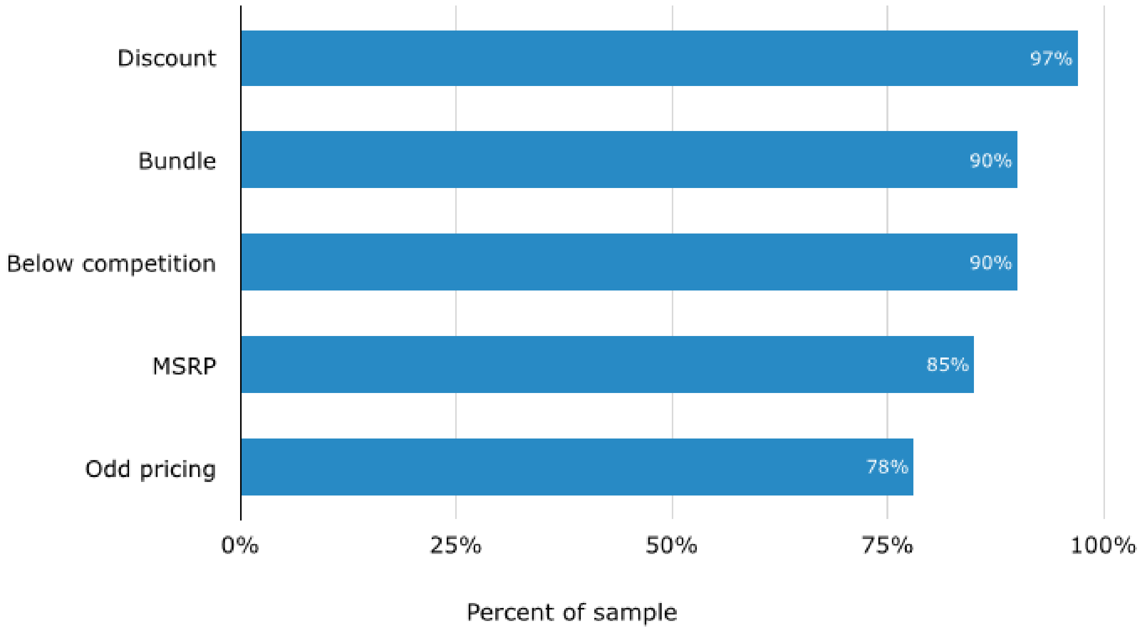
4.3 RETAIL PROMOTION AND PRICING STRATEGIES

Three retail pricing strategies are prominent in the retail sector. Frequent discounting - small, regular price discount offers targeted at consumers; depth discounting - involves large discounts offered occasionally; and everyday low pricing (EDLP) - where retailers consistently offer products at low prices and consumers do not have to wait for sales promotions.

Drawing specific attention to frequent discounting, a recent sector-based survey on the best retail pricing strategies indicates discounts were the most popular under this category with price bundling and below competition strategies coming in close behind followed by manufacturer's suggested retail price (MSRP) and odd pricing strategies (see figure 4.5).

Price discounting is a core focus of the literature on reference prices.

Figure 4.5
Pricing strategies in the retail sector



Source: Schrantz, 2015

4.4 INTERNAL REFERENCE PRICE AS A REFERENCE POINT

Based on the preceding discussion on price discounting, we draw from past research on price framing and the impact of frame on mental accounting principles. Previous studies in this area of research argue that the experiments from which Thaler's (1985) MAPs were derived lacked explicitly stated reference points and that the inclusion of some form of reference could possibly alter some of these proposed principles.

As it relates to our present paper, these arguments suggest that the ways in which decision makers prefer to code their perceived monetary savings from price discounts could be dependent not just on mental accounting principles, but also from the context surrounding the decision frame. We specify context in terms of the price frames which show changes in prices as deviations from the consumer's reference point.

The reference point considered in this chapter is internal reference price which we define as *a retailer's past prices observed in the store* from the consumer's most recent visit. This conceptualisation is based on Mazumdar et al. (2005) finding that the strongest determinants of a consumer's IRP are the prior prices observed or prices encountered on recent purchase occasions. We posit that both the discount sizes and/or the promotion signal subject to the reference point, would significantly affect MAPs since most decision makers will respond either to the number of times prices changed, or will only consider the size of the discount. Consequently, we expect that percentage frames would enhance the perceptions of monetary savings and increase the tendency to segregate gains as well as minimize the disutility perceived from an increase in prices based on the premise that a price increase appears comparatively small when expressed in percentage. We therefore also propose that decision makers would also prefer to segregate multiple losses contrary to the prevailing MAP. This reasoning forms the three primary hypotheses investigated in this chapter.

H_1: Percentage frames will reverse MAP for mixed gains and losses.

H_2: Percentage frames will reinforce MAP for multiple gains and reverse multiple losses.

H_3: Comparison of a retailer's current prices with a retailer's past prices will affect the consumer's perception of prices.

4.4.1 Experiment 1

To promote comparability with previous related research, we replicate the decision scenarios adopted by Chatterjee et al. (2000) and Heath et al. (1995) which evaluates framing effect in multiple events and is based on Thaler's (1985) original approach. Where Thaler's (1985) experiments are however lacking explicit reference points, the experiments by Chatterjee et al. (2000) and Heath et al. (1995) adopted the 'couch and chair' purchase scenarios which shows two hypothetical men faced with decision frames involving financially equivalent situations and have to make a choice between purchasing only a chair or the two items together.

As it relates to the prevailing MAPs, the purchase of the couch alone represents a single outcome indicating the MAP of integration while the purchase of the chair and couch represents two outcomes indicating segregation.

Subjects were asked to indicate on a scale of 1-15 which of two men in hypothetical decision scenarios would be relatively happier (Gains) or unhappier (Losses). The mean of the scales (1-15) '8' was taken as the indicator of indifference for combinations of outcomes. Means below 8 suggest the MAPs of integration and means above 8 indicate segregation. Furthermore, in the gains outcomes, higher numbers indicated by the subjects on the scale, show the levels of relative happiness of either Mr. A who bought an item or Mr. B who bought two items; and in the losses domains, higher numbers show the levels of relative unhappiness of either Mr. A who bought one item or Mr. B who bought two items.

In carrying out this experiment, we ignored the effects of psychological processes such as price certainty and uncertainty, affective reactions to price change; situational factors such as the specific brand in which changes in prices occur, or information in the market place; and individual differences such as product preferences, or level of cognition. We however incorporate some level of memory for previously observed past prices into the questionnaires to indicate a degree of familiarity with the brand or patronage of that particular store.

4.4.2 Design of experiment 1

We carry out four experimental conditions in a repeated-measures design based on outcome type and with the retailer's past prices as the reference point. Although the between-subjects design permeates studies on framing effect, we use a within-subjects design to manipulate price frame. Our reasons for employing this design are: a) to take advantage of the elimination of the subject to subject variation associated with between-subjects experiments, b) to adequately detect an effect of our independent variable, and c) to highlight the generalizability of our results to real life situations.

We also utilize the differences between the means as a medium of analysis across each frame and evaluate how these relate to each other. A major concern however was the possibility that respondents would remember their previous choices and not deviate from them, thereby making their responses consistent across most frames. This would result in the reduction of any framing effect observed.

Respondents were post graduate Economics students in the Adam Smith Business School of the University of Glasgow, United Kingdom. There were 247 respondents in total, and 93 of them were randomly assigned to the four experimental conditions. Forty-eight subjects were randomly assigned to two levels of the dependent variable (mixed gains and mixed losses outcome types) and thirty-five were assigned to the other two levels (multiple gains and multiple losses).

Each respondent is assigned to three treatment levels which represent decision scenarios with explicitly stated reference points and one control level based on Thaler’s (1985) original experiments which have been described as lacking reference points. The experiments were designed such that the same respondent assigned to the control and treatment levels in the mixed gains domains, was also assigned to that in the mixed losses domain but not to the other two outcome types. This in effect implies that one group of respondents had questionnaires evaluating mixed outcomes and another group, multiple outcomes. The 3 levels of the independent variable are absolute, relative and dual. The absolute frame presents the price change in absolute monetary terms. The relative frame describes the price change in percentage terms and omits the final price (after applying the change in price), while the dual frame indicates both the percentage discount and the final discounted price. Overall values of changes in prices across all outcomes and treatment levels are presented in table 4.2.

Table 4.2
Value of price change across frame and outcome type

OUTCOME	FRAME	VALUE	
		Absolute	**Percentage**
Mixed Gains:	Control	£50	–
	Absolute	£50	–
	Dual	£50	3.84%
	Relative	–	3.84%
Mixed Losses:	Control	£150[14]	–
	Absolute	£50	–
	Dual	£50	4%
	Relative	–	4%
Multiple Gains:	Control	£100	–
	Absolute	£100	–
	Dual	£100	7.69%
	Relative	–	7.69%
Multiple Losses:	Control	£100	–
	Absolute	£100	–
	Dual	£100	8%
	Relative	–	8%

4.4.3. Assumptions

We made implicit assumptions that the buyer is familiar with the retailer's prices based on past purchase experiences at the store. We also assumed that the purchase intent of the consumer was to buy products from that retailer subject to finding prices consistent with the consumer's IRP.

[14] Control groups are the classic decision scenarios from Thaler's (1985) experiments and we replicated the same values used in his experiments. The overall gains and losses across frames in each outcome type are however the same.

4.5 RESULTS FROM PILOTS

Thaler's (1985) MAPs are based on which of the two preferences (integration or segregation) will produce greater utility. This is easily interpreted in the decision scenarios involving gains as opposed to those for losses.

We carried out two pilot tests prior to the actual study (tables 4.3 and 4.4). From table 4.3 in the mixed gains domains, the relative frames (percentage frames) in both tests showed preference reversal from the proposed integration to segregation which is evidence of framing effect.

In the control condition for mixed losses, the results are consistent with the MAP to segregate. The indicated preference of integration suggests that subjects considered Mr A. and not Mr. B to be unhappier given the specific decision frame. As such, the preference to integrate does not minimize the disutility experienced from mixed losses so segregation is preferred. However, the MAP for mixed losses does not hold in the treatment frames. The preference to segregate in both dual and relative frames shows that subjects considered Mr. B to be unhappier. This implies that integration is preferred for minimizing disutility and shows evidence of the framing effect.

Table 4.3
Results from pilot tests (Mixed outcomes)

	Frame	Results from tests		MAPs hold?	
		1	2	1	2
Mixed gains (Integration)	Control	Segregation	Indifference	No	No
	Absolute	Integration	Segregation	Yes	No
	Dual	Integration	Segregation	Yes	No
	Relative	Segregation	Segregation	No	No
Mixed losses (Segregation)	Control	Integration	Integration	Yes	Yes
	Absolute	Integration	Segregation	Yes	No
	Dual	Segregation	Segregation	No	No
	Relative	Segregation	Segregation	No	No

Table 4.4
Results from pilot tests (Multiple outcomes)

	Frame	Results from tests		MAPs hold?	
		1	2	1	2
Multiple gains (Segregation)	Control	Indifference	Integration	No	No
	Absolute	Segregation	Integration	Yes	Yes
	Dual	Segregation	Segregation	Yes	Yes
	Relative	Segregation	Segregation	Yes	Yes
Multiple losses (Integration)	Control	Segregation	Segregation	Yes	Yes
	Absolute	Segregation	Integration	Yes	No
	Dual	Segregation	Integration	Yes	No
	Relative	Segregation	Integration	Yes	No

4.6 DISCUSSION ON MODAL PREFERENCES

From table 4.5[15] we see a representation of the most frequent choices picked by our respondents. We will begin by reviewing results from the control conditions.

In the mixed gains outcome, 75% of the respondents made choices consistent with Thaler's (1985) original experiments with the decision to integrate a small loss with a larger gain. For mixed losses, the modal preference (52%) indicates that integration maximizes disutility and hence, segregation is preferred. For multiple gains however, the choice to integrate, (33%) is inconsistent with the MAP for that outcome. Results for multiple losses are also consistent with MAPs. Subjects indicated that segregation did not minimize unhappiness and as such, integration is preferred.

[15] Control conditions where we replicated the scenarios from Thaler's (1985) original experiments are highlighted in bold texts to emphasize consistency or lack of with MAPs.

Table 4.5
Presentation of modal preferences across all outcomes

Outcome type	Frame	Modal preferences		
		I	S	MAPs hold?
Mixed gains **(integration)**	Control	75%	21%	**Yes**
	Absolute	33%	40%	No - reversal
	Dual	25%	63%	No - reversal
	Relative	27%	63%	No - reversal
Mixed losses **(segregation)**	Control	52%	38%	**Yes**
	Absolute	35%	40%	No - reversal
	Dual	33%	52%	No - reversal
	Relative	27%	60%	No - reversal
Multiple gains **(segregation)**	Control	33%	22%	**No**
	Absolute	11%	60%	Yes - reinforced
	Dual	9%	69%	Yes - reinforced
	Relative	11%	67%	Yes - reinforced
Multiple losses **(integration)**	Control	22%	51%	**Yes**
	Absolute	27%	47%	Yes
	Dual	16%	67%	Yes
	Relative	13%	69%	Yes

In our treatment conditions where we evaluate the impact of varying price frames and familiarity with the retailers' past prices (IRP), 63% of the respondents changed their preferences and chose to segregate mixed gains in both of the percentage frames, compared to the percentage who preferred to integrate. Similarly, we find evidence of framing effect in the absolute frame with a higher percentage (40%) preferring to segregate than integrate.

This finding is very similar to what we obtained in the pilot tests. This suggests that consumers' perceptions of monetary gains are not always consistent but could deviate based on how it is described. In other words, the modal preferences we obtained are indicative of the frame dependence of reference dependence. Furthermore, since the location of a reference point makes framing effect possible, we are of the opinion that the reference point investigated, IRP, affected decision makers' perceptions of price discount.

In the mixed losses outcome, we found evidence of framing effect. Both treatment frames, show that subjects preferred integration rather than segregation. Similarly, the inclusion of IRP alone also led to a preference reversal as we hypothesized.

Preferences for multiple gains also show evidence of frame dependence and support our hypothesis that MAPs for multiple gains would be reinforced by varying price frame. This is evident in the increase between the number of respondents who chose to segregate multiple gains in the absolute price frame (60%) and in the dual (69%) and relative (67%) frames.

With multiple losses however, modal preferences are consistent with the mental accounting principle to integrate and showed no evidence of framing effect in the percentage frames. In addition, we also found no evidence that IRP alone in the absence of percentage frames influenced price perception in the multiple losses outcome (absolute frame).

Overall, our results from the control conditions were mostly consistent with MAPs with the exception of multiple gains. Similarly, in the treatment conditions, only multiple losses indicated preferences consistent with Thaler’s (1985) MAPs. Nevertheless, framing effects were observed in the other three outcomes. Results from modal preferences suggest that consumers are very sensitive to the context relating to their decision frames.

4.7 ANALYSIS OF RESULTS

Table 4.6 shows the means obtained from experiment 1. The consistencies of our means in each monetary outcome with Thaler’s (1985) MAPs are also indicated in table 4.6. The results are analysed using a frame by outcome type repeated measures ANOVA where frame is the independent categorical variable and outcome type is the dependent variable measured on a scale of 1-15. The means from all conditions are tested against the scale’s mid-point ‘8’ which represents indifference between integration and segregation. The computer software used carried out the Mauchly’s test of the sphericity and also made corrections where there were any violations.

Table 4.6
Means from all experiments tested against mean 8

Monetary Outcome and Price Frame	*n*	Mean predicted[16]: actual[17]	Actual mean	Consistency with predicted MAPs
Mixed Gains (Mr. A is happier)				
Control	48	<8: 6.16	6.16	Mr. A is happier. MAP holds
Absolute	48	<8: 8.02	8.02	Mr. B is happier. MAP reversed
Dual	48	8: 8.81	8.81	Mr. B is happier. MAP reversed
Relative	48	8: 8.85	8.85	Mr. B is happier. MAP reversed
Mixed Losses (Mr. A is unhappier, Mr. B is preferred)				
Control	48	>8: 7.27	7.27	Mr. A is unhappier. MAP holds
Absolute	48	>8: 7.70	7.70	Mr. A is unhappier. MAP holds
Dual	48	8: 8.70	8.70	Mr. B is unhappier. MAP reversed
Relative	48	8: 8.95	8.95	Mr. B is unhappier. MAP reversed
Multiple Gains (Mr. B is happier)				
Control	45	>8: 7.57	7.57	Mr. A is happier. MAP inconsistent
Absolute	45	>8: 9.48	9.48	Mr. B is happier. MAP reinforced
Dual	45	8: 9.88	9.88	Mr. B is happier. MAP reinforced
Relative	45	8: 9.75	9.75	Mr. B is happier. MAP reinforced
Multiple Losses (Mr. B is unhappier, Mr. A is preferred)				
Control	45	<8: 9.24	9.24	Mr. B is unhappier. MAP holds
Absolute	45	<8: 8.88	8.88	Mr. B is unhappier. MAP holds
Dual	45	8: 9.80	9.80	Mr. B is unhappier. MAP holds
Relative	45	8: 10.04	10.04	Mr. B is unhappier. MAP holds

Prevailing mental accounting principles suggests that mixed gains will be integrated while mixed losses will be segregated. We hypothesized that percentage frames would alter consumers' perceptions of price change and would increase their tendency to maximize value by reversing the mental accounting principles for mixed gains and mixed losses, that is, segregation of mixed gains and integration of mixed losses. Based on this hypothesis,

[16] Where MAP suggests integration, predicted mean will be less than 8 which is the scale's midpoint and greater than 8 in segregation in the control and absolute frames. The treatment frames however indicate our prediction based on our hypothesis.

[17] These are means obtained from our experiments and which are tested against the scale's midpoint.

we expect that at least one or both of the dual and relative frames would increase sensitivity towards maximizing value in the mixed gains and mixed losses conditions.

Mental accounting principles for multiple gains and multiple losses also predict segregation of multiple gains and integration of multiple losses. We hypothesized that percentage frames would increase the tendency to segregate two or more discounts (multiple gains), but reverse the tendency to integrate multiple increases in prices (losses).

In other words, we expect percentage frames to reinforce mental accounting principles in multiple gains but reverse it in multiple losses. This is however different from the findings of Heath et al. (1995) in that they hypothesized that percentage frames would reinforce MAPs across both the multiple gains and multiple losses scenarios.

At first glance, the mean results in the mixed gains domain (from table 4.6) seem to support hypothesis 1 (percentage frames will reverse MAP for mixed gains and losses) because both treatment frames have means greater than 8 (8.81 and 8.85 in dual and relative frames) indicating segregation and which is contrary to the proposed MAP for mixed gains. The absolute frame likewise shows a slight tendency towards segregation (8.02) which suggests that where clearly specified, reference states alter MAPs. Based on these means alone, we could conclude that there's been a preference reversal of the predicted preference to integrate. Further investigation shows that the statistical significance from our analysis justifies the means obtained. Mauchly's test of sphericity from repeated measures ANOVA indicated that the assumption had been violated ($X^2(5) = 22.68$ with $p < 0.001$). Degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\varepsilon = 0.78$). The results show that there was a statistically significant effect of frame on outcome type F (2.33, 109.43) = 9.51, p < 0.001. Post hoc analysis with pairwise comparison was conducted with a Bonferroni correction applied. We find significant mean differences at the 0.05 level between the treatment frames and the control frame and between the absolute and control frames. We therefore reject the null hypothesis.

In the mixed losses domains, the means tested against the mid-point 8 shows evidence of framing effect in the treatment frames. Mean preferences indicate segregation which further implies that integration best minimizes disutility. Mauchly's test of sphericity indicated that the assumption had been violated ($X^2(5) = 39.25$ with $p < 0.001$). Degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\varepsilon = 0.67$), F (2.02, 94.99) = 4.27 p = 0.016. However, Pairwise comparison with

Bonferroni correction shows non-significant mean differences between the frames and we fail to reject the null hypothesis as we find no significant evidence that price framing altered the MAP for mixed losses.

For multiple gains, the means obtained in the absolute, dual and relative frames differ significantly from mid-point '8', which suggests an increased tendency to segregate as predicted by MAP. This is consistent with our hypothesis that the preference to segregate would be reinforced for multiple gains. Mauchly's test of sphericity shows that the assumption had been violated ($X^2(5) = 34.59 \text{ with } p < 0.001$). Greenhouse-Geisser estimates of sphericity ($\varepsilon = 0.74$) was applied in correcting the degrees of freedom. The results show that there was a statistically significant effect of frame on outcome type F (2.21, 97.43) =9.32, p < 0.001. Pairwise comparison with Bonferroni correction shows significant mean differences between the treatment frames and the control group and we therefore reject the null hypothesis.

In multiple losses, means tested against the scale's midpoint '8' from our treatment frames show a strong tendency towards segregation. This, in turn implies that respondents preferred to integrate multiple losses as predicted by MAP. Mauchly's test of sphericity from repeated measures ANOVA indicated that the assumption had been violated ($X^2(5) = 23.14 \text{ with } p < 0.001$). Degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\varepsilon = 0.81$). The results show that there was a non-statistical significant effect of frame on outcome type F (2.443, 107.41) =2.38, p < 0.087. Post hoc analysis with pairwise comparison was not necessary as we cannot reject the null hypothesis.

In summary, we found that gains were more sensitive to frame manipulation than losses. In addition, although we found evidence of framing effect in mixed losses, it was non-significant.

4.7.1 Comparison of our results with previous related studies

Heath et al. (1995) and Chatterjee et al. (2000) criticized Thaler's (1985) MAPs with respect to the lack of explicit reference points within the decision frames of the experiments from which MAPs were investigated. They suggested that the specific reference points from which the deviations of gains and losses are evaluated could affect how consumers perceive monetary outcomes and further opined that the value function

Table 4.7
Comparison of previous studies

Study	Conceptualization of IRP	Outcome	Hypothesis	Results
Mazumdar and Jun (1993)	No reference prices.	Multiple gains Single gain Single loss Multiple losses	Preferable to single gain. Not preferable to multiple gains. Preferable to multiple losses. Less preferable to single loss.	Confirmed MAPS of segregating gains. Confirmed MAPs of integrating losses.
Heath et al. (1995)	Retailer's original prices	Mixed gains Mixed losses Multiple gains Multiple losses	MAPs reversed MAPs reversed MAPs reinforced MAPs reinforced	MAPs reversed MAPs reversed MAPs reinforced MAPs reinforced
Chatterjee et al. (2000)	Retailer's original prices	Mixed gains Mixed losses	MAPs reversed MAPs reinforced	MAPs reversed No framing effect
Current paper Experiment 1	Recently observed past prices of a retailer	Mixed gains Mixed losses Multiple gains Multiple losses	MAPs reversed MAPs reversed MAPs reinforced MAPs reversed	MAPs reversed Confirmed MAPs MAPs reinforced Confirmed MAPs

(Kahneman and Tversky, 1979) could possibly need to be re-evaluated so as to capture how deviations from the status quo are framed. This present study replicates the existing research by Heath et al. (1995) which considered a retailer's original prices, and we investigate to what extent MAPs will hold when reference states are introduced into decision scenarios.

In table 4.7 we make a comparison between our results and the results obtained in related studies by Mazumdar and Jun (1993), Heath et al. (1995) and Chatterjee et al. (2000) which had examined the framing of prices in relation to Thaler's (1985) prevailing MAPs. We recap the main ideas from these studies and distinguish between the results and ours.

The first study by Mazumdar and Jun (1993) evaluated consumers' perceptions of multiple price changes in component products versus single price changes in a product bundle. More specifically, they compared the differences in the way consumers perceived multiple gains and a single gain (single discount) and multiple losses and a single loss (single increase in price). They did not evaluate mixed gains and mixed losses.

Further to the finding by Thaler (1985) that decision makers derive more satisfaction from two or more gains than from one single gain and conversely, find two or more losses more unrewarding than just a single loss, they considered situations in which consumers were uncertain about the price and how this affected their perceptions of changes in prices. They also examined consumers' perceptions of price discount or price increase on a product bundle consisting of a low priced and high priced product. Previous studies show that consumers tend to be insensitive to changes in the price of the lower priced product (Monroe, 1990; Nagle, 1987) leading to a reduced effect in the overall change in price.

Their methodology was similar to that utilized in existing studies (Thaler 1980, 1985) in which subjects are faced with hypothetical decision scenarios. In the study under discussion, participants were asked to evaluate on a scale of 1-11 having 6 as the midpoint the relative happiness or unhappiness of decision makers. Ratings above six indicated a favourable evaluation of multiple gains (losses) while ratings below six signified favourable evaluations of a single change in price (decrease and increase). Their findings indicated that multiple gains in form of decreases in prices were more gratifying than a single price decrease, and a single price increase was less painful than multiple increases in prices. Their study did not evaluate the impact of price frame on perceptions of price and in this way it differs from previous related studies and this current study. However, their results were consistent with MAPs of segregating gains and integrating losses.

Heath at al. (1995) investigated the impact of price frame on multiple and single changes in prices. They investigated the impact of price framing on consumers' perceptions of gains and losses across all outcome types. In the absolute frame, their findings supported MAPs and were also consistent with the empirical findings of Mazumdar and Jun (1993). In contrast, results from the percentage frames showed that price perception was significantly affected. MAPs were reversed in mixed gains and losses and were reinforced in the two multiple outcomes of gains and losses. Their results also showed that the concept of reference dependence which says that the way gains and losses are perceived or coded are dependent on deviations from the reference points could be dependent on frame.

They found that percentage frames reversed consumers' preferences between gains and losses thereby suggesting that the framing of the deviations from the reference point itself matters. The possibility of frame dependent reference dependence is yet to be established theoretically. They concurred with the suggestion of Mazumdar and Jun (1993) that a 'frame-sensitive' value function would be best suited for capturing the frame-dependence of reference dependence.

The last study by Chatterjee et al. (2000) analysed the impact of price frame among two categories of individuals: Individuals with low need for cognition and those with a high need for cognition. Their application of cognition referred to the mental effort individuals applied in the processing of changes in prices. They expected individuals in the low cognition category to be more susceptible to preference reversal due to their unwillingness to exert intensive mental efforts.

They investigated the impact of price frame on types of decision makers across the mixed gains and mixed losses outcomes with price framed in absolute dollar terms versus percentage terms and hypothesized that percentage frames would reverse the MAPs to integrate mixed gains among low cognition individuals and reinforce the preference to segregate mixed losses in the same group of individuals. Their study was similar to that by Mazumdar and Jun (1993) in that they only examined two out of the four monetary outcomes. They did not look into multiple outcomes. Their results were consistent with empirical findings that the complexity involved in calculating the total savings where price discounts are described in percentage-based terms affects IRP of consumers. They found evidence of framing effects among the low cognition decision makers but only in the mixed gains outcome.

In the mixed losses outcome however, they found no evidence of framing effects across both types of decision makers with high cognition decision makers having preferences consistent with MAPs regardless of the price frame. They found among the low cognition decision makers that where gains were concerned, they were not so sensitive to price discount frames. This was however different with losses as they tended to exercise more caution in evaluating increases in prices. They were in agreement with Heath et al. (1995) on the need to modify the value function especially in the gains outcome which is more sensitive to the impact of frame than losses which have been found to extenuate sensitivity to frame.

Our current study is more closely related to that by Heath et al. (1995). We examined the same reference state considered in their study however, based on slightly different research hypotheses as indicated in table 4.7. We evaluated the effects of price framing on MAPs and reference dependence based on the following expectations: a) in mixed gains, the MAP to integrate would be reversed to segregate, b) in mixed losses, the tendency for segregation would be reversed to integration, c) in multiple gains, the MAP to segregate will be reinforced, and d) in multiple losses, integration will be reversed to segregation.

In the mixed gains and multiple gains outcomes where we tested the same hypotheses as Heath et al. (1995), our results provided empirical support for their claim that MAPs were frame dependent. However, in the losses domains, we found monetary losses less sensitive to frame manipulation. More specifically, for multiple losses, the MAP to integrate remained consistent with Thaler's (1985) predicted MAP and, although founded on different hypothesis, our results likewise, confirmed those by Heath et al. (1995) in which MAP was reinforced in their multiple losses outcome. Our results differed significantly from theirs in the mixed losses outcome. Where we found no evidence of framing effect, indicated by a reversal of the MAP to segregate, Heath et al. (1995) findings were otherwise.

We found that with the reference state specified as a retailer’s past prices, consumers were less sensitive to the framing of losses compared with that of gains since the results obtained from our experiment were consistent with Thaler's (1985) predicted MAPs for mixed losses and multiple losses.

We draw on the results from our study to make the following recommendations for marketing managers. Firstly, we propose that percentage price signals should be utilized in communicating price discounts to consumers. This is in conformity with existing studies which show the importance of percentages in signalling discounts (Chen et al. 1998; Heath et al. 1995).

Secondly, since consumers are less sensitive to frame manipulations of losses, marketing managers could emphasize key attributes of products as a means of justifying increases in product prices. This would draw attention to the qualities of the product itself and mitigate the negative feelings which could arise from perceptions of unfair prices.

Thirdly, our results in the mixed losses outcome provide empirical support for Thaler's (1985) silver lining principle in which he proposed that consumers would prefer to separate a large gain from a small loss to maximize utility as opposed to cancelling the loss by the size of the gain. Jarnebrant, Toubia and Johnson (2009) also provide empirical support for the silver lining effect from their study evaluating nonmonetary and monetary conditions and propose that the silver lining principle is likely to occur universally. Therefore, since decision makers are invariably faced with mixed outcomes on a frequent basis, we propose that the silver lining effect could provide guidance for managers on how to communicate pricing strategies such that consumers perceive gains from overall perceptions of losses.

Lastly, our results provide support for frequent discounting by retailers as a pricing strategy alternative to depth discounting which offers large discounts infrequently.

4.7.2 Results from Wilcoxon signed-rank test

A Wilcoxon signed-rank was used to ascertain the impact of price frame on monetary outcomes. We hypothesized that frame would have an impact on MAPs as follows.

H_1: Percentage frames will reverse MAP for mixed gains and losses.

H_2: Percentage frames will reinforce MAP for multiple gains and reverse multiple losses.

From table 4.8, we see in the mixed gains outcome that the mean rank for the dual frame suggests the tendency to be better than the relative frame in affecting MAPs with the relative frame having a higher result. We also see a significant difference in the mean ranks of the price frames ($X^2 = 7.248$ with $p = 0.027$). We conducted post hoc analysis (multiple comparisons of price frame) using the Wilcoxon signed-rank test and applied a Bonferroni correction (0.05 / 3 = p < 0.017). Our results indicate that there were no significant differences between the dual and absolute frames (Z = -1.81, p = 0.071), the relative and dual frames (Z = -1.26, p = 0.208) and between the relative and absolute frame (Z = -1.39, p = 0.166) and we therefore cannot reject the null hypothesis.

Likewise in mixed losses, we find significant differences in the mean ranks of the price frames ($X^2 = 10.493$ with $p = 0.005$). A Bonferroni correction indicates that there was a significant difference between the relative and absolute frames only (Z = -2.873, p = 0.004) and we can therefore reject the null hypothesis.

Contrary to our expectations, our results do not indicate any significant differences in the mean ranks of the price frames in the multiple gains outcome ($X^2 = 3.185$ with $p = 0.203$). Hence, a Bonferroni correction was not necessary and we cannot reject the null hypothesis.

Lastly, the results in the multiple losses outcome show a significant difference in the mean ranks of the price frames ($X^2 = 9.596$ with $p = 0.008$). However, from the Bonferroni correction applied we found no significant differences across all frames. We therefore cannot reject the null hypothesis.

In summary, contrary to our expectations, our findings from the Wilcoxon signed-rank test suggest that price frame manipulations had significant impact only in the mixed losses domains. We found no impact of framing effect in mixed gains, multiple gains and multiple losses outcomes.

Table 4.8
Outputs from Friedman Test

Mixed gains

Ranks	
	Mean Rank
Absolute	1.76
Dual	2.04
Relative	2.20

$Test\ Statistics^a$	
N	48
Chi-square	7.248
df	2
Asymp.Sig	0.027

Multiple comparisons of frame (Based on negative ranks)

	Dual - Absolute	Relative - Dual	Relative - Absolute
Z	-1.808^{b}	-1.258^{b}	-1.387^{b}
Asymp.Sig. (2-tailed)	0.071	0.208	0.166

Mixed losses

Ranks	
	Mean Rank
Absolute	1.70
Dual	2.06
Relative	2.24

$\boldsymbol{Test\ Statistics^{a}}$	
N	48
Chi-square	10.493
df	2
Asymp.Sig	0.005

Multiple comparisons of frame (Based on negative ranks)

	Dual - Absolute	Relative - Dual	Relative - Absolute
Z	-1.830^{b}	-2.873^{b}	-1.109^{b}
Asymp.Sig. (2-tailed)	0.067	0.004	0.267

Multiple gains

Ranks	
	Mean Rank
Absolute	1.84
Dual	2.02
Relative	2.13

$\boldsymbol{Test\ Statistics^{a}}$	
N	45
Chi-square	3.185
df	2
Asymp.Sig	0.203

Multiple comparisons of frame (Based on negative and positive ranks)

	Dual - Absolute	Relative - Dual	Relative - Absolute
Z	-1.133^{b}	$-.473^{b}$	$-.139^{c}$
Asymp.Sig. (2-tailed)	0.257	0.636	0.890

Multiple losses

Ranks	
	Mean Rank
Absolute	1.71
Dual	2.10
Relative	2.19

$\boldsymbol{Test\ Statistics^{a}}$	
N	45
Chi-square	9.596
df	2
Asymp.Sig	0.008

Multiple comparisons of frame (Based on negative ranks)

	Dual - Absolute	Relative - Dual	Relative - Absolute
Z	-1.836^{b}	-2.373^{b}	$-.491^{b}$
Asymp.Sig. (2-tailed)	0.066	0.018	0.623

4.8 GENERAL DISCUSSION

In this chapter, we applied concepts from the field of Behavioural Economics to hypothetical consumer behaviour as a means of understanding how consumers react to different real life purchase decisions. Specifically, we investigated the impact of price frame on consumers' perceptions of changes in a retailer's prices based on Thaler’s (1985) proposed mental accounting principles, and identified key insights about the influence of price as a multidimensional construct on consumer decision making. Our findings are summarized as follows.

a) Price framing primarily influences how consumers perceive marketing price signals/promotions. Our results show that consumers perceive a greater sense of value when price discounts are described in percentage terms. This led to changes in their preferences from integrating mixed gains to segregating them, and reinforced their decisions to segregate multiple price discounts. This implies that experiencing the price discounts separately, for example on two or more items to be purchased, was more appealing when the discounts were framed in percentages, than if one discount had been applied to the total sum of purchases.
b) It does not matter how you frame it, consumers are more sensitive to losses than gains of the same magnitude. We found that losses seem immune to price framing manipulations especially when anchored against past prices.

A key factor which explains the evidence of preference reversals in our study is based on the empirical findings of Mazumdar and Papatla (2000). They found evidence supporting the claim that consumers utilize reference prices differently and it would be incorrect to assume that all consumers utilize the same number and quantity of reference prices. As yet, it is not possible to pinpoint the exact cognitive processes of reference price based decision making. It is entirely possible that people are more inclined to minimize losses and maximize gains. It is also possible that the reference point for people may vary and not be dependent on the experimenter's formulated decision frame but on a different subjective frame. This would imply that decision makers could possibly still adopt their own frames which might differ from that intended by the researcher, leading to a difference in choices. Nonetheless, we are of the opinion that percentage price frames refocus consumers' perceptions of changes in prices such that gains are good and losses do not hurt so much. It is therefore plausible to propose that in relation to discounts/price promotions, the discounted products are perceived as providing more acquisition utility due to the percentage frame used in communicating the change in prices. Percentage frames increase the sense of value or 'deal' attainment.

With regards to consumers' perception of losses, Harinck et al. (2007) and Kermer et al. (2006) found that when consumers were asked to indicate what they thought their responses would be after experiencing a negative event, respondents tended to put more emphasis on the impact they thought such an event would have. This could explain the tendency for losses to be consistent with MAPs regardless of frame manipulation. Tversky and Kahneman (1981) provide empirical support for this through their findings that "losses loom larger than gains"[18].

An important caveat of our study is in relation to the design of the control conditions versus treatment conditions. The control conditions were not truly compatible with the rest of the study because although they are the original experiments from which MAPs were derived, and these MAPs are replicated in 3 out of 4 of our control conditions[19], they differ in structure and content from the rest of the questions employed in our experiment. Consequently, we emphasize the need for care in extrapolating our results to real life situations subject to further studies to validate these findings and proffer alternative explanations.

In terms of managerial implications, this study shows that pricing strategies employed by marketers should emphasize the use of percentages in communicating price discounts. In addition, since empirical research suggests that consumers are more sensitive to losses than gains, where prices of products have been increased, managers could draw attention to key attributes of the products in order to highlight why consumers should go ahead with making the purchase rather than switching to a lower priced brand.

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[18] Conversely, Harinck et al. (2007) also found from their study that in small sums of money, the utility derived from gains was greater than the disutility from losses.

[19] In the control conditions, we replicated Thaler's (1985) mental accounting principles in the mixed gains, mixed losses and multiple losses outcomes. The preference to segregate multiple gains was not replicated in the control conditions.

CHAPTER 5

THE IMPACT OF PRICE FRAMING AND REFERENCE POINTS ON CONSUMERS' PERCEPTION OF PRICES

In this chapter, we discuss our second and third reference points: competitor's current and competitor's past prices. External reference prices have been described as those prices which are present within the purchase environment, provided by the seller, and against which the consumer makes price comparisons. External reference prices have also been described as retailers' prices which are set slightly lower than those of competing products within the retailer's product offerings. Given this premise, we assume that the consumer is familiar with the retailer's prices and the store environment, visits the store with the intention of buying from the retailer and compares the retailer's current prices with the prices of competing products within the purchase environment. Our results provide justification for the importance of price framing and reference points in marketing.

5.1 THEORETICAL BACKGROUND

Studies on branding suggest that individuals' perceptions of the prices of brands they are familiar with are defined by available information which is supplied by the retailer. For consumers who are not familiar with a brand on the other hand, their perceptions of price are formed based on available information within the purchase environment (Biswas, 1992).

Retailers frequently carry out price promotion on some of their products. These new prices are carefully targeted to affect consumers' perceptions of the retailer's 'new prices' and their desires to get a good 'deal'. The good 'deal' could be communicated to consumers' in any number of ways for example, by making comparisons between a retailer's past prices and a retailer's new discounted prices; or comparison between a manufacturer's prices versus a retailer's prices, etc. These other ways of making price comparisons where the comparative price is provided by the retailer is known as external reference pricing (Biswas and Blair, 1991; Grewal, Monroe, and Krishnan, 1998; Lichtenstein and Bearden, 1989; Lichtenstein, Burton, and Karson 1991; Urbany, Bearden, and Weilbaker, 1988) because the prices are exogenously supplied by the retailer whose overall aim is to achieve higher sales by influencing the consumer into perceiving the retailer's prices as comparatively lower (Bitta et al. 1981).

Three groups of people are proposed to be affected by a price promotion: the retailers who adjust prices, the consumers who patronise the store, and the competitors or other competing brands. This is because often, consumer goods are sold through retailers who offer other competing products.

A number of studies have examined how decision makers evaluate differences in prices expressed in relative terms among competing brands or products based on the concept of reference prices (Biswas and Blair, 1991; Jacobson and Obermiller, 1990; Lattin and Bucklin, 1989; Lichtenstein and Bearden, 1989; Putler, 1982; Urbany and Dickson, 1991). Other papers have looked into the effects of both internal and external reference prices as factors concurrently influencing price perception. The general consensus along this line of research is that consumers derive transaction utility from the purchases because external reference prices raise consumers' internal reference prices thereby leading to favourable perceptions of price (Compeau and Grewal, 1998; Grewal and Compeau, 2007).

Nevertheless, a form of reference pricing which has received little to no empirical attention is the external reference price (ERP) which occurs when retailers set prices slightly below those of other competing products or brands carried by the retailer (Ferrell and Hartline, 2012).

This current analysis evaluates external reference standards as two price constructs which are assumed to be present within the consumers' purchase environment and are derived from the usual in-store display cues where the retailer's products are arranged in close proximity to other competing brands to emphasise that prices are comparatively low. In the use of external reference prices, the store environment serves as the most striking frame that could impact the consumers' decision making process.

When choosing among brands, consumers evaluate prices not absolutely, but in comparison to some form of standard price, the reference price. The empirical studies reviewed previously support this premise, and at least two theoretical frameworks explain the logic: prospect theory (Kahneman and Tversky, 1979) and mental accounting (Thaler, 1985). These frameworks suggest that consumers do not make decisions in terms of absolute wealth but of losses or gains relative to a reference point. In the current context, this would imply evaluating brands by comparing their price with a reference price. Prospect theory and mental accounting show the importance of framing to decision making.

Using prospect theory and mental accounting principles, we present positive deviations in form of price discounts as gains and negative deviations in form of increases in the retailer’s prices as losses. Our goal is to evaluate the impact of price framing on consumers' perceptions of value in relation to the afore-mentioned frameworks.

In essence, we present competitor’s current and past prices as reference points against which negative (price increase) and positive (price decrease) deviations of the retailer's prices are evaluated. We hold the competitor’s prices constant and only the retailer’s prices change (increases and decreases).

5.2 EXTERNAL REFERENCE PRICES AND PRICE DISCOUNTING

The sales strategy of frequent discounting is a popular method employed by stores/retailers to attract buyers. Although extant literature shows that price discounts usually fall within the 15% - 40% range, some retailers often offer higher discounts of 60% - 70% off their products. An important question resulting from this, and which has been addressed by researchers is whether consumers find these price discounts plausible. Results from studies investigating the effect of seemingly exaggerated reference prices (Urbany et al. 1988), show that decision makers do not find these discounts credible and tend to have a sceptical attitude towards them. As such, their perceptions of these discounts are generally less than what is suggested by the retailers (Blair and Landon, 1981; Fry and McDougall, 1974; Liefeld and Heslop, 1985; Mobley, Bearden and Teel, 1988; Sewall and Goldstein, 1979) and implies that consumers discount the price discounts offered by the retailers. For example, Blair and Landon (1981) found that consumers tended to discount retailer-supplied prices by 25% and that even where the prices are implicitly advertised, consumers seemed to review the prices downwards. Supporters of the use of price promotions applaud this practice of discounting discounts by claiming that it is a means consumers employ in protecting themselves (Blair and Landon, 1981).

Another motive put forward in research for this practise is related to the credibility of the retailer/store offering the discount. Research suggests that consumers’ beliefs and behaviours are influenced by the price image of the retailer and store (Hamilton and Chernev, 2013) in terms of perceptions of fair prices, choice of store, decision to make purchase from specific stores or compare prices at other stores, etc. Barnes (1975) found that price discounts from premium stores tended to be more credible than price discounts offered by lower quality stores. Similarly, a study by Biswas and Blair (1991) suggests that consumers tended to discount price promotions from discount stores more than those from non-discount stores.

A different paper (Gupta and Cooper, 1992) carried out tests based on the premise that store image and frequent price discounts were negatively correlated. Their results indicate that price promotions from retailers who do not offer discounts frequently are more likely to be perceived as plausible since consumers' past experience with frequent discounting retailers would immediately suggest that the selling price of a product after a price discount has been applied was not its regular price. Therefore, the implication of discounting the discount would be that the regular price of the discounted product would be perceived as lower than the discounted price offered.

5.3 THE USE OF SEMANTIC CUES

Retailers employ semantic price cues in communicating their comparatively lower prices to consumers. They could be within-store price cues which implies comparison of the prices of specific products offered by a retailer, to other prices available in the store and which our current paper investigates, or between-store cues which involves comparison of prices between competing stores (Grewal, Roggeveen and Lindsey, 2014).

Several studies show that when consumers are uncertain about product prices, some form of prejudice may arise towards the store (see for example, Biswas and Blair, 1991; Biswas and Sherell, 1993; Gunnarsson, 2015; Yadav and Seiders, 1998). Where this occurs, consumers use non-price information in evaluating the value of price promotions. Examples of this non-price information employed in evaluating products are quality, design, size, colour and purpose or intended use. Where these attributes are perceived as similar or seen to overlap, it is easy for uncertain consumers to substitute one product for another regardless of any price discounts offered. Similarly, substitutability will be low where products are marginally related (Walters, 1991).

Other factors influencing price perception in uncertain consumers include the physical attributes of the store, individual differences of consumers, etc.

5.3.1 Physical attributes of the store

Consumers assess the interior and exterior designs of stores in making price judgements (Kirby and Kent, 2010). Ward, Bitner and Barnes (1992) found that consumers could describe a store as expensive or cheap based on the appearance of the store front. This could be from the logo of the store, its design, colours, building materials utilized, the fittings, shelves or ceiling (Verhoeven et al. 2009).

Other studies suggest that the state of being spacious or cluttered lends to the perception of a store as expensive or cheap. Spacious stores with simple but high product displays could be viewed more as a warehouse than a store (Gunnarsson, 2015). On the other hand, a cluttered store could lead to a low perception of the retailer's store and price image.

Other features evaluated which could influence the consumer's perception of a retailer's prices are the sales volume or traffic within the store, lighting and easy access to the products (Esbjerg and Bech-Larsen, 2009; Leudesdorff and Schielke, 2012). These store assessments determine the perceptions of the store's price image and if the price discount will be viewed as low, too low, high or too high or considered credible.

5.3.2 Individual differences of consumers

Decision makers differ on a lot of levels and these differences play a huge role in how prices are evaluated.

Some consumers enjoy searching for price deals and comparing prices from different stores or retailers. Fox and Hoch (2005) and Schindler (1989) term this as 'cherry picking'. Other consumers who prefer to buy only when products are undergoing sales promotions will depend to a large extent on external information supplied by the retailer and tend to be familiar with various retailers' prices. Although consumers differ on the afore-mentioned, they are however faced with similar problems some of which include being able to consistently recall retailers' past prices or persist in 'deal' searches. These factors make consumers susceptible to applying heuristics decision processes or adopting mental frames in their decision making leading to irrational purchase decisions (Gunnarsson, 2015) one of which is mental accounting (see chapter 2). Grewal and Compeau (2007) explain this tendency as being due to consumers' desires to minimize cognitive efforts.

Research also suggests that individuals exhibit differences based on their need for cognition. The need for cognition was initially defined by Cohen, Stotland and Wolfe

(1955) as an individual's desire to understand his or her experiential reality. It has since its original conception been applied to differing inclinations of decision makers to become involved in cognitive behaviour (Cacioppo et al. 1996) or 'effortful, analytical thinking' (Chatterjee et al. 2005). In its application to prices and price promotions, a number of studies have shown that some consumers could be more sensitive to external reference prices depending on their levels of need for cognition (Inman, McAlister and Hoyer, 1990).

From a closely related context to the current paper, Chatterjee et al. (2000) investigated the impact of frame and the need for cognition in the processing of changes in prices. They defined cognition as 'thoughtful effort' and classified subjects into two broad categories: decision makers who apply high cognitive efforts and those who apply low cognitive efforts in the processing of price. They employed two price frames, absolute and percentage frames, and hypothesised that in the percentage frame, low cognitive individuals will avoid the difficult task of calculating the final price after applying the price discount and that for mixed gains outcomes, the mental accounting principle to integrate will be reversed but remain consistent for high cognition subjects. Also, in the mixed losses domains, the tendency to segregate mixed losses will be reinforced in low cognitive individuals but not in the high cognitive ones.

The study by Inman, McAlister and Hoyer (1990) supports their view as they suggest that low cognitive individuals are motivated by external reference price signals even in the absence of any actual price decreases, while high cognitive individuals on the other hand will be motivated to make the purchase based only on the relative size of the discount. Extant literature supports both views and indicates that framing price discounts in percentage-off terms have the tendency to result in promotions being consistently undervalued (Morwitz et al. 1998). This is because, in an attempt to calculate the product price less the discount, the resulting revised prices could be inaccurate thus, leading to a lower perception of the discounted price. For negative deviations in particular, Morwitz et al. (1998) associate this undervaluation with the difficulty in recalling the exact amount of the discount in absolute terms and suggest that consumers tend to recall lower prices when asked.

The implication of this is that the internal reference prices (IRPs) of decision makers tends to be reviewed downwards leading to an expectation of lower sale prices. Kopalle and Mullikin (2003) describe this as a "boomerang effect" which is based on the posited inverted U-shaped relationship between external reference price discrepancy and consumers' IRPs (Goldberg and Hartwick, 1990; Kopalle and Lehmann, 1995). Thus, if the actual price post computation or at the checkout till is higher (lower) than a consumer expects, it could decrease (increase) chances of purchasing the promoted product (Papatla and Krishnamurthi, 1996; Winer, 1986). These price comparisons are consistent with Kahneman and Tversky's (1979) description of the role reference points play in reference dependence.

In addition to the prospect theory framework discussed above, the inverted U- shaped effect of external reference prices on consumers' perceptions of prices has also been analysed using two of the previously mentioned frameworks of reference prices (see chapter 2). Lichtenstein et al. (1991) investigated this effect based on Helson's (1964) adaptation level theory and Sherif and Hovland's (1961) assimilation contrast theory. They found that when the difference between ERP and IRP was zero, it led to a little, though significant, downshift in IRPs. However, with a positive and increasing difference between ERP and IRP, IRP increased at a decreasing rate indicating that when price discounts are higher than the IRPs of consumers, they tend to discount the price promotion. It was only when the difference between the two was negative that the sales promotion by the retailer was perceived as credible. Empirical studies which have investigated the claim that consumers discount discounts based on the three previously reviewed theoretical frameworks are in support of this notion.

5.4 EXTERNAL REFERENCE PRICE AS A REFERENCE POINT

ERP has been conceptualized in several ways in the literature on reference pricing varying from the retailer's selling price as at the time of purchase (Mayhew and Winer, 1992) to highest, lowest and mean brand prices of other competing products within the brand category (Rajendran and Tellis, 1994).

Research on external reference price supports the claim that external prices play a more significant role on price perception than internal reference prices. Rajendran and Tellis (1994) found that the retailer-supplied prices for crackers had a higher impact on consumer choice in one of the markets they studied compared with internal reference prices. Gupta (1988) in an unrelated study found that consumers would rather switch between prices when faced with changes in prices than change their purchase decisions regarding when to buy or how much to buy.

We apply the rationale behind the arguments above and investigate the role of external reference prices and the influence of price framing on MAPs and reference dependence.

We investigate two external reference prices operationalized as prices of other competing products offered by a retailer and which are within the purchase environment. The original study by Thaler (1985) forms the basis of our examination.

We design experiments in which decision makers compare the actual price of a product with a retailer supplied external reference price. Consumers' familiarity with the prices of the retailer is indicated by their internal reference prices. We however expect consumers' reference prices and subsequent purchase decision to be affected not by the variations in the retailers' prices alone but by comparison with the competing prices accessible to them. Price changes in the form of price discounts and increases in prices are the deviations from the status quo. We utilize three price frames, absolute, dual and relative in the two experiments carried out.

Furthermore, we also expect that the complexity involved in computing changes in retailers' prices presented by the percentage frames, subject to the reference point would significantly affect MAPs. We expect that percentage frames would enhance the perceptions of monetary savings and increase the tendency to segregate gains and at the same time to minimize the perception of loss by drawing attention to the value of changes in prices and not the number of times prices changed. Thus, we propose that decision makers would also prefer to segregate losses in contradiction to the prevailing MAPs for losses. We test the following hypotheses:

H_4: Comparison of a retailer's current prices with a competitor's current prices will affect the consumer's perception of prices.
H_5: Comparison of a retailer's current prices with a competitor's past prices will affect the consumer's perception of prices.
H_{4a}: Percentage-based frames will reverse MAP for mixed gains and losses.
H_{5a}: Percentage-based frames will reinforce MAP for multiple gains and reverse multiple losses.

5.5 STATEMENT OF ORIGINALITY

As far as we know, no other study has empirically investigated the impact of framing competitor's prices on MAPs and reference dependence across both streams of reference price research. In the research stream which centres primarily on modelling reference prices using consumer panel data, the operationalization of external reference prices from those studies is markedly different from ours. To mention a few, Rajendran and Tellis

(1994) model ERP as consumers' lowest prices in specific markets; Mayhew and Winer (1992) model retailer-supplied 'regular' brand price as ERP; Hardie et al. (1993) model the current price of a product on a previous purchase occasion as ERP {see Mazumdar and Sinha, (2005) for a more extensive review}.

The research by Kalwani and Yim (1992) is similar to our study in that they evaluated two hypothetical brands. They carried out a computer controlled-experiment involving two hypothetical brands of laundry detergents with four price discount levels of 10%, 20%, 30% and 40%. Regular prices of the hypothetical brands were the same as actual retail prices from store data with the higher price used as a target while the lower was the control.

Our study employs retailer-supplied prices of other competing products which the consumer is exposed to. We assume implicitly that the consumer is familiar with the retailers' prices and goes to the store with the intent of purchasing the retailer's brand and not the competing brand.

5.6 CONTRIBUTION OF THE CURRENT RESEARCH WITH RESPECT TO EXISTING LITERATURE

The impact of reference prices have been extensively evaluated in literature. Areas of focus vary from the impact of ERP on consumers IRP and price perception to using economic theory to formulate models of consumer choice using panel data. A gap in the literature on reference prices which as yet remains inadequately addressed is the empirical analysis of reference prices under controlled conditions.

Rajendran and Tellis (1994) in particular draw attention to this point. Although their study was based on scanner data, they urged researchers to conduct experiments on reference prices to look into further reference price related questions like the causes of reference prices in order to develop the theory on reference prices. Similarly, Chang, Siddarth and Weinberg (1999) were of the opinion that controlled laboratory experiments and data elicited from surveys would go a long way in explaining the process by which consumers form reference prices as although there is undeniable empirical evidence to support the concept of reference prices, there is as yet no clear evidence that consumers form reference prices or a model or theory explaining how they form reference prices. Extant literature only supports the notion that consumers behave like they form reference prices (Kalyanaram and Winer, 1995).

Thus, the contribution of this research is twofold. First, we address a gap in the methodology on reference prices by carrying out experiments through surveys and second, we evaluate external reference prices in a context not previously considered in literature.

5.7 EXPERIMENT 1

We employ decision scenarios consistent with Thaler (1985), Chatterjee et al. (2000) and Heath et al. (1995) which investigated framing effect in multiple events. While our control questions are based on Thaler's (1985) original approach in which reference states/points were omitted, we explicitly incorporate external reference prices as reference points into our treatment questions.

We adopt the 'couch and chair' purchase scenarios from experiment 1 in chapter four which shows two hypothetical men faced with decision frames involving financially equivalent situations and have to make a choice between purchasing only a chair or a chair and a couch together.

As it relates to the prevailing MAPs, the purchase of the couch alone represents a single outcome indicating the MAP of integration while the purchase of the chair and couch represents two outcomes indicating segregation.

Subjects were asked to indicate on a scale of 1-15 which of two men in hypothetical decision scenarios would be relatively happier (Gains) or unhappier (Losses). The mean of the scales (1-15) '8' was taken as the indicator of indifference for combinations of outcomes. Means below 8 suggest the MAP of integration and means above 8 indicate segregation. In addition, in the gains outcomes, higher numbers indicated by the subjects on the scale, shows the levels of relative happiness of either Mr. A who bought an item or Mr. B who bought two items; and in the losses domains, higher numbers show the levels of relative unhappiness of either Mr. A who bought one item or Mr. B who bought two.

In carrying out this experiment, we ignored the effects of psychological processes such as price certainty and uncertainty, affective reactions to price change; situational factors such as the specific brand in which changes in prices occur, and information in the market place; and individual differences such as product preferences, and level of cognition.

5.7.1 Measures

Subjects were given booklets containing 8 scenarios. The first four scenarios described the gains outcome while the last four presented the losses outcome. The control condition was the first of each set of four scenarios. Participants were asked to evaluate each scenario on a 15-point scale as follows:

Scale of 1 to 7 – Mr. A is happier than Mr. B (with 7 being highest level of happiness).

Scale of 1 to 7 – Mr. A is unhappier than Mr. B (with 7 being highest level of unhappiness).

At midpoint 8 – Mr. A and Mr. B are equally happy.

At midpoint 8 – Mr. A and Mr. B are equally unhappy.

Scale of 9 to 15 – Mr. B is happier than Mr. A (with 15 being highest level of happiness).

Scale of 9 to 15 – Mr. B is unhappier than Mr. A (with 15 being highest level of unhappiness).

Decision scenarios from our questionnaires to illustrate competitor's current prices and price presentation across the 3 frames are shown below. Scenario A shows price change in absolute terms, B shows price change using the dual frame, and C utilizes only the relative frame. All decision scenarios used in our experiments are presented in detail in Appendixes 2 and 3.

Scenario A (Absolute frame)

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair. At the store, Mr. A finds that the price of the £1300 couch he set out to buy has been reduced to £1250; a competitor's couch of the same quality and within the same store is priced at £1250. Mr. B finds that the prices of the £200 chair and £1100 couch he set out to buy have been reduced to £100 and increased to £1150 respectively. A competitor's chair and couch of the same quality and within the same store goes for £100 and £1150 respectively.

Scenario B (Dual frame)

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair. At the store, Mr. A finds that the price of the £1300 couch he set out to buy has been reduced by 4% to £1250; a competitor's couch of the same quality and within the same store is priced at £1250. Mr. B finds that the prices of the £200 chair and £1100 couch he set out to buy have been reduced by 50% to £100 and increased by 5% to £1150 respectively. A competitor's chair and couch of the same quality and within the same store goes for £100 and £1150 respectively.

Scenario C (Relative frame)

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair. At the store, Mr. A finds that the price of the £1300 couch he set out to buy has been reduced by 4%; a competitor's couch of the same quality and within the same store is priced at £1250. Mr. B finds that the prices of the £200 chair and £1100 couch he set out to buy have been reduced by 50% and increased by 5% respectively. A competitor's chair and couch of the same quality and within the same store goes for £100 and £1150 respectively.

5.7.2 Assumptions

We did not conduct any test on ambiguity as further information was not required from respondents in answering the survey. A few made notes on the questionnaires but these are negligible and no useful information could be extrapolated from these.

5.7.3 Design of experiment 1

We carry out four experimental conditions in a repeated-measures design based on outcome type varied across three price frames and with a competitor's current prices as the reference point.

Respondents were post graduate Economics students in the Adam Smith Business School of the University of Glasgow, United Kingdom. There were 247 respondents in total, and 71 of them were randomly assigned to the four experimental conditions. Thirty-three subjects were randomly assigned to two levels of the dependent variable (mixed gains and mixed losses outcome types) and thirty-eight were assigned to the other two levels (multiple gains and multiple losses).

Each respondent is assigned to two treatment levels which represent decision scenarios with explicitly stated reference points and percentage-based price frames; one control level based on Thaler's (1985) original experiments which do not have clearly stated lacking reference points, and an absolute frame in which prices are stated in currency denominated units only and with the reference state clearly stated. The experiments were designed such that the same respondent assigned to the control and treatment levels in the mixed gains domains, was also assigned to that in the mixed losses domain but not to the other two outcome types. This in effect implies that one group of respondents had questionnaires evaluating mixed outcomes and another group, multiple outcomes. Overall values of changes in prices across all outcomes and treatment levels are presented in table 5.1.

Table 5.1 (Competitor's current prices)
Amount of price change across frame and outcome type

OUTCOME	FRAME	VALUE	
		Absolute	Percentage
Mixed Gains:	Control	£50	–
	Absolute	£50	–
	Dual	£50	4%
	Relative	–	4%
Mixed Losses:	Control	£150[20]	–
	Absolute	£50	–
	Dual	£50	4%
	Relative	–	4%
Multiple Gains:	Control	£100	–
	Absolute	£100	–
	Dual	£100	8%
	Relative	–	8%
Multiple Losses:	Control	£100	–
	Absolute	£100	–
	Dual	£100	8%
	Relative	–	8%

5.8 RESULTS FROM PILOTS FOR EXPERIMENT 1

Two pilot tests were carried out prior to the actual study (tables 5.2 and 5.3). Results from both tests were mixed. From table 5.2 in the mixed gains domains, both the dual and relative frames (percentage frames) in pilot 2 showed a preference reversal from the proposed integration to segregation which is indicative of framing effect. In pilot 1 however, we found no evidence of framing effect across both treatment frames.

Overall, results for the mixed gains outcome from both pilot tests were mixed. Where pilot 2 shows a preference reversal, pilot 1 is consistent with MAPs to integrate mixed gains.

[20] Control groups are the classic decision scenarios from Thaler's (1985) experiments and we replicated the same values used in his experiments. The overall gains and losses across frames in each outcome type are however the same.

<u>Table 5.2</u>
<u>Results from pilot tests (Mixed outcomes)</u>

	Frame	Results from tests		MAPs hold?	
		1	2	1	2
Mixed gains (Integration)	Control	Segregation	Integration	No	Yes
	Absolute	Integration	Indifference	Yes	No
	Dual	Integration	Segregation	Yes	No
	Relative	Integration	Segregation	Yes	No
Mixed losses (Segregation)	Control	Segregation	Segregation	No	No
	Absolute	Integration	Indifference	Yes	No
	Dual	Segregation	Indifference	No	No
	Relative	Integration	Integration	Yes	Yes

<u>Table 5.3</u>
<u>Results from pilot tests (Multiple outcomes)</u>

	Frame	Results from tests		MAPs hold?	
		1	2	1	2
Multiple gains (Segregation)	Control	Segregation	Integration	Yes	No
	Absolute	Integration	Integration	No	No
	Dual	Integration	Segregation	No	Yes
	Relative	Integration	Segregation	No	Yes
Multiple losses (Integration)	Control	Segregation	Integration	Yes	No
	Absolute	Segregation	Integration	Yes	No
	Dual	Segregation	Segregation	Yes	Yes
	Relative	Integration	Segregation	No	Yes

In the dual frame of the mixed losses domains for pilot 1, subjects indicated that integration was best suitable for minimizing disutility which is contrary to the MAP for mixed losses. The relative frame was however, consistent with MAPs. For pilot 2, although subjects were indifferent between preferences in the dual frame, the choice in the relative frame was consistent with MAPs.

From table 5.3, we once again find results consistent with our hypothesis with both the dual and relative frames reinforcing the preference to segregate multiple gains in the pilot 2 test. In pilot 1 however, we find no evidence of framing effect as results from both treatment frames showed preferences which were inconsistent with the MAP to segregate multiple gains.

In the multiple losses domains on the other hand, the results were mixed. While the dual frames in both pilot tests were consistent with integration of multiple losses, the relative frame in pilot 1 showed a preference reversal.

The control questions were not always consistent with MAPs. Results from both pilot tests were not reproducible in the mixed gains domains while the absolute frame was mostly consistent with the proposed MAPs. This finding was however not the same in the mixed losses outcome as the results from our control questions showed preferences inconsistent with segregation across both pilot tests, while in the multiple gains and multiple losses outcomes, preferences were mixed in the control conditions of both tests.

5.9 EXPERIMENT 2

Experiment 2 is very similar to experiment 1. Respondents were given the same instructions as in experiment 1 about the two hypothetical men with the only difference being the change in reference point. Our reference point in experiment 2 is ‘a competitor’s past prices’ as illustrated below.

Scenario A (Absolute frame)

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair. At the store, Mr. A finds that the price of the £1300 couch he set out to buy has been reduced to £1250. He had visited the store the previous week and a competitor’s couch of the same quality and within the same store had been priced at £1300. Mr. B finds that the prices of the £200 chair and

£1100 couch he set out to buy have been reduced to £100 and increased to £1150 respectively. He had visited the store the previous week and a competitor's chair and couch of the same quality and within the same store had been priced at £200 and £1100 respectively.

Scenario B (Dual frame)

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair. At the store, Mr. A finds that the price of the £1300 couch he set out to buy has been reduced by 4% to £1250. He had visited the store the previous week and a competitor's couch of the same quality and within the same store had been priced at £1300. Mr. B finds that the prices of the £200 chair and £1100 couch he set out to buy have been reduced by 50% to £100 and increased by 5% to £1150 respectively. He had visited the store the previous week and a competitor's chair and couch of the same quality and within the same store had been priced at £200 and £1100 respectively.

Scenario C (Relative frame)

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair. At the store, Mr. A finds that the price of the £1300 couch he set out to buy has been reduced by 4%. He had visited the store the previous week and a competitor's couch of the same quality and within the same store had been priced at £1300. Mr. B finds that the prices of the £200 chair and £1100 couch he set out to buy have been reduced respectively by 50% and increased by 5%. He had visited the store the previous week and a competitor's chair and couch of the same quality and within the same store had been priced at £200 and £1100 respectively.

5.9.1 Design of experiment 2

We carry out two experimental conditions in a repeated-measures design based on outcome type varied across three price frames and with a competitor's past prices as the reference point.

Respondents were post graduate Economics students in the Adam Smith Business School of the University of Glasgow, United Kingdom. There were 247 respondents in total, and 83 of them were randomly assigned to the four experimental conditions. Thirty-nine subjects were randomly assigned to two levels of the dependent variable (mixed gains and mixed losses outcome types) and forty-four were assigned to the other two levels (multiple gains and multiple losses).

Table 5.4 (Competitor's past prices)
Amount of price change across frame and outcome type

OUTCOME	FRAME	VALUE	
		Absolute	**Percentage**
Mixed Gains:	Control	£50	–
	Absolute	£50	–
	Dual	£50	4%
	Relative	–	4%
Mixed Losses:	Control	£150[21]	–
	Absolute	£50	–
	Dual	£50	4%
	Relative	–	4%
Multiple Gains:	Control	£100	–
	Absolute	£100	–
	Dual	£100	8%
	Relative	–	8%
Multiple Losses:	Control	£100	–
	Absolute	£100	–
	Dual	£100	8%
	Relative	–	8%

Each respondent is assigned to the same type of treatment levels and decision scenarios utilized in experiment 1. The experiments were designed such that the same respondent assigned to the control and treatment levels in the mixed gains domains, was also assigned to that in the mixed losses domain but not to the other two outcome types. This in effect implies that one group of respondents had questionnaires evaluating mixed outcomes and another group, multiple outcomes. The 3 levels of the independent variable are absolute, relative and dual. The absolute frame presents the price change in absolute monetary terms. The relative frame describes the price change in percentage terms and omits the final price (after applying the change in price), while the dual frame is a combination of the other 2 frames. Changes in prices across all outcomes and treatment levels are presented in table 5.4.

[21] Control groups are the classic decision scenarios from Thaler's (1985) experiments and we replicated the same values used in his experiments. The overall gains and losses across frames in each outcome type are however the same.

5.10 RESULTS FROM PILOTS FOR EXPERIMENT 2

We carried out two pilot tests prior to the actual study (tables 5.5 and 5.6). Results from both tests were mixed. From table 5.5 in the mixed gains domains for pilot 2, only one of the treatment frames (relative) showed a preference reversal. As for pilot 1, while we found evidence of framing effects only in the dual frame alone, subjects were indifferent between the two MAPs in the relative frame.

In the mixed losses outcome, the dual frame in the two pilot tests supported our hypothesis with a reversal of the principle to segregate mixed losses. The relative frames on the other hand had mixed results from both tests. Pilot 1 showed no evidence of framing effect while we observe a reversal of preferences from segregate to integrate in pilot 2.

Table 5.5
Results from pilot tests (Mixed outcomes)

	Frame	Results from tests		MAPs hold?	
Mixed gains (Integration)		1	2	1	2
	Control	Segregation	Integration	No	Yes
	Absolute	Segregation	Integration	No	Yes
	Dual	Segregation	Integration	No	Yes
	Relative	Indifference	Segregation	No	No
Mixed losses (Segregation)	Control	Segregation	Integration	No	Yes
	Absolute	Indifference	Integration	No	Yes
	Dual	Segregation	Segregation	No	No
	Relative	Integration	Segregation	Yes	No

<u>Table 5.6</u>
<u>Results from pilot tests (Multiple outcomes)</u>

	Frame	Results from tests		MAPs hold?	
Multiple gains (Segregation)		1	2	1	2
	Control	Integration	Segregation	No	Yes
	Absolute	Segregation	Segregation	Yes	Yes
	Dual	Segregation	Segregation	Yes	Yes
	Relative	Segregation	Segregation	Yes	Yes
Multiple losses (Integration)	Control	Segregation	Integration	Yes	No
	Absolute	Segregation	Segregation	Yes	Yes
	Dual	Segregation	Segregation	Yes	Yes
	Relative	Segregation	Segregation	Yes	Yes

From table 5.6, we find results consistent with our hypotheses with both the dual and relative frames reinforcing the preference to segregate multiple gains in pilot tests 1 and 2, thereby showing evidence of framing effects across both treatment frames.

Finally, for multiple losses, results in the treatment frames of both pilot tests did not support our hypothesis and were consistent with the MAP to integrate multiple losses. Preferences for the control condition were mixed in both tests and across all outcome types.

5.11 MAIN RESULTS

Whilst our results from experiments 1 and 2 are unprecedented, they were consistent with our research hypotheses. We begin discussion of our main results with a review of the modal preferences from both experiments and thereafter go over the analysis of our results with a review of tables showing deviations from the mean.

Tables 5.7 and 5.8 highlight the modal preferences from both experiments while tables 5.9 and 5.10 present the means.

Table 5.7
Presentation of modal preferences (competitor's current prices)

Outcome type	**Frame**	**Modal preferences**		
		I	S	MAPs hold?
Mixed gains **(integration)**	Control	79%	9%	**Yes**
	Absolute	39%	39%	No - indifference
	Dual	39%	39%	No - indifference
	Relative	21%	61%	No - reversal
Mixed losses **(segregation)**	Control	64%	24%	**Yes**
	Absolute	48%	18%	Yes
	Dual	50%	22%	Yes
	Relative	34%	31%	Yes
Multiple gains **(segregation)**	Control	50%	32%	**No**
	Absolute	21%	34%	Yes - reinforced
	Dual	3%	66%	Yes - reinforced
	Relative	5%	68%	Yes - reinforced
Multiple losses **(integration)**	Control	18%	63%	**Yes**
	Absolute	26%	39%	Yes
	Dual	18%	53%	Yes
	Relative	13%	61%	Yes

5.12 DISCUSSION OF MODAL PREFERENCES (competitor's current prices)

From table 5.7 we see a representation of the most frequent choices picked by our respondents.

Starting with the control conditions[22], in mixed gains, we obtained results which are consistent with Thaler's MAPs (79%). Similarly, for mixed losses, 64% of the respondents preferred segregation of monetary losses in order to minimize disutility since they found the preference to integrate (Mr. A) more unpleasant than the choice to segregate (Mr. B). However, MAPs do not hold for multiple gains as rather than segregate, 50% of our subjects preferred to integrate. Lastly under the control condition, we found that MAPs were also consistent in the multiple losses outcome.

For our treatment conditions where we evaluate the impact of varying price frames and the comparison of a retailer's prices with a competitor's current prices (ERP), 61% of the respondents changed their preferences and chose to segregate mixed gains in the relative frame. Results obtained from the dual frame were however inconclusive. Modal preferences also suggest that subjects were indifferent in their preferences between the absolute frame and the dual frame. Furthermore, we can infer that ERP alone in the absence of price framing did not have an impact on price perception.

In the mixed losses outcome, modal preferences are consistent with the MAP to segregate and we therefore find no evidence of frame-dependence across the treatment frames and in the absolute frame.

Nevertheless, the results from the multiple outcomes of gains are consistent with our research hypothesis that the impact of price frame will reinforce the preference to segregate multiple gains. This is evident in the increase between the number of respondents who chose to segregate multiple gains in the absolute price frame (34%) and in the dual (66%) and relative (68%). Furthermore, we do not find evidence that ERP alone affected perceptions of prices as modal preferences were consistent with MAPs to segregate multiple gains (34%) compared to 21% of the participants who chose to integrate.

With multiple losses, our results are consistent with MAPs. All three frames (absolute, dual and relative) showed no evidence of preference reversals.

[22] Control conditions replicate the scenarios from Thaler's (1985) original experiments. The consistencies of our modal preferences with the original MAPs are highlighted in bold texts throughout this chapter.

5.13 DISCUSSION OF MODAL PREFERENCES (competitor's past prices)

Table 5.8 shows the modal preferences from experiment 2. Starting with the control condition,

82% of the respondents in the mixed gains outcome made choices consistent with Thaler's (1985) original experiments with the decision to integrate a small loss with a larger gain. Similarly, in mixed losses, the preference to segregate was also consistent with MAPs. Multiple gains remained consistent with previous findings as we failed to confirm the MAP to segregate. Notwithstanding, our results were consistent with MAPs for multiple losses.

In the treatment conditions where we evaluate the impact of varying price frames and comparison of a retailer's prices with a competitor's past prices (ERP), both the dual and relative frames showed evidence of framing effect as indicated by the higher number of subjects who chose to segregate as opposed to integrate based on MAPs. 49% of the respondents preferred to segregate mixed gains in the dual frame compared with the 31% who chose integration. While in the relative frame, 46% preferred segregation. Moreover, we do not find evidence that ERP alone affected perceptions of prices in the absolute frame as modal preferences were consistent with MAPs to integrate mixed gains (46%) compared to 33% of the participants who chose to segregate.

In the mixed losses outcome, we found mixed results. In the dual frame, we observed no evidence of framing effect while in our relative treatment frame, modal preferences were inconsistent with MAPs. Similarly, we found evidence that ERP alone affected perceptions of prices as MAPs did not hold in the absolute frame.

TABLE 5.8
Presentation of modal preferences (competitor's past prices)

Outcome type	Frame	Modal preferences		
		I	S	MAPs hold?
Mixed gains **(integrate)**	Control	82%	15%	**Yes**
	Absolute	46%	33%	Yes
	Dual	30%	49%	No - reversal
	Relative	33%	46%	No - reversal
Mixed losses **(segregate)**	Control	51%	41%	**Yes**
	Absolute	28%	44%	No - reversal
	Dual	36%	31%	Yes
	Relative	36%	38%	No - reversal
Multiple gains **(segregate)**	Control	45%	30%	**No**
	Absolute	14%	57%	Yes - reinforced
	Dual	21%	55%	Yes - reinforced
	Relative	18%	64%	Yes - reinforced
Multiple losses **(integrate)**	Control	9%	64%	**Yes**
	Absolute	18%	48%	Yes
	Dual	21%	61%	Yes
	Relative	20%	64%	Yes

Results from the multiple outcomes of gains have been consistent across both experiments and also consistent with our research hypothesis that the impact of price frame will reinforce the preference to segregate multiple gains. This is evident in the increase between the number of respondents who chose to segregate multiple gains in the absolute price frame (57%) and in the relative frame (64%). Preferences dipped ever so slightly in the dual frame to 55% but we can still conclude that percentage frames elicited framing effect. Furthermore, we do not find evidence that ERP alone affected perceptions of prices as modal preferences were consistent with MAPs to segregate multiple gains (57%) compared to 14% of the participants who chose to integrate.

With multiple losses, modal preferences indicate that the MAP to integrate holds across all three outcomes (absolute, dual and relative).

5.14 ANALYSIS OF RESULTS FROM EXPERIMENT 1

Table 5.9 shows the means from experiment 1. The results are analysed using a frame by outcome type repeated measures ANOVA where frame is the independent categorical variable and outcome type is the dependent variable measured on a scale of 1-15. The means from all conditions are tested against the scale's mid-point '8' which represents indifference between integration and segregation. The computer software used carried out the Mauchly's test of the sphericity and also made corrections where there were any violations.

Prevailing mental accounting principles suggest that mixed gains will be integrated while mixed losses will be segregated. We hypothesize that percentage frames would alter consumers' perceptions of price change and would increase their tendency to maximize value by reversing the MAPs for mixed gains and mixed losses: that is, segregation of mixed gains and integration of mixed losses. Based on this hypothesis, we expected that at least one or both of the dual and relative frames would increase sensitivity towards framing effects in the mixed gains and mixed losses conditions.

Similarly, mental accounting principles for multiple gains and multiple losses predict segregation of multiple gains and integration of multiple losses. We hypothesize that percentage frames would increase the tendency to segregate gains but reverse the tendency to integrate losses. In other words, we expect percentage frames to reinforce MAPs in multiple gains but reverse it in multiple losses, thereby increasing the tendency to segregate multiple outcomes.

TABLE 5.9
Means from all outcomes in experiment 1 tested against mean 8

Monetary Outcome and Price Frame	*n*	Mean (predicted[23]: actual[24])	Actual mean	Consistency with predicted MAPs
Mixed Gains (Mr. A is happier)				
Control	33	<8: 5.33	5.33	Mr. A is happier. MAP holds
Absolute	33	<8: 8.12	8.12	Mr. B is happier. MAP reversed
Dual	33	8: 8.09	8.09	Mr. B is happier. MAP reversed
Relative	33	8: 9.39	9.39	Mr. B is happier. MAP reversed
Mixed Losses (Mr. A is unhappier, Mr. B is preferred)				
Control	33	>8: 6.69	6.69	Mr. A is unhappier. MAP holds
Absolute	33	>8: 6.42	6.42	Mr. A is unhappier. MAP holds
Dual	33	8: 7.00	7.00	Mr. A is unhappier. MAP holds
Relative	33	8: 7.96	7.96	Mr. A is unhappier. MAP holds
Multiple Gains (Mr. B is happier)				
Control	38	>8: 7.78	7.78	Mr. A is happier. MAP inconsistent
Absolute	38	>8: 8.28	8.28	Mr. B is happier. MAP reinforced
Dual	38	8: 10.36	10.36	Mr. B is happier. MAP reinforced
Relative	38	8: 10.55	10.55	Mr. B is happier. MAP reinforced
Multiple Losses (Mr. B is unhappier, Mr. A is preferred)				
Control	38	<8: 9.63	9.63	Mr. B is unhappier. MAP holds
Absolute	38	<8: 8.28	8.28	Mr. B is unhappier. MAP holds
Dual	38	8: 9.36	9.36	Mr. B is unhappier. MAP holds
Relative	38	8: 9.97	9.97	Mr. B is unhappier. MAP holds

In the mixed gains domains, we found a small evidence of framing effect in the absolute frame. The mean result in this frame showed a slight tendency towards segregation (8.12) and was inconsistent with mental accounting prediction to integrate. The dual frame also showed a slight tendency towards segregation (8.09). However, the relative frame indicates a clear reversal of the MAP to integrate mixed gains with a mean of 9.39 which points to segregation. Mauchly's test of sphericity from repeated measures ANOVA indicated that

[23] Where MAP suggests integration, predicted mean will be less than 8 which is the scale's midpoint and greater than 8 in segregation in the control and absolute frames. The treatment frames however indicate our prediction based on our hypothesis.

[24] These are means obtained from our experiments and which are tested against the scale's midpoint.

the assumption had not been violated and was not significant i.e. the variances of differences were not significantly different but approximately equal ($X^2(5) = 5.825$ with $p = 0.324$). As a result, no correction was made to the degrees of freedom. The results show that there was a statistically significant effect of frame on outcome type F (3, 96) = 14.01, p < 0.001. Post hoc analysis with pairwise comparison was conducted with a Bonferroni correction applied. Results shows significant mean differences at the .05 confidence level between the treatment frames and the control frame and between the absolute and control frames. We therefore reject the null hypothesis.

Ostensibly, mean results in the treatment frames of the mixed losses outcome provide support for MAPs and contradict our hypothesis that percentage frame will reverse MAP from segregate to integrate. Further analysis confirms that mixed losses are not frame-dependent. Mauchly's test of sphericity indicated that the assumption had not been violated and the test statistic was non-significant ($X^2(5) = 8.889$ with $p = 0.114$). No correction was made to the degrees of freedom. The results suggest that there was no significant effect of frame on outcome type F (3, 96) = 2.16 p = 0.098 and we cannot reject the null hypothesis.

In the multiple gains outcome, again, we found a slight tendency towards segregation in the absolute frame (8.28) as predicted by MAPs. Means obtained in the treatment frames however differ significantly from '8' which indicates evidence of framing effect with reinforcement in the MAPs to segregate (10.36 and 10.55 in the dual and relative frames). Mauchly's test of sphericity shows that the assumption had been violated ($X^2(5) = 28.39$ with $p < 0.001$). Greenhouse-Geisser estimates of sphericity ($\varepsilon = 0.74$) was applied in correcting the degrees of freedom. The results show that there was a statistically significant effect of frame on outcome type F (2.21, 82.09) = 9.87, p < 0.001. Pairwise comparison with Bonferroni correction shows significant mean differences between the treatment frames and the control frame; and between the absolute and treatment frames. We therefore reject the null hypothesis.

At first glance, the results from the multiple losses outcome appear very similar to those in mixed losses. Mean results in the absolute, dual and relative frames showed that subjects preferred integration to segregation. We also found no evidence to suggest that ERP alone affected MAPs. Nevertheless, we obtained a significant effect of frame on outcome type. Mauchly's test of sphericity from repeated measures ANOVA indicated that the assumption had been violated ($X^2(5) = 13.896$ with $p = 0.02$). Degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\varepsilon = 0.78$), F (2.35, 86.90) =

3.48, p = 0.03. Pairwise comparison with Bonferroni correction shows significant mean differences between the control and absolute frames, and between the absolute and relative frames. We therefore reject the null hypothesis.

Overall, our results from the mixed gains and multiple outcomes of gains and losses suggest that competitor's current prices and price frame manipulations affected prevailing MAPs. Only in the mixed losses outcome did we reject the null hypothesis. We can therefore conclude based on our findings in the afore-mentioned three domains that mental accounting principles and reference dependence depend on how deviations from the reference points are presented.

5.15 ANALYSIS OF RESULTS FROM EXPERIMENT 2

Table 5.10 shows the means from experiment 2. The results are analysed using a frame by outcome type repeated measures ANOVA where frame is the independent categorical variable and outcome type is the dependent variable measured on a scale of 1-15. The means from all conditions are tested against the scale's mid-point 8 which represent indifference between integration and segregation. The computer software used carried out the Mauchly's test of the sphericity and also made corrections where there were any violations.

Prevailing mental accounting principles suggest that mixed gains will be integrated while mixed losses will be segregated. We hypothesize that percentage frames will reverse MAPs in both outcomes such that consumers would prefer to segregate mixed gains and integrate mixed losses. Based on this hypothesis, we expect that at least one or both of the dual and relative frames would increase sensitivity towards framing effects in the mixed gains and mixed losses conditions.

Likewise, where mental accounting principles for multiple gains and multiple losses predict segregation and integration respectively, we hypothesize that percentage frames will increase the tendency to segregate gains but reverse the tendency to integrate losses. In other words, we expect percentage frames to sensitize decision makers to segregate multiple outcomes.

Table 5.10
Means from all outcomes in experiment 2 tested against mean 8

Monetary Outcome and Price Frame	*n*	Mean (predicted[25]: actual[26])	Actual Mean	Consistency with predicted MAPs
Mixed Gains (Mr. A is happier)				
Control	39	<8: 5.00	5.00	Mr. A is happier. MAP holds
Absolute	39	<8: 7.51	7.51	Mr. A is happier. MAP holds
Dual	39	8: 8.43	8.43	Mr. B is happier. MAP reversed
Relative	39	8: 8.38	8.38	Mr. B is happier. MAP reversed
Mixed Losses (Mr. A is unhappier, Mr. B is preferred)				
Control	39	>8: 7.71	7.71	Mr. A is unhappier. MAP holds
Absolute	39	>8: 8.20	8.20	Mr. B is unhappier. MAP reversed
Dual	39	8: 7.46	7.46	Mr. A is unhappier. MAP holds
Relative	39	8: 7.76	7.76	Mr. A is unhappier. MAP holds
Multiple Gains (Mr. B is happier)				
Control	44	>8: 7.57	7.57	Mr. A is happier. MAP inconsistent
Absolute	44	>8: 9.48	9.48	Mr. B is happier. MAP reinforced
Dual	44	8: 9.88	9.88	Mr. B is happier. MAP reinforced
Relative	44	8: 9.75	9.75	Mr. B is happier. MAP reinforced
Multiple Losses (Mr. B is unhappier, Mr. A is preferred)				
Control	44	<8: 10.47	10.47	Mr. B is unhappier. MAP holds
Absolute	44	<8: 9.43	9.43	Mr. B is unhappier. MAP holds
Dual	44	8: 9.50	9.50	Mr. B is unhappier. MAP holds
Relative	44	8: 9.65	9.65	Mr. B is unhappier. MAP holds

First, we found that means obtained in the absolute frame of the mixed gains domains were consistent with MAPs to integrate (7.51). Results from our treatment frames were however consistent with our hypothesis as we found the preference to integrate reversed in both frames (8.43, 8.38). This also shows evidence of framing effect. Mauchly's test of sphericity from repeated measures ANOVA indicated that the assumption had not been violated and was non-significant i.e. the variances of differences were not significantly

[25] Where MAP suggests integration, predicted mean will be less than 8 which is the scale's midpoint in the control and absolute frames. The treatment frame however indicates our prediction based on our hypothesis.

[26] These are means obtained from our experiments and which are tested against the scale's midpoint.

different but approximately equal ($X^2(5) = 9.530$ with $p = 0.090$). As a result, no correction was made to the degrees of freedom. The results show that there was a statistically significant effect of frame on outcome type F (3, 114) = 12.58, $p < 0.001$. Post hoc analysis with pairwise comparison was conducted with a Bonferroni correction applied. Results show significant mean differences at the 0.05 confidence level between the treatment frames and the control frame and between the absolute and control frames. We therefore reject the null hypothesis. Significant mean differences between the control and absolute frames, point to the importance of reference states in MAPs.

For mixed losses, mean results in the treatment frames show no evidence of framing effect and confirm MAPs. The absolute frame however, shows evidence of a slight reversal in the preference to segregate. Upon further analysis, the statistical significance does not confirm our hypothesis that the MAP for mixed losses will be reversed so we fail to reject the null hypothesis. Mauchly's test of sphericity shows that the assumption had been violated ($X^2(5) = 11.19$ with $p = 0.048$). Greenhouse-Geisser estimates of sphericity ($\varepsilon = .85$) was applied in correcting the degrees of freedom. The results suggests that there was no significant effect of frame on outcome type F (2.56, 97.08) = 0.514 $p = 0.65$.

In the multiple gains outcome, results in the absolute frame are consistent with the preference to segregate multiple discounts as predicted by MAPs. Means obtained in the treatment frames also indicate evidence of framing effect with reinforcement of the preference to segregate (9.43 and 9.81 in dual and relative frames). Mauchly's test of sphericity shows that the assumption had been violated ($X^2(5) = 13.43$ with $p = 0.02$). Greenhouse-Geisser estimates of sphericity ($\varepsilon = 0.81$) was applied in correcting the degrees of freedom. The results show that there was a statistically significant effect of frame on outcome type F (2.43, 104.84) =4.41, p=0.01. Pairwise comparison with Bonferroni correction shows significant mean differences between the relative frame and the control frame. We therefore reject the null hypothesis.

For multiple losses, mean results in our treatment and absolute frames show that MAPs hold. Further analysis provides no support for our hypothesis that frame manipulation will reverse multiple losses. Mauchly's test of sphericity from repeated measures ANOVA indicates that the assumption had not been violated and was non-significant ($X^2(5) = 6.774$ with $p = 0.238$). As a result, no correction was made to the degrees of freedom. Our results show that there was no statistical significant effect of frame on outcome type F (3, 129) =1.85, $p = 0.14$ and we fail to reject the null hypothesis.

Overall, our results from experiments 1 and 2 suggest that the framing of a competitor's current prices and not a competitor's past price was more effective at influencing consumers' perceptions of prices. Although decision makers remained insensitive to frame manipulations of mixed losses in both ERPs, they however, showed evidence of framing effect when faced with multiple increases in the competitor's current prices. These results suggest that decision makers are particularly sensitive to the way losses are presented and different manipulations of deviations from the reference points could elicit preference reversals.

Table 5.11
Comparison of means from external reference prices

Frame	*n*	Mean (experiment 1: experiment 2)	MAPs experiments 1&2
Mixed Gains:			
Control	33:39	5.33: 5.00	Integration/Integration
Absolute	33:39	8.12: 7.51	Segregation/Integration
Dual	33:39	8.09: 8.43	Segregation/ Segregation
Relative	33:39	9.39: 8.38	Segregation/ Segregation
Mixed Losses:			
Control	33:39	6.69: 7.71	Integration/ Integration
Absolute	33:39	6.42: 8.20	Integration/Segregation
Dual	33:39	7.00: 7.46	Integration/ Integration
Relative	33:39	7.96: 7.76	Integration/ Integration
Multiple Gains:			
Control	38:44	7.78: 7.57	Integration/ Integration
Absolute	38:44	8.28: 9.48	Segregation/Segregation
Dual	38:44	10.36: 9.88	Segregation /Segregation
Relative	38:44	10.55: 9.75	Segregation /Segregation
Multiple Losses:			
Control	38:44	9.63: 10.47	Segregation/ Segregation
Absolute	38:44	8.28: 9.43	Segregation/ Segregation
Dual	38:44	9.36: 9.50	Segregation/ Segregation
Relative	38:44	9.97: 9.65	Segregation/ Segregation

5.16 COMPARISON OF RESULTS FROM EXPERIMENTS 1 & 2

An important reason to understand how consumers perceive and cognitively adopt changes in brand prices is to enable retailers and product advertisers to set appropriate prices for their products and also choose effective pricing strategies in communicating changes in prices.

Table 5.11 seemingly suggests that both experiments 1 and 2 were consistent with our hypotheses that percentage frames would either reverse or reinforce MAPs. We see evidence of reversal in the mixed gains outcome, and reinforcements of MAPs in the multiple gains outcome of both experiments. The table also indicates that MAPs remained consistent in the mixed losses and multiple losses outcome of both experiments.

The data analysis below further evaluates the differences in consumers' perceptions of prices between our 2 samples using the Linear Mixed Model analysis. Drawing from experiments 1 and 2 of this current paper, sample 1 represents data from experiment 1 with ERP defined as competitor's current prices, while sample 2 comes from experiment 2 where ERP was conceptualized as competitor's past prices. We investigate the differences in ratings between both sample groups using linear mixed model. For the purpose of this analysis, group 1 is identified as *'CCP'* and group 2 as *'CPP'*.

5.17 LINEAR MIXED MODEL ANALYSIS

Table 5.12 shows that in the mixed gains outcome, there was a significant fixed effect of frame on MAPs {$F(1, 71) = 6.14$, $p = 0.016$}. We obtained no similar result in the between group analysis {$F(1, 70) = 1.93$, $p = 0.17$}. Likewise, in the multiple losses outcome, there were no significant differences between the two samples {$F(1, 80) = 0.64$, $p = 0.43$}. Frame on the other hand had a significant impact on mental accounting preferences.

Our results in the mixed losses outcome suggest that mixed losses were immune to framing manipulations and external stimuli as both price frames {$F(1, 71) = 1.19$, $p = 0.28$} and ERPs indicated non-significant fixed effects {$F(1, 70) = 1.91$, $p = 0.17$}.

Results in the multiple gains outcome were similar to those in the mixed gains domains with frame {$F(1, 81) = 4.23$, $p = 0.043$} rather than between group differences having a significant effect on MAPs.

Table 5.12
Mixed model analysis (ERPs)

Outcome	Source	Estimate	Numerator df	Denominator df	F	Sig.
Mixed gains	Intercept	6.36	1	99.12	92.98	0.00
	Group	0.80	1	70	1.94	0.16
	Frame	1.05	1	71	6.14	0.01
Mixed losses	Intercept	7.27	1	97.39	93.81	0.00
	Group	-0.79	1	70	1.91	0.17
	Frame	0.47	1	71	1.19	0.28
Multiple gains	Intercept	-	1	108.93	180.16	0.00
	Group	-	1	80	0.01	0.90
	Frame	-	1	81	4.23	0.04
Multiple losses	Intercept	8.19	1	111.75	156.04	0.00
	Group	-0.41	1	80	0.64	0.42
	Frame	0.90	1	81	5.37	0.02

*Numbers rounded off to 2 decimal places

5.18 COMPETITORS' PRICES AS A STANDARD OF COMPARISON

Table 5.13 presents an overview of the main results from our experiments. Our results suggest that mixed losses seem particularly immune to framing manipulations. In experiment 2 where we evaluated competitors past prices as a reference point, we also found no impact of price framing on multiple losses. These results support findings from extant literature that losses hurt more than gains of the same magnitude (Kahneman and Tversky, 1979).

We propose that the reference point in experiment 2 implies that the subjects infer any upward changes in the retailer's past prices as a huge decrease in value which should be minimised regardless of how it is presented. In addition, they do not have to buy from the retailer if previous experience indicates they can get a better 'deal' from switching brands.

We can also infer from our findings the possibility that the internal reference points of our respondents with regards to preferences were not formed until comparisons were made with the retailer-supplied prices. This behaviour is consistent with the perceptual processes of reference prices presented in the literature review chapter.

Table 5.13
Summary of results

	Hypothesis and Results	
Outcome Type	**Competitor's current price**	**Competitor's past price**
Mixed gains	Evidence of frame dependence. Reject null hypothesis.	Evidence of frame dependence. Reject null hypothesis.
Mixed losses	No evidence of frame dependence. Cannot reject null hypothesis.	No evidence of frame dependence. Cannot reject null hypothesis.
Multiple gains	Evidence of frame dependence. Reject null hypothesis.	Evidence of frame dependence. Reject null hypothesis.
Multiple losses	Evidence of frame dependence. Reject null hypothesis.	No evidence of frame dependence. Cannot reject null hypothesis.

Nonetheless, we found that using competitor's current prices as a standard of comparison seems to have more impact on consumers' perceptions of multiple losses compared with past prices and suggests a decreasing sensitivity to losses. One possible explanation for this is that for decision makers, although the reference point is clearly stated in the decision problems faced, a different subjective reference point known only to the decision maker could have been applied such that rather than thinking in terms of one huge loss, as a result of increases in prices, the lower increase in price (4%) was perceived as negligible and did not factor into the overall assessment of losses.

This shows the importance of price frame manipulation in communicating changes in prices.

5.19 RESULTS FROM WILCOXON SIGNED RANK TEST (EXPERIMENT 1)

A Wilcoxon signed-rank was used to ascertain the impact of price frame on monetary outcomes (table 5.13). We hypothesized that frame would have on impact of MAPs as follows:

H_{4a}: Percentage frames will reverse MAP for mixed gains and losses.
H_{5a}: Percentage frames will reinforce MAP for multiple gains and reverse multiple losses.

From table 5.14, we see in the mixed gains outcome that the mean rank for the dual frame suggests the tendency to be better than the relative frame in affecting MAPs with the relative frame having a higher result. We also see a significant difference in the mean ranks of the price frames ($X^2 = 8.96$ with $p = 0.011$). We conducted post hoc analysis (multiple comparisons of price frame) using the Wilcoxon signed-rank test and applied a Bonferroni correction (0.05 / 3 = p < 0.017). Our results indicate that there were no significant differences between the dual and absolute frames (Z = -0.014, p = 0.989); the relative and absolute frame (Z = -2.184, p= 0.029) and the relative and dual frames (Z = -2.316, p = 0.021). We therefore cannot reject the null hypothesis.

Likewise in mixed losses, we find significant differences in the mean ranks of the price frames ($X^2 = 6.84$ with $p = 0.033$). A Bonferroni correction indicates that there were no significant differences between the relative and absolute frames (Z = -2.329, p = 0.020), the relative and dual frames (Z = -2.170, p = 0.030) and the dual and absolute frames (Z = -0.826, p = 0.409). We therefore cannot reject the null hypothesis.

Similarly, our results show significant differences in the mean ranks of the price frames in the multiple gains outcome ($X^2 = 9.312$ with $p = 0.010$) A Bonferroni correction indicates that there was a significant difference just between the dual and absolute (Z = -3.274, p = 0.001) and the relative and absolute frames (Z= -3.067, p= 0.002) only. We therefore reject the null hypothesis.

Lastly, similar to our findings in the multiple gains outcome, the results from the multiple losses outcome show a significant difference in the mean ranks of the price frames ($X^2 = 8.000$ with $p = 0.018$). From the Bonferroni correction applied we found significant differences only between the relative and absolute frames (Z = -2.628, p = 0.009). We can therefore reject the null hypothesis.

In summary, results from the Wilcoxon signed-rank test across all outcome types indicate the impact of price frame on MAPs only in the multiple outcomes of gains and losses. This then implies that price framing has a higher impact on consumers' perceptions of multiple price changes compared with single price changes and marketing managers/advertisers can satisfactorily alter their purchase intentions and preference using percentage frames.

Table 5.14
Outputs from Friedman Test (competitor's current price)

Mixed gains

Ranks	
	Mean Rank
Absolute	1.79
Dual	1.86
Relative	2.35

$\boldsymbol{Test\ Statistics^{a}}$	
N	33
Chi-square	8.95
df	2
Asymp.Sig	0.01

Multiple comparisons of frame (Based on negative and positive ranks)

	Dual - Absolute	Relative - Absolute	Relative - Dual
Z	-0.01^{b}	-2.18^{c}	-2.31^{c}
Asymp.Sig. (2-tailed)	0.98	0.02	0.02

Mixed losses

Ranks	
	Mean Rank
Absolute	1.82
Dual	1.89
Relative	2.29

$\boldsymbol{Test\ Statistics^{a}}$	
N	33
Chi-square	6.84
df	2
Asymp.Sig	0.03

Multiple comparisons of frame (Based on negative ranks)

	Dual - Absolute	Relative - Absolute	Relative - Dual
Z	-0.82^{b}	-2.32^{b}	-2.17^{b}
Asymp.Sig. (2-tailed)	0.40	0.02	0.03

Multiple gains

Ranks	
	Mean Rank
Absolute	1.68
Dual	2.14
Relative	2.17

$Test\ Statistics^a$	
N	38
Chi-square	9.31
df	2
Asymp.Sig	0.01

Multiple comparisons of frame (Based on negative ranks)

	Dual - Absolute	Relative - Absolute	Relative – Dual`
Z	-3.27^{b}	-3.06^{b}	-0.52^{b}
Asymp.Sig. (2-tailed)	0.00	0.00	0.59

Multiple losses

Ranks	
	Mean Rank
Absolute	1.74
Dual	2.03
Relative	2.24

$Test\ Statistics^a$	
N	38
Chi-square	8.00
df	2
Asymp.Sig	0.01

Multiple comparisons of frame (Based on negative ranks)

	Dual - Absolute	Relative - Absolute	Relative - Dual
Z	-1.92^{b}	-2.628^{b}	-1.308^{b}
Asymp.Sig. (2-tailed)	0.05	0.00	0.19

5.20 RESULTS FROM WILCOXON SIGNED RANK TEST (EXPERIMENT 2)

A Wilcoxon signed-rank was used to ascertain the impact of price frame on monetary outcomes. We hypothesized that frame would have an impact on MAPs as follows.

H_{4a}: Percentage-based frames will reverse MAP for mixed gains and losses.
H_{5a}: Percentage-based frames will reinforce MAP for multiple gains and reverse multiple losses.

From table 5.15, we see in the mixed gains outcome that the mean rank for the dual frame suggests the tendency to be better than the relative frame in affecting MAPs with the relative frame having a higher result. We also see a significant difference in the mean ranks of the price frames ($X^2 = 6.358 \text{ with } p = 0.042$). We conducted post hoc analysis (multiple comparisons of price frame) using the Wilcoxon signed-rank test and applied a Bonferroni correction (0.05 / 3 = p < 0.017). Our results indicate that there were no significant differences between the dual and absolute frames (Z = -1.681, p = 0.093), the relative and absolute frame (Z = -1.657, p = 0.097) and the relative and dual frames (Z = 0.000, p = 1.000) and we therefore cannot reject the null hypothesis.

In the mixed losses outcome on the other hand, we find no significant differences in the mean ranks of the price frames ($X^2 = 3.500 \text{ with } p = 0.174$). A Bonferroni correction also showed non-significant differences across all frames: relative and absolute frames (Z = -1.049, p = 0.294); the relative and dual frames (Z = -0.637, p = 0.524); and the dual and absolute frames (Z = -1.270, p = 0.204)}. In light of this, we cannot reject the null hypothesis.

Similarly, our results show non-significant differences in the mean ranks of the price frames in the multiple gains outcome ($X^2 = 1.847 \text{ with } p = 0.397$) A Bonferroni correction also indicated non-significant differences across all frames. As such we cannot reject the null hypothesis.

Our findings in the multiple losses outcome are also consistent with results from the previous three outcomes reviewed. The results show a non-significant difference in the mean ranks of the price frames ($X^2 = 1.491 \text{ with } p = 0.475$). From the Bonferroni correction applied we found no significant differences across all. We cannot therefore reject the null hypothesis.

In summary, results from the Wilcoxon signed-rank test across all outcome types indicate that price framing had no impact on MAPs.

Table 5.15
Outputs from Friedman Test (Competitor's past price)

Mixed gains

Ranks	
	Mean Rank
Absolute	1.73
Dual	2.10
Relative	2.17

$\boldsymbol{Test\ Statistics^a}$	
N	39
Chi-square	6.35
df	2
Asymp.Sig	0.04

Multiple comparisons of frame (Based on negative and positive ranks)

	Dual - Absolute	Relative - Absolute	Relative - Dual
Z	-1.68^{b}	-1.657^{b}	0.00^{c}
Asymp.Sig. (2-tailed)	.0.93	0.09	1.00

Mixed losses

Ranks	
	Mean Rank
Absolute	2.19
Dual	1.87
Relative	1.94

$\boldsymbol{Test\ Statistics^a}$	
N	39
Chi-square	3.50
df	2
Asymp.Sig	0.17

Multiple comparisons of frame (Based on negative and positive ranks)

	Dual - Absolute	Relative - Absolute	Relative - Dual
Z	-1.27^{b}	-1.04^{b}	-0.63^{c}
Asymp.Sig. (2-tailed)	0.20	0.29	0.52

Multiple gains

Ranks	
	Mean Rank
Absolute	1.92
Dual	1.94
Relative	2.14

$\boldsymbol{Test\ Statistics^{a}}$	
N	44
Chi-square	1.847
df	2
Asymp.Sig	.397

<u>Multiple comparisons of frame (Based on negative and positive ranks)</u>

	Dual - Absolute	Relative - Absolute	Relative – Dual`
Z Asymp.Sig. (2-tailed)	-0.24^{b} 0.80	-0.42^{c} 0.67	-0.89^{c} 0.37

Multiple losses

Ranks	
	Mean Rank
Absolute	1.92
Dual	1.97
Relative	2.11

$\boldsymbol{Test\ Statistics^{a}}$	
N	44
Chi-square	1.49
df	2
Asymp.Sig	0.47

<u>Multiple comparisons of frame (Based on negative ranks)</u>

	Dual - Absolute	Relative - Absolute	Relative - Dual
Z Asymp.Sig. (2-tailed)	-0.22^{b} 0.81	-1.05^{b} 0.29	-0.29^{b} 0.76

5.21 GENERAL DISCUSSION

Mental accounting principles explain how decision makers evaluate the reference points within decision outcomes in terms of gains and losses. Based on these principles, decision makers can choose between the option to integrate or segregate combinations of gains and losses. Central to the determination of reference dependent preferences is the identification and evaluation of the reference point.

This study examined the impact of price framing on consumer’s perception of changes in prices where the reference points are clearly stated as a competitor's current and competitor's past prices. Our key findings are summarized as follows.

1) **Our experiments identified the most effective sales promotion strategy given consumer behaviour.** Of the two reference points investigated in this paper, competitor’s current prices had the most significant impact on consumers’ perception of prices. We found that while both types of reference states affected MAPs in the mixed gains and multiple gains outcome leading to preference reversals, only competitor’s current prices affected multiple losses. In other words, the impact of percentage frames as well as the influence of making price comparison with current prices as opposed to past prices led to changes in consumers’ preferences to integrate when faced with price increases in two or more items they planned to purchase. Although it is not standard practise for vendors or retailers to communicate to consumers by how much their prices have gone up especially for grocery stores or supermarkets, there are notwithstanding a few that carry out this practise. For example, those who provide broadband coverage, telephone line rentals, gas and/or electricity etc. Viewed from this context, percentage price frames anchored against a competitor’s current price is an effective pricing strategy because it is able to mitigate the effect of price increases by influencing consumers’ perception of the change in price such that it is perceived as less than its absolute value.

2) **Robust results on competitors’ current prices.** In addition to the parametric test employed in analysing our data, we also used non-parametric tests. We found that in the multiple gains and multiple losses outcomes, only results from a competitor’s current prices remained consistent across both types of tests. Based on these findings, we propose that the results from previous empirical papers which suggest that past prices had a more significant impact on consumers’ purchase decisions could be imprecise. We propose, subject to further studies to the contrary, that the use of current prices as a standard of comparison could have a more significant impact on price perception than past prices.

In conclusion, decision makers appear to be more sensitive to the framing of gains than they are of losses. These results demonstrate the important influence that price manipulations have on consumer preferences especially in the domains of mixed losses and multiple losses which we found to be generally immune to price manipulations. In light of this, the use of appropriate pricing strategies by retailers is crucial in managing their objectives of increased profitability and brand equity.

5.22 LIMITATIONS OF STUDY

Although we replicated Thaler's (1985) MAPs in the mixed gains, mixed losses and multiple losses outcomes of our control conditions,[27] and they were the same in principle as our scenarios with reference states/points evaluated in the treatment conditions, nevertheless, the decision frames from Thaler's (1985) original experiments differed from ours in specific content. As such, they do not adequately provide a basis for comparison between the questions without reference point used in the control level and those which had reference points incorporated, thereby making it difficult to fully evaluate the claim that the original experiments from which Thaler's (1985) MAPs were derived lacked explicitly stated reference states.

In the same vein, our treatment questions could have been designed to individually capture the varying effects of frame and reference state/point on price perception as opposed to both effects. This makes it difficult to isolate reference point effects from price framing effects.

5.23 MANAGERIAL IMPLICATIONS

In experiment 1 where the inclusion of a competitor's current prices significantly altered the MAP for multiple losses causing a preference reversal, we propose that price framing has a more significant impact on multiple outcomes (multiple gains and losses) than on single outcomes (mixed gains and losses). This echoes Thaler's (1985) finding that consumers derive more satisfaction from 2 or more gains and find 2 or more losses more unrewarding than a single loss. In addition, although previous studies suggest that past prices are the main predictors of reference prices (Kalwani et al. 1990), our results indicate that current prices might have a more significant impact on reference prices than had been

[27] Our results in the multiple gains outcome for the control conditions across all experiments conducted (in chapters 4 and 5) remained inconsistent with Thaler's (1985) principle for that outcome.

recognised in the literature. This could be linked to the difficulty in recalling past prices as opined by Dickson and Sawyer (1990) as opposed to current prices. Building on the foregoing, we are of the opinion that consumers' perceptions of losses in particular could be context dependent with the specific context here being reference price.

A key managerial insight from our findings is in relation to the proposed link between regret aversion and loss aversion. Previous studies (for example, Hardie et al. 1993; Mayhew and Winer, 1992; Putler, 1992) provide empirical evidence that price increases (negative deviations from reference prices perceived as losses) have a more significant impact on consumer choice than decreases in prices (positive deviations from reference prices perceived as gains). In addition, consumers are able to predict that in retrospect, they would feel regret after making a 'wrong' purchasing decision or choice. In order to avoid these feelings of regret, consumers tend to have established or default choices for most decisions which they rarely deviate from (Simonson, 1992). Building on these findings, we propose regret aversion as the reason for consumers reduced sensitivity to price frame manipulations in the losses outcomes. This is because, an individual will be resistant to making any purchase decision which is contrary to his/her default choice. Therefore, if the individual's conventional choice was to proceed with a purchase regardless of its now higher price, then such an individual would be impervious to price framing. The take home message for managers therefore is the possibility that consumers are able to adapt to higher prices holding constant other exogenous influences such as the brand or quality of the product.

CHAPTER SIX
THE IMPACT OF EXPECTATIONS OF PRICE CHANGE ON MENTAL ACCOUNTING PRINCIPLES

In this chapter, we present our final reference point: internal reference prices conceptualised as consumers' expectations of retailer's future prices. We discuss the impact of consumers' expectations of changes in prices on purchase decisions. Where expected prices are lower (higher) than retailer's prices, consumers could decide to increase or decrease purchase, or completely forgo making any purchase decisions. This study differs completely from the studies discussed in chapters 4 and 5 in that the buyer's expected prices are both explicitly stated as well as implicitly incorporated into the experiments. Our aim is to evaluate how consumers prefer to code a decrease (gains) or increase (losses) in retailer's prices based on their expectations of changes in the retailer's prices. In addition, we compare these results with those from the study in chapter 4 to investigate any differences in consumers' perceptions of prices based on the definition of internal reference prices.

6.1 INTRODUCTION

While research on reference price has involved numerous conceptualizations of internal reference prices (hereafter IRPs), there is no consensus in literature on how decision makers evaluate these various conceptualizations, if these conceptualizations mean the same thing to consumers at the time of purchase or whether consumers employ more than one IRP in evaluating product prices at any given purchase (Rajendran, 2009).

One of the associated consequences of this multidimensional aspect to (IRP) is the difficulty in correctly matching the researcher's definition of reference price with how the consumer interprets reference price. Rajendran (2009, p. 19) suggests that although previous research defined IRP as expected prices using Helson's (1964) Adaptation Level theory[28], this evaluation of IRP could have been conceptualised by consumers as fair prices.

A fair price is defined as that price a consumer considers just or appropriate for a product. As Maxwell (2002) argues, consumers subjectively judge a retail price as fair when that price is equal to its reference price. Furthermore, Rajendran (2009, p. 24) found that

[28] See chapter 2 for a review of Adaptation Level theory.

consumers differentiate between fair prices and expected prices. Other researchers who support this notion emphasize the link between price fairness, consumers' willingness to buy, and the satisfaction derived from purchase (Dickinson and Dickinson, 2012; Kamen and Toman, 1970; Maxwell, 2002; Thaler, 1985; Xia et al. 2004).

Expected price, on the other hand, is the price consumers predict for a product. In addition to the aforementioned, empirical support for the notion that consumers do not interpret IRP as expected price, posit that unlike unfair prices, an unexpected price does not result in the decision to forgo making a purchase (Boyd & Bhat, 1998; Campbell, 1999; Huppertz et al., 1978). However, on both sides of the argument there is unanimity that past prices play a significant role in the formation of 'expected' and 'fair' prices.

Based on the foregoing, this chapter evaluates the impact of price framing on price perception by matching our definition of 'expected price', or a consumer's expectation of prices, with the consumers' interpretation. We define expected price as the price a consumer imagines he will pay for a product at the next purchase. This conceptualisation is consistent with previous studies (Jacobson and Obermiller, 1990; Rajendran, 2009; Winer, 1988) and differs from the definition of fair prices in that we do not interpret expected prices as an appropriate price for a product.

We propose that these expected prices are implicit and examine two sides of implicit expected prices. Firstly, we examine expected prices as a result of recently observed retailer's prices[29]. We assume a specified time period to convey the impendency of the decision maker encountering the retailer's prices, and further assume that the decision maker will have a 'certain' implicit expectation of the retailer's immediate future prices based on recently observed current prices. Consequently, the retailer's future prices will be expected to be the same at the next purchase. This is investigated in the mixed gains outcome. Secondly, we also examine expected prices based on what the consumer thinks the price should be. One common feature across these definitions is uncertainty. Uncertainty is a key feature of expectations because perfect information is inaccessible with regards to consumer products (Georgescu-Roegen, 1958). Hence, we propose that the decision maker is 'uncertain' about the retailer's prices and his expectation that his expected prices will be the same as the retailer's prices will be low. We evaluate this aspect in the mixed losses, multiple gains, and multiple losses outcomes.

[29] Note that we do not assume past prices in the strict sense.

Our approach is to have the price change post-consumer expectation: that is, the consumer's expectation of the retailer's prices is not based on an on-going price promotion. On the contrary, it is based on either being certain of the prices from recent observation or uncertain about the price because there is no actual knowledge of the current product prices. So, we investigate price changes after the formation of consumers' expectations and in turn, how the retailer's prices compare with the consumers' expected prices. More importantly, we examine the impact of price frame manipulation on consumers' perceptions of price.

6.2 THEORETICAL BACKGROUND

The theory of expectations spans a considerable number of disciplines such as psychology and economics. In more recent times, the importance of expectations has been applied to the field of behavioural decision theory (Oliver and Winer, 1987).

There have been several definitions of expectations proposed in literature. Olson and Dover (1979) and Oliver (1980) define expectation from a belief perspective, i.e. a consumer's belief about a product. They opined that a consumer's expectation about a product sets in before purchase and is ongoing after appraisal of the product has been made.

Kahneman and Tversky's (1982) framework of expectations is utilized in the design of our experiments. This framework focuses on expectations from an active/passive perspective. Active expectations as defined by Kahneman and Tversky (1982) usually comes into play when a decision maker makes price comparisons between future expected prices and current observed prices. While this does imply some form of information processing on the part of the decision maker, passive expectations on the other hand have to do with little processing of information. For example, the fact that prices of goods would generally be expected to go up in future due to inflation.

Kalwani et al. (1990) applied the price expectations hypothesis (PEH) in explaining the long-term impact of price promotions on consumer choice. They posit that the expectations consumers have of future product prices is shaped by their experiences of past prices of the retailer and how often the products undergo sales promotion. Other papers (Dodson, Tybout and Sternthal, 1978; Guadagni and Little, 1983, Shoemaker and Shoaf, 1977) suggest that the probability of a repeat purchase of a product after a price promotion is lower than if the purchase had been made without a price promotion offer.

From previous research (Lichtenstein and Bearden, 1988) we understand that external reference prices (ERPs) could shift IRPs up or down, thereby influencing consumers' perceptions of price. The importance of studying the implications of consumers' expectations of prices then lies in the notion that the purchase probability of a product could be dependent not only on expectations of future prices of a retailer/brand (IRP) but also on context-specific factors such as future prices of other competing products (ERP), or the price frame utilized in conveying changes in prices. Studies on price expectation under varying conditions of price changes therefore provide additional insights into consumers' price judgements.

The conceptualisation of expected price as an IRP is not new in the research stream of reference prices. Jacobson and Obermiller (1989 and 1990) proposed the notion of expected prices being both forward and backward-looking. Prior research had focused on the backward-looking perspective with expected prices derived from previous experiences of a retailer's past prices (Kwon and Schumann, 2001). A forward-looking perspective, on the other hand, has to do with prices consumers expect to pay for the products in the future (Jacobson and Obermiller, 1990; Kalwani and Yim, 1992; Krishna, 1994). While previous researchers had investigated expected prices from a price elicitation perspective (Jacobson and Obermiller, 1990; Kalwani and Yim, 1992; Rajendran, 2009), our study evaluates the impact of consumers' expectation of changes in prices in relation to actual changes in a retailer's immediate future prices[30].

Building on the framework of expectations developed by Kahneman and Tversky (1982), we incorporate consumers' active and passive expectations into our experiments. Our objective is twofold: 1) we examine the effect of expected prices from a price certainty/uncertainty perspective within decision outcomes and in relation to Thaler's MAPs and 2) we compare the impact of 2 operationalisations of IRPs on consumer purchase decisions.

[30] This could arguably be considered as current prices. However, we assume that prices have been recently observed by the consumer, and allow for some intervening time between the previous purchase and the next. In this regard, we propose the retailer's prices as immediate future.

6.3 EMPIRICAL RESEARCH ON INTERNAL REFERENCE PRICE

Most studies on reference prices have focused on developing models of consumer choice (Briesch et al. 1997; Putler, 1992; Winer, 1986). Others have modelled the effects of reference prices on the competitive behaviour of firms (Greenleaf, 1995; Kopalle, Rao, and Assunção, 1996). Researchers such as Hardie, Johnson, and Fader (1993), Lattin and Bucklin (1989), and Urbany et al. (1988a and 1988b) investigate the impact of IRPs on consumer behaviour and evaluations of price, price promotions and product quality. Other researchers have examined reference prices presented in relative versus absolute terms (Biswas and Blair, 1991; Jacobson and Obermiller, 1990; Lichtenstein and Bearden, 1989; Putler, 1982; Urbany and Dickson, 1991). In few instances, attempts have also been made to investigate how reference prices are formed (Biswas and Blair, 1991; Dickinson and Dickinson, 2012; Klein and Oglethorpe, 1987; Puto, 1987; Rajendran and Tellis, 1994; Rowe and Puto, 1987).

Another line of research examined the possibility that consumers applied one or more IRPs at any given purchase encounter. For example, Chandrashekaran and Jagpal (1995) carried out a study of four IRPs (fair price, reservation price, normal price and lowest price seen) and found that rather than aggregating the four IRPs into a single IRP used in evaluating prices, the use of IRPs by consumers was particular to each product.

Internal reference prices have been defined using varying price concepts in literature. Average price (Bearden et al. 1992; Diamond and Campbell, 1989), lowest market price (Biswas and Blair, 1991), reasonable price (Folkes and Wheat, 1995), perceived price (Monroe, 1973), evoked price (Rao and Gautschi, 1982), lowest acceptable price (Stoetzel, 1970) and Winer (1988) who examined five IRPs operationalized as fair price, reservation price, lowest acceptable price, expected price and perceived price.

However, as far as we know, no empirical study has examined IRP experimentally based on our approach.

6.4 JUSTIFICATION FOR STUDY

We address a gap and contribute to the literature on reference prices by investigating IRP from a contextual perspective not previously reviewed in literature. Also, in comparing the differences in consumers' perceptions of gains and losses where IRP are defined as expected prices and as recently observed retailer's past prices (chapter 4), we examine the impact different IRP constructs have on price perceptions. This is especially important for marketing purposes because as suggested by prior studies, the use of IRPs by consumers is product-specific and if marketers can identify and understand the different internal reference prices that consumers employ and how they are affected by changes in price, they can design pricing strategies that will influence reference prices, affect consumers' perceptions of prices and generate increase in profit.

6.5 CONCEPTUAL FRAMEWORK OF EXPECTED PRICES

Working with the assumption that the consumer is faced with 2 reference points: i) the actual amount in absolute and relative terms of the change (increases/decreases) in the retailer's prices, and ii) the amount in absolute and relative terms of changes in prices based on the consumer's expectation.

In the first reference point, we evaluate the price change solely on its individual merits as loss or gain while in the second, we compare the two reference points such that where the changes in prices are equal it would be perceived as a good deal, if less than, it would be perceived as a gain and if greater than, then a loss. Consequently, we propose that the perception of changes in prices depends on the final reference point from which the consumer evaluates the alternative(s) in a decision problem to determine whether the change in price will be coded as a gain or a loss.

Furthermore, we assume that: a) the consumer has pre-conceived price expectations prior to the purchase but has the intention of making a purchase, b) the 'certain' consumer has a higher level of expectation than the 'uncertain' consumer due to having observed the retailer's prices prior to the store visit, c) the uncertain consumer, on the other hand, is unsure of what the retailer's prices are and makes a rough estimate based on his idea of what the approximate prices should be and as a result, d) the uncertain consumer has lower expectations compared to the other consumer.

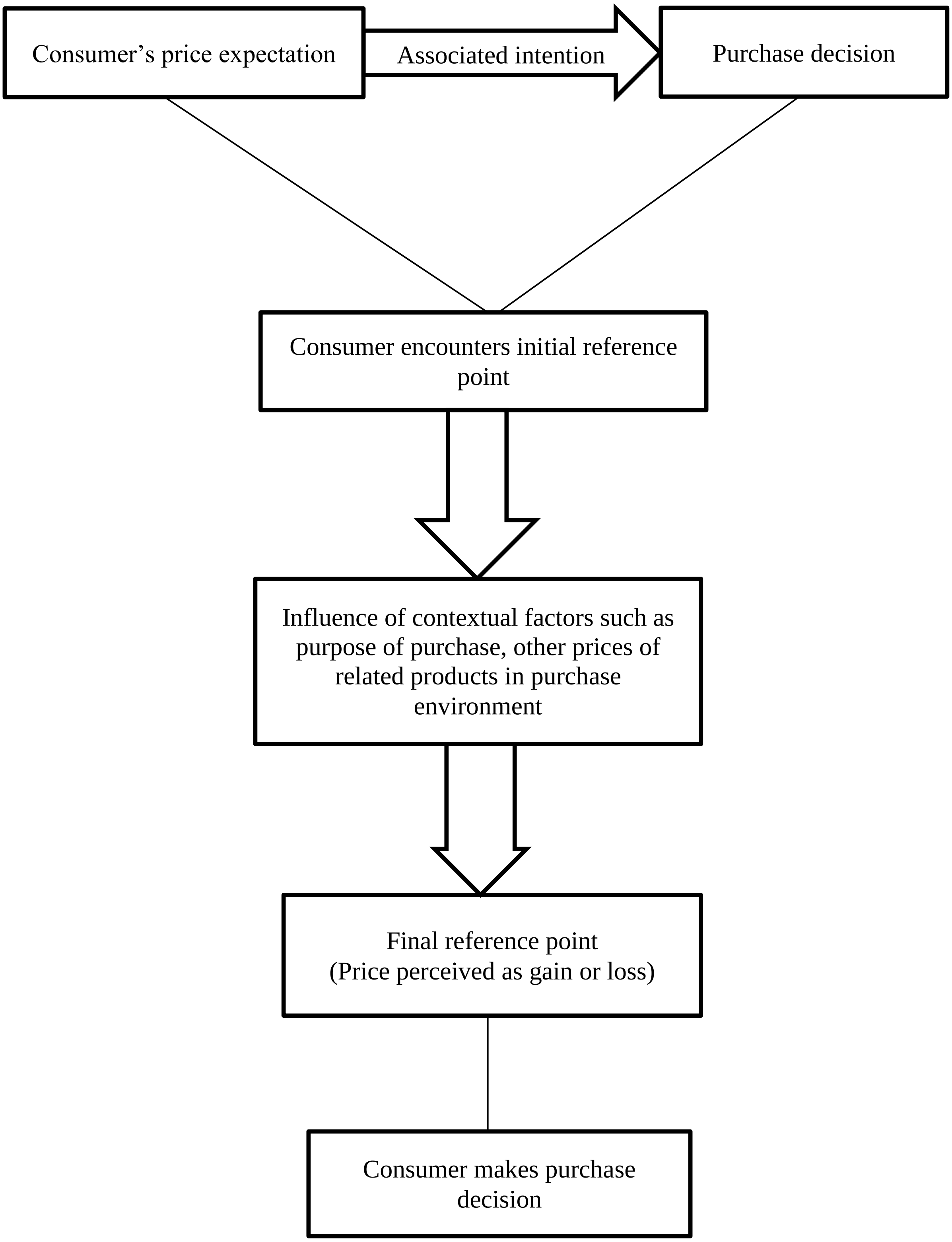
Another point to note is that we are not evaluating certainty or uncertainty of price expectations based on type or classification of consumers. Rather, we assess it from a reference point perspective.

Some of the factors which would be expected to influence the consumer's specific expected price are: i) type of retailer, i.e. frequent discounting retailer, high end product retailer, everyday-low-prices retailer, etc. ii) consumers' awareness of the quality of the retailer's product, and iii) market trend, for example expectations that prices will be high versus low. However, for this present analysis, these situational factors are held constant and are not assumed to influence the decision making process of the consumer mainly because we do not assume a strict familiarity with retailer's prices especially with 'uncertain' expected prices.

Nonetheless, the decision scenarios we adopt show that the consumer is aware of the market trend and could either have optimistic (prices will decrease) or pessimistic (prices will decrease) price expectations in the gains and losses domains. Moreover, we posit that overall, the impact of percentage price frames will be neutralised by the consumer's perception of gains and losses subject to the final reference point leading to no reversals in Thaler's MAPs. In other words, MAPs will be consistent across all outcome types.

It is important to note that the conceptual framework in figure 6.1 is not being suggested as a theory. Rather, it guides the reader through our proposed conceptual process of decision making using expected prices.

Figure 6.1
Proposed conceptual framework of expectations-based purchase decision



6.6 EXTENSION TO THALER (1985)

Thaler (1985) identified a type of decision scenario which evaluates gains and losses from an expectations perspective. For example, an individual has an expectation regarding an outcome (X). However, rather than obtaining X he obtains X+ΔX. In this scenario X+ΔX: X would be a reference outcome. Thaler (1985) suggested that an individual could either evaluate his unexpected component alone as segregation or in conjunction with his expected component as integration. The example from his study below illustrates the concept of a reference outcome where a consumer's expected price differs from the retailer's price.

'Mr. A expected a Christmas bonus of $300. He received his check and the amount was indeed $300. A week later he received a note saying that there had been an error in this bonus check. The check was $50 too high. He must return the $50'.

'Mr. B expected a Christmas bonus of $300. He received his check and found it was for $250'.

Since Mr. A's loss came after he had received the check, it would imply segregation and would be coded as a loss of $50. On the other hand, Mr. B would evaluate his outcome as having his gain reduced (Thaler, 1985). He proposed that where decision scenarios are subject to varying interpretations, the four mental accounting principles (MAPs) discussed in previous chapters[31] would hold. The MAPs are shown below:

a) Mixed Gains (a large gain + a small loss) should be integrated.
b) Mixed Losses (a large loss + a small gain) should be segregated.
c) Multiple Gains (2 gains of same or different magnitudes) should be segregated
d) Multiple Losses (2 losses of same or different magnitudes) should be integrated.

Building on Thaler's (1985) MAPs, we carry out analysis in order to investigate how monetary gains and losses are evaluated in decision scenarios with reference outcomes, and in turn, those without.

[31] See chapter 2 for a review of mental accounting principles.

6.7 THE IMPACT OF BRAND FAMILIARITY AND PRICE FRAME ON PURCHASE

One of the disadvantages associated with frequent discounting of prices by retailers is that consumers get used to the lower prices and when these prices return to their ‘normal’ (pre-frequent discounting prices), they are perceived as increase in prices by the consumers. As a result, customers learn to anticipate or expect such changes in prices and make purchase decisions based on how the new normal prices compares with their anticipated/expected prices.

Although there is empirical evidence showing that the mental effort required in processing price discounts stated in percentage terms greatly reduces consumers’ price expectations and influences their purchase decisions at the end of the price promotion (Delvecchio et al. 2007), we propose that where both price expectations and frame manipulation simultaneously influence price perception, one would offset the effect of the other leading to no reversals in MAPs across outcomes.

In essence, we predict that the effect of percentage frames on consumers’ purchasing decisions will likely be moderated by consumers having a pre-purchase expectation of prices. In other words, although it is possible that a comparison of only a retailer’s expected prices with the retailer’s actual prices after the price increase or decrease will affect a consumer’s purchase intentions, we propose that the presence of both percentage-based price frames and a reference outcome in any decision scenario will bring about a less significant overall effect on consumers purchasing decisions as proposed by MAPs than where both are not present simultaneously.

Following the discussion above, we propose the following hypothesis:

H_6: Expected prices will have a neutralising effect on percentage frames and MAPs will not be significantly affected.

6.8 RESEARCH DESIGN AND DATA COLLECTION

We adopt the decision scenarios used in previous research for evaluating the framing effect in multiple events (Chatterjee et al. 2000; Heath et al. 1995; and Thaler, 1985). Our experiments are similar to Thaler's (1985) original approach in which 2 hypothetical men face financially equivalent situations. However, to ensure that our decision scenarios are strictly reference outcome based, we explicitly state that both men expected changes in the retailer's prices. The expected price change and the actual retailer's price at the point of purchase for both men are equivalent irrespective of their purchase intentions (Mr. A intends to buy one item while Mr. B plans on two).

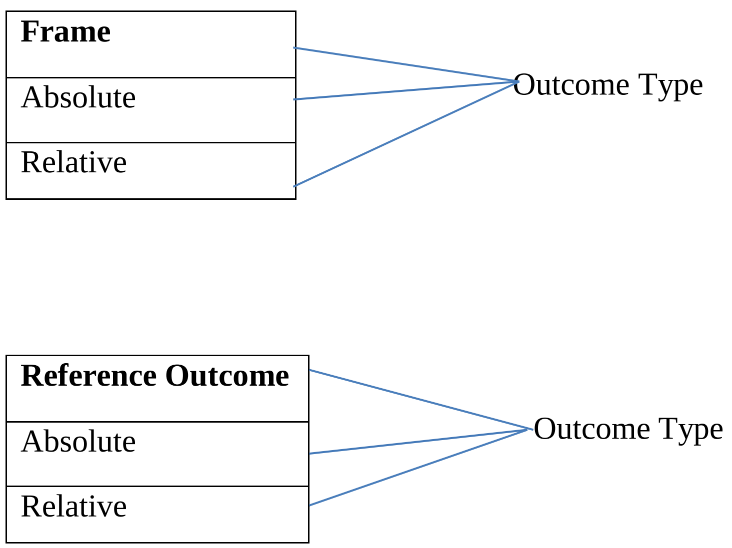
Post graduate students in the Adam Smith Business School at the University of Glasgow, United Kingdom were offered cash-prize incentives to participate in the study. Ninety-two post graduate students participated in the survey. We carried out 8 experimental conditions in a repeated-measures design. Respondents were randomly assigned to 4 of these conditions based on outcome type (Mixed Gains, Mixed Losses, Multiple Gains and Multiple Losses). The survey was completely anonymous and no information was collected based on name, gender, age or ethnic background. Of the ninety-two respondents who participated, only one result was unusable.

6.8.1 Design

Dependent Variables. The outcome types multiple gains, multiple losses, mixed gains and mixed losses were the dependent variables.

Independent Variables. Our hypotheses revolve around how the manipulation of price presentation and the inclusion of active price expectations in form of reference outcome affect consumer purchase decisions and perceptions of price. To examine this, we present changes in price across each outcome type using 2 price frames with "frame" and "reference outcome" as our independent variables (see table 6.1).

Figure 6.2
Specification of variables



Two experimental groups were evaluated in our study: ‘non-expectation’ and ‘expectations’ groups. Based on our hypothesis that the inclusion of a reference outcome will temper the effect of percentage frames on purchase decisions, we compare the results from both groups and evaluate based on proposed MAPs. Respondents assigned to the ‘non-expectations’ conditions had questionnaires where changes in prices were stated in percentages as well as absolute terms but with the decision makers involved (Mr. A and Mr. B) having no expectations regarding changes in retailer’s prices. In the ‘expectations conditions’, changes in prices are stated in percentage terms and the consumer's expected prices across all outcomes are clearly indicated. Although each respondent was randomly assigned to both conditions, the questionnaires were counterbalanced to eliminate order effects based on outcome type (see table 6.2).

Table 6.1

Assignment of respondents to experiments

No of Respondents	**Outcome Type**	**Condition**
47	Multiple Gains Multiple Losses	Expectations
47	Mixed Gains Mixed Losses	Non-expectations
44	Mixed Gains Mixed Losses	Expectations
44	Multiple Gains Multiple Losses	Non-expectations

Based on the structure in table 6.2, respondents were randomly assigned such that each respondent answered questionnaires from 2 outcome types under the ‘expectations’ conditions and 2 different outcome types under the ‘non-expectations’ condition.

6.8.1.1 Mixed Gains Outcome

Consumers' explicit expectations of changes in the retailer's prices were incorporated into three of our monetary outcomes (dependent variables). In the mixed gains outcome, we investigate the effect of expected prices which, though not clearly stated, are inherent within the questionnaire based on the consumer's recent experience at the store. This is based on the rationale that, if one visits the store and finds a product of interest but makes plans to return the following day to purchase the item, the expectation of that individual, given his experience at the store, will be that the product prices will still be the same as those from the previous day.

6.8.2 Design of experiments

We employed a repeated-measures design based on outcome type varied across two price frames and with consumers' expectation of a retailer's future prices as the reference point.
Each outcome type involves four experimental levels two of which represent decision scenarios with reference outcomes and the outstanding two are those without. The latter two levels also represent the control condition. Changes in prices across all outcomes and treatment levels are presented in table 6.3.

Table 6.2
Value of price change across frame and outcome type

Outcome Type	Condition	Expected Price Change		Actual Price Change	
		Absolute	Relative	Absolute	Relative
Multiple Gains	Expectations	£70 less	5% less	£50 less	4% less
Multiple Losses		£70 more	6% more	£100 more	8% more
Mixed Gains	Non-expectations	-	-	£50 less	4% less
Mixed Losses		-	-	£50 more	4% more
Mixed Gains	Expectations	£50 more	4% more	£50 less	4%less
Mixed Losses		£30 more	2% more	£50 more	4% more
Multiple Gains	Non-expectations	-	-	£100 less	8% less
Multiple Losses		-	-	£100 more	8% more

6.8.3 Questionnaire

Respondents were asked to determine which of 2 hypothetical men in hypothetical decision scenarios they thought would be relatively happier (Gains) or unhappier (Losses) across the two conditions. The purchase of the couch alone represents a single outcome indicating the MAP of integration while the purchase of the chair and couch represents two outcomes indicating segregation.

The following page illustrates decision scenarios from the two conditions to show the inclusion of expectations in our experiments. All decision scenarios used in our experiments are presented in detail in Appendix 4.

6.8.4 Measures

Subjects were given booklets containing 8 scenarios. The first four scenarios described the mixed gains and losses outcomes from 'non-expectations' and while the last four presented the multiple gains and losses outcomes from the 'expectations' conditions. Subjects were asked to indicate on a scale of 1-15 which of two men in hypothetical decision scenarios would be relatively happier (Gains) or unhappier (Losses).

The mean of the scales (1-15) '8' was taken as the indicator of the preference for combination of outcomes. Means below 8 suggest the MAPs of integration and means above 8 indicate segregation. In addition, in the gains outcomes, higher numbers indicated by the subjects on the scale, shows the levels of relative happiness of either Mr. A who bought an item or Mr. B who bought two items; and in the losses domains, higher numbers show the levels of relative unhappiness of either Mr. A who bought one item or Mr. B who bought two.

Scale of 1 to 7 – Mr. A is happier than Mr. B (with 7 being highest level of happiness).
Scale of 1 to 7 – Mr. A is unhappier than Mr. B (with 7 being highest level of unhappiness).
At midpoint 8 – Mr. A and Mr. B are equally happy.
At midpoint 8 – Mr. A and Mr. B are equally unhappy.
Scale of 9 to 15 – Mr. B is happier than Mr. A (with 15 being highest level of happiness).
Scale of 9 to 15 – Mr. B is unhappier than Mr. A (with 15 being highest level of unhappiness).

Scenario A (Absolute frame) 'Expectations' Condition

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair. At the store, Mr. A finds that the £1250 couch now costs £100 more. Although, he had been expecting some price increase, he had been estimating a price increase of only £70; Mr. B finds that both the £200 chair and the £1050 couch now each cost £50 more. Although, he had been expecting some price increase, he had been estimating a combined price increase of only £70 in both the couch and the chair.

Scenario B (Relative frame) 'Expectations' Condition

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair. At the store, Mr. A finds that the £1250 couch now costs 8% more. Although, he had been expecting some price increase, he had been estimating a price increase of only 6%; Mr. B finds that the £200 chair now costs 25% more and the £1050 couch was now priced 5% more. Although, he knew that the combined price increase in both the couch and the chair was 8%, he had been estimating a combined price increase of only 6% in both the couch and the chair.

6.9 RESULTS FROM PILOTS

We carried out 2 pilot tests prior to the actual study (tables 6.3 and 6.4) to evaluate the impact of price frame on consumers' expectation of retailer's future prices. The absolute frame presented changes in the retailer's prices and the consumer's expected prices without any frame manipulation. Deviations from the consumer's status quo as well as changes in the retailer's prices are described in percentages in the relative frame.

Recall, we tested the hypothesis that expected prices will have a neutralising effect on percentage frames and MAPs will not be significantly affected.

From table 6.3, in the multiple gains outcome we found that as hypothesized, price framing did not alter the MAP to segregate multiple price discounts. The absolute frame on the other hand presented mixed results and is inconclusive.

Similarly, the results in the multiple losses outcome for pilots 1 and 2 is consistent with MAP since the indicated preference of segregation in the relative frames implies that the opposite (integration), is a better way to minimize disutility. In the absolute frame however, subjects preferred to segregate. This suggests that reference outcome alone altered perception of prices.

Table 6.4 shows that in mixed gains, preferences were mixed in both pilot tests while for mixed losses, while the results from pilot 2 were consistent with the MAP to segregate, they were reversed in pilot test 1.

Table 6.3
Results from pilot tests (Multiple outcomes)

	Frame	Results from tests		MAPs hold?	
		1	2	1	2
Multiple gains (Segregation)	Absolute	Segregation	Integration	Yes	No
	Relative	Segregation	Segregation	Yes	Yes
Multiple losses (Integration)	Absolute	Integration	Integration	No	No
	Relative	Segregation	Segregation	Yes	Yes

Table 6.4
Results from pilot tests (Mixed outcomes)

	Frame	Results from tests		MAPs hold?	
Mixed gains (Integration)		1	2	1	2
	Absolute	Segregation	Integration	No	Yes
	Relative	Segregation	Integration	No	Yes
Mixed losses (Segregation)	Absolute	Segregation	Integration	No	Yes
	Relative	Segregation	Integration	No	Yes

6.10 MAIN RESULTS

While our results were consistent in some respects with those from chapter 4 where we looked at a retailer's past prices, they are at the same time also comparatively different. We begin with a discussion of the modal preferences from both experimental conditions on IRPs. Our results confirm the findings by Mazumdar and Jun (1993) that mixed losses seem impervious to framing effects and reference point manipulations.

6.10.1 Discussion on modal preferences

Table 6.5 shows modal preferences from our subjects. The left side represents IRP defined as consumers' expectations of a retailer's future price and serves as the standard against which the retailer's prices are compared. On the right, we report modal preferences adapted from experiment 1 in our fourth chapter where IRPs are described as recently observed past prices of a retailer.

Table 6.5
Comparison of results based on modal preferences

Expectations Condition						**Non-expectations Condition**				
Outcome type	**Frame**	**Proposed MAPs**				**Outcome type**	**Frame**	**Proposed MAPs**		
		I	S	MAPs hold?				I	S	MAPs hold?
Multiple gains **(S)**	Absolute	35%	17%	No		Multiple gains **(S)**	Absolute	11%	40%	Yes
	Relative	25%	46%	Yes			Relative	11%	67%	Yes
Multiple losses **(I)**	Absolute	32%	36%	Yes		Multiple losses **(I)**	Absolute	27%	47%	Yes
	Relative	23%	47%	Yes			Relative	13%	69%	Yes
Mixed gains **(I)**	Absolute	30%	41%	No		Mixed gains **(I)**	Absolute	33%	40%	No
	Relative	27%	59%	No			Relative	27%	63%	No
Mixed losses **(S)**	Absolute	30%	36%	No		Mixed losses **(S)**	Absolute	35%	40%	No
	Relative	21%	55%	No			Relative	27%	60%	No

Following our hypotheses in chapter 4, we expect the percentage price frame alone to cause a reversal of the MAPs for mixed gains, mixed losses and multiple losses, and reinforce the MAP for multiple gains in the non-expectations condition (right-hand side of table 6.5). However, based on our hypothesis that consumers' expectations of price will counteract the effect of price frame on MAPs, we expect MAPs to remain consistent across all outcome types in the relative frame.

In the 'non-expectations condition' for multiple gains, as proposed, we found evidence of framing effect indicated by an increase in the number of respondents who preferred segregation across both frames (absolute frame (40%), relative frame 67%) suggesting a reinforcement of that MAP. Similarly, the modal preference in the relative frame of the 'expectations condition' was consistent with our hypothesis, with 25% of respondents choosing to integrate and 46% to segregate and which implies that MAPs hold. The absolute frame however suggests that expectations of price change alone led to a reversal.

In the 'non-expectations condition' for multiple losses, we found no evidence of framing effect in the relative frame. Likewise, in the 'expectations condition', modal preferences are consistent with MAPs. The same results are observed in the absolute frames of both conditions.

In the mixed gains outcome we found a reversal in the preference to integrate mixed gains in the absolute and relative frames of both conditions.

Finally, in the mixed losses outcome, modal preferences indicate reversals from segregation to integration in the absolute and relative frames of both conditions.

In conclusion, although modal preferences were partly consistent (only multiple gains and multiple losses were consistent with MAPs) with our hypothesis that expected prices will mitigate the impact of percentage price framing, they nevertheless suggest that reference dependence and mental accounting depend on the context from which decision problems are presented.

In the following section we discuss the analysis of our results.

6.10.2 Analysis of results

Table 6.6 shows the means from our experiment. The results are analysed using a frame by outcome type repeated measures ANOVA where frame is the independent categorical variable with 2 levels and outcome type is the dependent variable measured on a scale of 1-15. The means from all conditions are tested against the scale's mid-point '8' which represents indifference between integration and segregation. The computer software used carried out the Mauchly's test of the sphericity and also made corrections where there were any violations.

Table 6.6
Means from all experiments tested against mean 8

Monetary Outcome and Price Frame	*n*	(Expectations) Actual[32]mean	MAPs hold?	(Non -expectations) Actual mean	MAPs hold?
Multiple Gains (Mr. B is happier)					
Absolute	47	8.13	Yes	9.48	Yes
Relative	47	8.48	Yes	9.75	Yes
Multiple Losses (Mr. B is unhappier, Mr. A is preferred)					
Absolute	47	8.02	Yes	8.88	Yes
Relative	47	9.13	Yes	10.04	Yes
Mixed Gains (Mr. A is happier)					
Absolute	44	7.39	Yes	8.02	No
Relative	44	8.27	No	8.85	No
Mixed Losses (Mr. A is unhappier, Mr. B is preferred)					
Absolute	44	7.95	Yes	7.70	Yes
Relative	44	8.18	No	8.95	No

[32] These are means obtained from our experiments and which are tested against the scale's midpoint.

Prevailing mental accounting principles suggests that mixed gains will be integrated while mixed losses will be segregated. Also, for multiple outcomes, mental accounting principles predict segregation of multiple gains and integration of multiple losses. We hypothesize that consumers' expectation of the retailer's prices will have a neutralising impact on consumers' initial perception of price and will cancel out the effect of frame manipulation on consumers' final perception of price. We therefore expect MAPs to hold in the relative frames across all outcomes without any evidence of framing effects.

In the multiple gains domains, means obtained in the relative frame (8.48) of the expectations condition apparently indicate the preference to segregate which is consistent with MAPs. We also found that compared with the means from the relative frame in our non-expectations condition (9.75), the tendency to segregate is not as strong in the expectations condition. Further investigation however shows that there was no statistical significance. Mauchly's test of sphericity from repeated measures ANOVA indicated that the assumption had not been violated with ($X^2(2) = 0.41$ with $p = 0.81$). As such, there was no need to correct the degrees of freedom. The results show that there was no statistically significant effect of our reference point on outcome type F (2, 88) = 2.50, p = 0.08. Post hoc analysis with Pairwise Comparison was not required. We therefore cannot reject the null hypothesis.

For multiple losses, the means in the relative frame of the expectations condition was inconsistent with MAPs. From the table, we also see similar results in the relative frame of the non-expectations condition. However, further analysis shows a non-significant effect of reference point on MAPs. Mauchly's test of sphericity indicated that the assumption had not been violated ($X^2(2) = 1.99$ with $p = 0.37$) and F (2, 88) = 1.82, p = 0.16. We therefore cannot reject the null hypothesis.

The means from the relative frame of mixed gains (expectations condition), suggests a small evidence of framing effect (8.27) which, in turn, indicates reversal of the MAP to integrate mixed gains. The same results are not observed in the absolute frame which was consistent with MAP. As expected, means from the non-expectations condition indicate preference reversals in the relative frame while the absolute frame shows a slight tendency towards indifference. Mauchly's test of sphericity shows that the assumption had been violated ($X^2(2) = 8.74$ with $p = 0.01$). Degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\varepsilon = 0.85$). Overall, our results show a non-significant impact of reference point on outcome with F (1.71, 80.13) = 1.11, p = 0.33. We therefore cannot reject the null hypothesis.

Finally, in the mixed losses outcome, means from the relative frame (8.18) in the expectations condition indicate preferences which are inconsistent with the MAP to segregate. The same are observed in the treatment frame of the non-expectations condition (8.95). Mean results in the absolute frames of both conditions are however consistent with MAPs. Mauchly's test of sphericity from repeated measures ANOVA indicates that the assumption had been violated ($X^2(2) = 6.79$ with $p = 0.034$). Degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\varepsilon = 0.88$). We found no support for our hypothesis as there was no statistically significant effect of frame on outcome type with $F(1.75, 82.65) = 0.38$, $p = 0.66$.

Overall, although our results failed to yield significant evidence of the impact of expected prices on price perception, two important characteristics are observed: a) MAPs remained consistent in the relative frames of multiple outcomes of gains and losses, and b) in the absolute frame, MAPs were consistent across all outcome types and confirms Thaler's (1985) MAPs.

6.11 SUMMARY OF RESULTS

Contrary to our hypotheses, we found that consumers' expectations about changes in prices do not significantly affect price frame manipulations. Rather than having a neutralising effect on percentage frames, our results suggest that price expectations do not significantly affect price perception. Table 6.7 provides a summary.

Table 6.7
Summary of results from ANOVA

Study	Conceptualization of IRP	Hypothesis	Results
Non-expectations	Recently observed past prices of a retailer	Segregation is re-enforced in multiple gains MAP reversed to segregation in multiple losses MAP reversed to segregation in mixed gains. MAP reversed to integration in mixed losses	Segregation is re-enforced in multiple gains. Confirmed MAP of integrating multiple losses. Reversed MAP of integrating mixed gains. Reversed MAP of segregating mixed losses.
Expectations	Expectation of a retailer's future prices	MAPs will hold across all outcomes.	Expected prices do not have a significant effect on price perception.

6.12 COMPARISON OF INTERNAL REFERENCE PRICES

In chapter 4, we looked at IRP from the context of retailer's past prices which are derived from the consumer's previous purchase experience and in turn, indicate familiarity with the retailer's prices in a non-strict sense. As it relates to this current analysis, the consumer has a price estimate for the retailer's product without an expectation of a price change.

Previous studies suggest that consumers react more favourably to an unexpected decrease in prices as opposed to an expected decrease in product prices (Lattin and Bucklin, 1989). The data analysis below evaluates differences between 2 samples using a linear mixed model. The dataset from sample 1 represents the IRP investigated in this current study and with IRP defined as expectation of changes in prices. We denote this group as the 'Exp group'. For sample 2, we utilize the data from the experiment in chapter 4. This is described in our analysis as 'Nexp group' (non-expectations). We investigate the differences in ratings between groups and across frames using linear mixed model.

From table 6.9, our results suggest that frame has a more significant impact on price perception in the mixed gains {F (1, 95) = 4.24, p = 0.042}, mixed losses {F (1, 95) = 4.84, p = 0.030} and multiple losses outcomes {F (1, 89) = 9.28, p = 0.003}. There are no significant differences between the 'Exp' and 'Nexp' groups as we find no significant estimates of fixed effects between the two IRPs. Hence, our results suggest that frame manipulation would have a more significant effect in altering MAPs while IRPs might only slightly affect perceptions of changes in prices.

On the contrary, results in the multiple gains outcome were consistent with our hypothesis. Our findings indicate significant differences between groups {F (1, 88) = 5.54, p = 0.021} suggesting that price expectations had a significant effect on frame manipulation. However, although estimates of the effects of parameters indicate that frame is better at influencing MAPs, the results are non-significant {F (1, 89) = 0.582, p = 0.45}.

Possible explanations for our results could be, as suggested by Kalwani and Yim (1992), that decision makers are less sensitive to changes in a retailer's prices when these prices are slightly lower or higher than the consumers' expected prices. This implies that such price changes do not significantly influence consumers' perceptions of price and by extension, MAPs, thus, making price signal cues more effective in determining purchase decisions. At the same time, consumers could also be sensitive to multiple price discounts regardless of what IRP is being applied at the point of purchase (multiple gains outcome). Although this is not the focus of this research, our findings provide support for the assimilation contrast framework of reference prices and suggests that consumers have a latitude of acceptance for prices. This implies that the discrepancy between the consumers' expected prices and retailer's prices post-promotion notwithstanding, the retailer's prices are still adjudged acceptable when considered from the consumer's final reference point.

Table 6.8
Linear mixed model analysis

Outcome	Source	Estimate	Numerator df	Denominator df	F	Sig.
Mixed gains	Intercept	7.16	1	124.48	104.76	0.00
	Group	-0.60	1	94	1.48	0.22
	Frame	0.85	1	95	4.24	0.04
Mixed losses	Intercept	7.22	1	145.05	153.96	0.00
	Group	-0.26	1	94	0.23	0.63
	Frame	0.74	1	95	4.84	0.03
Multiple gains	Intercept	9.16	1	124.33	160.01	0.00
	Group	-1.31	1	88	5.54	0.02
	Frame	0.31	1	89	0.58	0.45
Multiple losses	Intercept	7.77	1	127.62	140.13	0.00
	Group	-0.89	1	88	2.77	0.09
	Frame	1.13	1	89	9.28	0.00

6.13 RESULTS FROM FRIEDMAN AND WILCOXON SIGNED RANK TEST

Further to the repeated measures ANOVA, a Wilcoxon signed-rank was used to ascertain the impacts of price expectation and price framing on monetary outcomes (table 6.11). We test the same previously defined hypothesis to see if there are differences in MAPs across outcome type based on expected prices and price frame. Here, we review differences across two frames: a) absolute and relative frames in the expectations condition, and b) absolute and relative frames in the non-expectations condition.

As in the repeated measures ANOVA, we begin the analysis with the multiple gains outcome. The initial Friedman test shows a non-significant effect of our independent variable on outcome type ($X^2 = 1.72$ with $p = 0.42$). There was no need to run post hoc tests. We therefore cannot reject the null hypothesis.

Likewise in multiple losses domains, we found no significant differences in the mean ranks of the price frames ($X^2 = 5.12$ with $p = 0.08$). There was no need to run post hoc tests. We cannot reject the null hypothesis.

The results in the mixed gains outcome also do not indicate any significant differences in the mean ranks of the price frames ($X^2 = 3.82$ with $p = 0.15$) and a Bonferroni correction was not necessary. Accordingly, we cannot reject the null hypothesis.

In the mixed losses outcome as well, we found no significant difference in the mean ranks of the price frames ($X^2 = 4.45$ with $p = 0.11$). Post hoc tests were not necessary and we therefore cannot reject the null hypothesis.

In summary, results from our non-parametric analysis were consistent with those obtained from the parametric tests. Results from both tests did not confirm our research hypotheses. We found that where expected prices and percentage frames are included in the same decision frame, expected prices do not have any significant impact on how consumers' perceive product prices or purchase decisions.

Table 6.9

Outputs from Friedman Test

Multiple gains

Ranks	
	Mean Rank
Absolute Nexp	2.12
Absolute	1.89
Relative	1.99

$\boldsymbol{Test\ Statistics^a}$	
N	45
Chi-square	1.72
df	2
Asymp.Sig	0.42

Multiple losses

Ranks	
	Mean Rank
Absolute Nexp	1.99
Absolute	1.80
Relative	2.21

$\boldsymbol{Test\ Statistics^a}$	
N	45
Chi-square	5.12
df	2
Asymp.Sig	0.08

Mixed gains

Ranks	
	Mean Rank
Absolute Nexp	2.02
Absolute	1.81
Relative	2.17

$Test\ Statistics^a$	
N	48
Chi-square	3.82
df	2
Asymp.Sig	0.15

Mixed losses

Ranks	
	Mean Rank
Absolute Nexp	1.82
Absolute	1.98
Relative	2.20

$Test\ Statistics^a$	
N	48
Chi-square	4.45
df	2
Asymp.Sig	0.11

6.14 GENERAL DISCUSSION

Previous research on price promotion and consumer choice points to the fact that consumers establish and utilize reference prices in their everyday purchase decisions (Monroe, 1979; Winer, 1986).

In this study, we evaluated expected prices as an internal reference price. Where expected prices are greater than actual transaction prices, consumers perceive this as a gain and where expected prices are lower, consumers perceive this as a loss. Based on the premise that the way price changes are presented could impact consumers' price perceptions, and resulting purchase decisions, we investigate the joint effects of price expectations and price framing on consumer behaviour using the underlying concept of mental accounting principle as the baseline. Our main findings are summarized as follows.

The discrepancy between consumers' expectations of changes in prices and actual prices do not significantly affect their perceptions of price. When faced with percentage price signals, the consumer's expectation of the retailer's prices at the point of purchase does not have a significant influence on their purchase decisions. This is consistent with previous empirical findings (Boyd & Bhat, 1998; Campbell, 1999). We also found that ‘certain’ expectation of the retailer’s prices also had no significant impact on consumer preferences. Indeed, the significant impact of price framing implies that consumers’ expectation of future prices have no significant effect on their preferences.

Consumers interpret internal reference price as 'fair price' and not 'expected price'. To the extent that reference prices are posited to affect consumers' purchase decisions in terms of willingness to buy and utility derived from the purchase, IRPs are theoretically conceptualised and interpreted as fair price by consumers. Furthermore, the concept of price introduced into the value function, and which generated Thaler's (1985) MAPs, was defined as fair price. Intuitively therefore, it seems more probable based on our findings that, fair prices and not expected prices, are employed as the standard of comparison which influence consumer choices.

Similarly, our results provide support for the finding that ERPs have a greater impact on consumer price perception when the reference price is defined as expected price (Rajendran, 2009), since unfair prices, not unexpected prices, determine the purchase or non-purchase of a product (Boyd & Bhat, 1998; Campbell, 1999).

6.15 FINAL NOTE ON DATA ANALYSES

Previous experimental studies evaluating consumer choices based on reference prices, framing effect and mental accounting principles (Heath et al. 1995; Gupta and Cooper, 1992; Frisch, 1993; Darke and Chung, 2005; Biswas, 1992; Chatterjee et al. 2000) carried out hypothesis tests of means. In this research, we also analyse our data using ANOVA in all three core chapters.

In addition, we were interested in how the results obtained using mean tests compare with those from median tests. This led to the decision to use both parametric and non-parametric analysis in this research.

Unsurprisingly, where we detected significant effects between frame and outcome type (chapters 4 and 5), our results from the non-parametric analysis did not always corroborate this, since parametric tests have more statistical power than the non-parametric.

Nevertheless, the means obtained from our data accurately represents our sample distribution, and since the size of our samples (see the section on research design and data collection in the 3 chapters) is large enough, we emphasize the findings from our parametric analysis.

6.16 MARKETING IMPLICATIONS OF OUR RESEARCH

This research highlights some important managerial insights with regards to preference reversals, and the framing of reference prices.

Preference reversals: a large number of studies (e.g., Arkes and Blumer, 1985; Kahneman, Knetsch, and Thaler, 1990; Schweitzer, 1994) have provided empirical support for the robustness of the concept of loss aversion (Kahneman and Tversky, 1979). Nevertheless, our study (chapter 5) suggests that it is possible to reverse loss aversion and consumer preferences. In a previous study, Harinck et al. (2007) found that for small sums of money, individuals tend to discount small losses leading to a reversal of loss aversion. Thus, from a managerial perspective, consumers may be able to perceive small price increases as temporary and minor inconveniences which, in relation to large losses, would have a less significant impact relative to their reference points.

Price framing and reference prices:

Managers need to acquire better understanding of the importance of reference prices, and how external reference prices affect consumer choices. A key marketing strategy, based on our results in chapter 5, is varying current prices relative to competitor current prices. In addition, the findings from chapter 6 suggests that their might be some disparity between what reference price means to consumers and what it has been generally interpreted as in pricing literature. Where consumers' internal reference prices are correctly defined in terms of price fairness, then strategies, such as price framing can be appropriately tailored so as to minimize the disutility consumers perceive from increases in prices. For example, retailers need to have knowledge of when consumers perceive a price increase as unfair and how to frame negative deviations within the right contexts (Kahneman, 1992; Ortmeyer, 1993).

CHAPTER 7
CONCLUSION AND FUTURE RESEARCH

7.1 CONCLUSION

The research presented here originates from the notion that reference dependence is dependent on the frame employed in describing gains and losses as deviations from the status quo (Kahneman and Tversky, 1979). We evaluate this frame dependence from a price related perspective in order to more specifically examine the importance of price presentation and reference points on consumers' perceptions of changes in prices.

Our empirical evidence on price manipulation is derived from the literature on reference prices (Chatterjee et al. 2000; Heath et al. 1995). In conformity with extant literature, we contribute to the growing body of literature on brand choice and consumer decision making (see for example Kalwani et al. 1990; Mayhew and Winer, 1986) by investigating the role of retailer's past prices, competitor's current prices, competitor's past prices, and consumer's expectations of future prices on consumers' perceptions of prices.

Our baseline analysis rests on the principles of mental accounting (Thaler, 1985) and its implications for consumer choice. Challenging these mental accounting principles, we empirically show that the manipulation of reference points and price frame elicits reversals in Thaler's (1985) proposed principles. In essence, our results provide evidence that mental accounting principles are frame dependent.

This research re-analysed and extended the previous study by Heath et al. (1995) which suggested that explicitly stated reference states were omitted in the experiments from which Thaler's (1985) mental accounting principles were derived.

In the first instance, we evaluated internal reference price conceptualized as recently observed past prices of a retailer. We found that price framing significantly altered mental accounting principles, consumers' perceptions of price and their purchase decisions. One of the ways percentage price framing filters into perceptions of price, is by making consumers more sensitive to the number of times a retailer's prices change as opposed to the magnitude of the change in prices (Buyukkurt, 1986) and thereby, increasing the satisfaction derived from the purchase. For example, when percentage frames are utilized in signalling multiple price discounts, consumers perceive a greater transaction utility from making such a purchase. This in turn, encourages them to buy component products, or products related either in terms of their marginal substitutability or complementarity, as seen for example, in the purchase of a chair and couch in our multiple gains scenario resulting from the reinforced preference to segregate.

Second, as an extension, we investigated competitor’s current and competitor's past prices. Both are external reference prices, and are conceptualized in this research as prices of other competing products in the retailer’s product offerings present within the purchase environment. Our findings indicate that external reference prices have a more significant impact on consumers’ perceptions of prices relative to internal reference prices and emphatically, current prices have a higher impact as a standard of comparison than past prices. This is consistent with extant literature which suggests that consumers utilize competitive prices more than past prices during purchase decisions (Rajendran, 2009).

Finally, we examined the impact of consumers’ expectations of a retailer’s future prices based on prior purchase experience which served as a benchmark for familiarity with the retailer’s previous prices. Expected prices are one of the conceptualizations of internal reference prices in price promotion literature and, in comparison with consumers’ recall of past prices, we found that price expectations do not have a significant effect on price perception. This was particularly evident in the mixed gains outcome where the consumer’s expectation of changes in prices was implicit in the decision problem and did not have a significant impact on mental accounting principles. Our rationale is that, in agreement with empirical findings (Rajendran, 2009), consumers do not interpret reference price as expected price (the predicted price of a product). Rather, they define reference price as fair prices (the appropriate or just price of a product). Furthermore, in relation to our assumption of the consumer's uncertainty about product prices, we propose that ‘brand confident’ consumers could be less sensitive to price framing manipulations. Laroche, Kim and Zhou (1996) echo this reasoning. Nevertheless, additional research is needed to examine the effect of types of decision makers and price framing on purchase decisions.

7.2 LIMITATIONS AND FUTURE RESEARCH

Although our study provides some interesting findings on consumer purchase behaviour in relation to variations in prices, a few limitations are identified.

First, our experiments employed questionnaires involving hypothetical decision scenarios. While this approach has some empirical support (Kuhberger et al. 2002) and is widely used in experimental studies, it is still open to criticism, as the artificial setting may limit the generalizability of the results. In addition, the questionnaires employed in our experiments are not error-proof and could have been possibly misleading.

Second, this study recruited post graduate students as subjects. Although the use of student-based samples has been criticized (see for example, Lynch, 1999), Bergmann and Grahn (1997) and Calder et al. (1981) argue that homogeneous sampling ameliorates the internal validity of research findings. It is however probable that there could be a divergence between student samples and a non-student sample/generalized population due to the fact that students may not appropriately represent the market sector investigated herein. For example, in our questionnaires, the hypothetical products for purchase (chair and couch) are arguably, not everyday items on a typical postgraduate's shopping list. It would be meaningful to cross-validate our findings with a sample more representative of the overall population.

Lastly, we adapted questions from Thaler's (1985) original experiments from which mental accounting principles were derived into our experiments (control) and these represented decision scenarios lacking explicit reference states. Although, these questions were similar to our treatment questions in context and contained relatively similar financial evaluations of the changes in prices as those in the treatment frames, they were not strictly the same in content and structure. In addition, while we obtained preferences which were consistent with MAPs in the control frame for mixed gains, mixed losses, and multiple losses outcomes, we were unable to replicate same in the multiple gains outcome.

Future research should address the question of how reference prices are formed. One possible approach is to look into thought eliciting experiments which could provide better insights into the deliberate thought processes of decision makers.

Another extension would be looking into the link or relationship between regret aversion and the formation of reference prices. We are of the opinion that decision makers form reference prices in an effort to avoid future regret concerning their purchase decisions. This is because consumers may anticipate the feeling of regret as a result of poor purchase decisions, (for example, buying a product just because it is on sale), so they attempt to rationalize their choices using reference prices, thereby, reducing the possibility of regret.

Furthermore, because consumer products are many and varied and since our study focused on only one of such, it is not exhaustive. Additional insights might be obtained by extending this study to other categories of products and across multi-attribute retail settings.

Finally, most of the empirical work on reference prices have used scanner panel data sourced from frequently purchased goods. Therefore, there is further need to evaluate and study reference prices from contexts other than that previously studied.

APPENDIX 1 (CHAPTER 4)

Consent form, Questionnaires, Analysis of repeated measures ANOVA, Wilcoxon signed-rank test

Appendix 1-1

Consent Form

Title of Project: Evaluating consumer price perception: a mental accounting and frame dependent perspective.

Name of Researcher: Agbato, Oluwadamilola

1. I confirm that I have read and understand the Plain Language Statement for the above study and have had the opportunity to ask questions.

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason.

3. I understand that my participation during this research project is not being audio or video recorded in any way.

4. I understand that participants will not be identified by pseudonym or name in any publications arising from the research and that the data will be completely anonymised.

5. I understand that the data from the research will be kept locked in filing cabinets at the University of Glasgow.

6. I understand that the data will not be retained beyond the end of the research project and that it would thereafter be completely shredded.

7. I understand that this research work has been given ethical approval by the College of Social Sciences Ethics Committee.

8. I agree / do not agree (delete as applicable) to take part in the above study.

Name of Participant ***Date*** ***Signature***

Appendix 1A – Questionnaires (Retailer's past prices)

In the scenarios below, you are asked to judge whether Mr. A or Mr. B is happier i.e. would you rather be Mr. A or Mr. B.

On a scale of 1 to 15, kindly rate the relative happiness of Mr. A and Mr. B.

Scale of 1 to 7 – Mr. A is happier than Mr. B *(with 7 being highest level of happiness)*
At midpoint 8 – Mr. A and Mr. B are equally happy
Scale of 9 to 15 – Mr. B is happier than Mr. A *(with 15 being highest level of happiness)*

Mixed Gains

SCENARIO 1

Mr. A wins £50 in a lottery, whereas Mr. B wins £100 in a lottery but un-expectedly owes his landlord £50 for damaging the carpet.

Who was happier? Mr. A or Mr. B

	Mr. A is happier							Both are equally happy	Mr. B is happier						
Scale of happiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 2

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.
At the store, Mr. A finds that the originally priced £1300 couch has been reduced to £1250; Mr. B finds that the originally priced £300 chair has been reduced to £200 while the price of the couch which had originally been £1000 had been increased to £1050.

Who was happier? Mr. A or Mr. B

	Mr. A is happier							Both are equally happy	Mr. B is happier						
Scale of happiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 3

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the originally priced £1300 couch has been reduced by 3.84% to £1250; Mr. B finds that the originally priced £300 chair has been reduced by 33.3% to £200 while the price of the couch which had originally been £1000 had been increased by 5% to £1050.

Who was happier? Mr. A or Mr. B

	Mr. A is happier							Both are equally happy	Mr. B is happier						
Scale of happiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 4

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the originally priced £1300 couch has been reduced by 3.84%; Mr. B finds that the originally priced £300 chair has been reduced by 33.3% while the price of the couch which had originally been £1000 had been increased by 5%.

Who was happier? Mr. A or Mr. B

	Mr. A is happier							Both are equally happy	Mr. B is happier						
Scale of happiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Mixed Losses

In the scenarios below, you are asked to judge whether Mr. A or Mr. B is unhappier.

On a scale of 1 to 15, kindly rate the relative unhappiness of Mr. A and Mr. B.

Scale of 1 to 7 – Mr. A is unhappier than Mr. B *(with 7 being highest level of unhappiness)*

At midpoint 8 – Mr. A and Mr. B are equally unhappy

Scale of 9 to 15 – Mr. B is unhappier than Mr. A *(with 15 being highest level of unhappiness)*

SCENARIO 1

Mr. A's car was damaged in a parking lot. He had to spend £150 to repair the damage. Mr. B's car was damaged in a parking lot. He had to spend £200 to repair the damage. The same day the car was damaged, he won £50 in the office football pool.

Who was unhappier? Mr. A or Mr. B

	Mr. A is unhappier							Both are equally unhappy	Mr. B is unhappier						
Scale of unhappiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 2

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the originally priced £1250 couch has been increased to £1300; Mr. B finds that the originally priced £200 chair has been increased to £300 while the price of the couch which had originally been £1050 has been reduced to £1000.

Who was unhappier? Mr. A or Mr. B

	Mr. A is unhappier							Both are equally unhappy	Mr. B is unhappier						
Scale of unhappiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 3

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the originally priced £1250 couch has been increased by 4% to £1300; Mr. B finds that the originally priced £200 chair has been increased by 50% to £300 while the price of the couch which had originally been £1050 has been reduced by 4.76% to £1000.

Who was unhappier? Mr. A or Mr. B

	Mr. A is unhappier							Both are equally unhappy	Mr. B is unhappier						
Scale of unhappiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 4

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair. On getting to the store, Mr. A finds that the originally priced £1250 couch has been increased by 4%; Mr. B finds that the originally priced £200 chair has been increased by 50% while the price of the couch which had originally been £1050 has been reduced by 4.76%.

Who was unhappier? Mr. A or Mr. B

	Mr. A is unhappier							Both are equally unhappy	Mr. B is unhappier						
Scale of unhappiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Multiple Gains

In the scenarios below, you are asked to judge whether Mr. A or Mr. B is happier i.e. would you rather be Mr. A or Mr. B.

On a scale of 1 to 15, kindly rate the relative happiness of Mr. A and Mr. B.

Scale of 1 to 7 – Mr. A is happier than Mr. B *(with 7 being highest level of happiness)*

At midpoint 8 – Mr. A and Mr. B are equally happy

Scale of 9 to 15 – Mr. B is happier than Mr. A *(with 15 being highest level of happiness)*

SCENARIO 1

Mr. A was given a ticket to a lottery. He won £100. Mr. B was given tickets to 2 lotteries. He won £75 in one lottery and £25 in the other.

Who was happier? Mr. A or Mr. B

	Mr. A is happier							Both are equally happy	Mr. B is happier						
Scale of happiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 2

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the originally priced £1300 couch has been reduced to £1200; Mr. B finds that the originally priced £300 chair has been reduced to £240 while the price of the couch which had originally been £1000 had been reduced to £960.

Who was happier? Mr. A or Mr. B

	Mr. A is happier							Both are equally happy	Mr. B is happier						
Scale of happiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 3

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the originally priced £1300 couch has been reduced by 7.69% to £1200; Mr. B finds that the originally priced £300 chair has been reduced by 20% to £240 while the price of the couch which had originally been £1000 had been reduced by 4% to £960.

Who was happier? Mr. A or Mr. B

	Mr. A is happier							Both are equally happy	Mr. B is happier						
Scale of happiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 4

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the originally priced £1300 couch has been reduced by 7.69%; Mr. B finds that the originally priced £300 chair has been reduced by 20% while the price of the couch which had originally been £1000 had been reduced by 4%.

Who was happier? Mr. A or Mr. B

	Mr. A is happier							Both are equally happy	Mr. B is happier						
Scale of happiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Multiple Losses

In the scenarios below, you are asked to judge whether Mr. A or Mr. B is unhappier.

On a scale of 1 to 15, kindly rate the relative unhappiness of Mr. A and Mr. B.

Scale of 1 to 7 – Mr. A is unhappier than Mr. B *(with 7 being highest level of unhappiness)*

At midpoint 8 – Mr. A and Mr. B are equally unhappy

Scale of 9 to 15 – Mr. B is unhappier than Mr. A *(with 15 being highest level of unhappiness)*

SCENARIO 1

Mr. A received a letter from the HM Revenue and Customs saying that he made a minor arithmetical mistake on his tax return and owed £100. There was no repercussion from the mistake. Mr. B received a letter from the HM Revenue and Customs saying that he made a minor arithmetical mistake on his tax return and owed £75 He received a similar letter the same day from the Council saying he owed £25 in council taxes. There were no repercussions from either mistake.

Who was unhappier? Mr. A or Mr. B

	Mr. A is unhappier							Both are equally unhappy	Mr. B is unhappier						
Scale of unhappiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 2

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the originally priced £1250 couch has been increased to £1350; Mr. B finds that the originally priced £200 chair has been increased to £250 while the price of the couch which had originally been £1050 has been increased to £1100.

Who was unhappier? Mr. A or Mr. B

	Mr. A is unhappier							Both are equally unhappy	Mr. B is unhappier						
Scale of unhappiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 3

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the originally priced £1250 couch has been increased by 8% to £1350; Mr. B finds that the originally priced £200 chair has been increased by 25% to £250 while the price of the couch which had originally been £1050 has been increased by 4.76% to £1100.

Who was unhappier? Mr. A or Mr. B

	Mr. A is unhappier							Both are equally unhappy	Mr. B is unhappier						
Scale of unhappiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 4

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the originally priced £1250 couch has been increased by 8%; Mr. B finds that the originally priced £200 chair has been increased by 25% while the price of the couch which had originally been £1050 has been increased by 4.76%.

Who was unhappier? Mr. A or Mr. B

	Mr. A is unhappier							Both are equally unhappy	Mr. B is unhappier						
Scale of unhappiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Appendix 1B - Analysis of repeated measures ANOVA

Mixed Gains

Within-Subjects Factors

Measure: MEASURE_1

Frame	Dependent Variable
1	Control
2	Absolute
3	Dual
4	Relative

Descriptive Statistics

	Mean	Std. Deviation	N
Control	6.1667	3.06201	48
Absolute	8.0208	3.48547	48
Dual	8.8125	3.33043	48
Relative	8.8542	3.87567	48

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Noncent. Parameter	Observed Power[c]
Frame	Pillai's Trace	.329	7.341[b]	3.000	45.000	.000	22.023	.976
	Wilks' Lambda	.671	7.341[b]	3.000	45.000	.000	22.023	.976
	Hotelling's Trace	.489	7.341[b]	3.000	45.000	.000	22.023	.976
	Roy's Largest Root	.489	7.341[b]	3.000	45.000	.000	22.023	.976

a. Design: Intercept
Within Subjects Design: Frame

b. Exact statistic

c. Computed using alpha = .05

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Frame	.609	22.684	5	.000	.776	.819	.333

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept
Within Subjects Design: Frame

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Frame	Type III Sum of Squares	df	Mean Square	F	Sig.	Noncent. Parameter	Observed Power[a]
Frame	Linear	188.151	1	188.151	14.597	.000	14.597	.963
	Quadratic	39.422	1	39.422	5.460	.024	5.460	.629
	Cubic	.234	1	.234	.061	.806	.061	.057
Error (Frame)	Linear	605.799	47	12.889				
	Quadratic	339.328	47	7.220				
	Cubic	181.316	47	3.858				

a. Computed using alpha = .05

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Noncent. Parameter	Observed Power[a]
Intercept	12176.255	1	12176.255	514.415	.000	514.415	1.000
Error	1112.495	47	23.670				

a. Computed using alpha = .05

Transformation Coefficients (M Matrix)

Average

Measure: MEASURE_1

Transformed Variable:

AVERAGE

Control	.500
Absolute	.500
Dual	.500
Relative	.500

Frame[a]

Measure: MEASURE_1

Dependent Variable	Frame		
	Linear	Quadratic	Cubic
Control	-.671	.500	-.224
Absolute	-.224	-.500	.671
Dual	.224	-.500	-.671
Relative	.671	.500	.224

a. The contrasts for the within subjects factors are:

Frame: Polynomial contrast

Estimated Marginal Means

Frame

Transformation Coefficients (M Matrix)

Measure: MEASURE_1

Dependent Variable	Frame			
	1	2	3	4
Control	1	0	0	0
Absolute	0	1	0	0
Dual	0	0	1	0
Relative	0	0	0	1

Estimates

Measure: MEASURE_1

Frame	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	6.167	.442	5.278	7.056
2	8.021	.503	7.009	9.033
3	8.813	.481	7.845	9.780
4	8.854	.559	7.729	9.980

Pairwise Comparisons

Measure: MEASURE_1

(I) Frame	(J) Frame	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	-1.854*	.513	.004	-3.263	-.445
	3	-2.646*	.590	.000	-4.266	-1.026
	4	-2.688*	.671	.001	-4.531	-.844
2	1	1.854*	.513	.004	.445	3.263
	3	-.792	.497	.530	-2.157	.574
	4	-.833	.693	.800	-2.736	1.069
3	1	2.646*	.590	.000	1.026	4.266
	2	.792	.497	.530	-.574	2.157
	4	-.042	.456	1.000	-1.295	1.212
4	1	2.688*	.671	.001	.844	4.531
	2	.833	.693	.800	-1.069	2.736
	3	.042	.456	1.000	-1.212	1.295

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.	Noncent. Parameter	Observed Power[b]
Pillai's trace	.329	7.341[a]	3.000	45.000	.000	22.023	.976
Wilks' lambda	.671	7.341[a]	3.000	45.000	.000	22.023	.976
Hotelling's trace	.489	7.341[a]	3.000	45.000	.000	22.023	.976
Roy's largest root	.489	7.341[a]	3.000	45.000	.000	22.023	.976

Each F tests the multivariate effect of Frame. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

b. Computed using alpha = .05

Mixed Losses

Within-Subjects Factors

Measure: MEASURE_1

Frame	Dependent Variable
1	Control
2	Absolute
3	Dual
4	Relative

Descriptive Statistics

	Mean	Std. Deviation	N
Control	7.2708	3.52945	48
Absolute	7.7083	3.38305	48
Dual	8.7083	3.47611	48
Relative	8.9583	3.46998	48

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Frame	Pillai's Trace	.140	2.435[b]	3.000	45.000	.077
	Wilks' Lambda	.860	2.435[b]	3.000	45.000	.077
	Hotelling's Trace	.162	2.435[b]	3.000	45.000	.077
	Roy's Largest Root	.162	2.435[b]	3.000	45.000	.077

a. Design: Intercept

Within Subjects Design: Frame

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Frame	.424	39.254	5	.000	.674	.704	.333

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept

Within Subjects Design: Frame

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Frame	Sphericity Assumed	92.766	3	30.922	4.270	.006
	Greenhouse-Geisser	92.766	2.021	45.896	4.270	.016
	Huynh-Feldt	92.766	2.112	43.913	4.270	.015
	Lower-bound	92.766	1.000	92.766	4.270	.044
Error (Frame)	Sphericity Assumed	1020.984	141	7.241		
	Greenhouse-Geisser	1020.984	94.996	10.748		
	Huynh-Feldt	1020.984	99.287	10.283		
	Lower-bound	1020.984	47.000	21.723		

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Frame	Type III Sum of Squares	df	Mean Square	F	Sig.
Frame	Linear	88.209	1	88.209	6.780	.012
	Quadratic	.422	1	.422	.110	.741
	Cubic	4.134	1	4.134	.846	.362
Error (Frame)	Linear	611.441	47	13.009		
	Quadratic	179.828	47	3.826		
	Cubic	229.716	47	4.888		

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	12789.005	1	12789.005	486.217	.000
Error	1236.245	47	26.303		

Transformation Coefficients (M Matrix)

Average

Measure: MEASURE_1

Transformed Variable:

AVERAGE

Control	.500
Absolute	.500
Dual	.500
Relative	.500

Frame[a]

Measure: MEASURE_1

Dependent Variable	Frame		
	Linear	Quadratic	Cubic
Control	-.671	.500	-.224
Absolute	-.224	-.500	.671
Dual	.224	-.500	-.671
Relative	.671	.500	.224

a. The contrasts for the within subjects factors are:

Frame: Polynomial contrast

Estimated Marginal Means

Frame

Transformation Coefficients (M Matrix)

Measure: MEASURE_1

Dependent Variable	Frame			
	1	2	3	4
Control	1	0	0	0
Absolute	0	1	0	0
Dual	0	0	1	0
Relative	0	0	0	1

Estimates

Measure: MEASURE_1

Frame	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	7.271	.509	6.246	8.296
2	7.708	.488	6.726	8.691
3	8.708	.502	7.699	9.718
4	8.958	.501	7.951	9.966

Pairwise Comparisons

Measure: MEASURE_1

(I) Frame	(J) Frame	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a]	
					Lower Bound	Upper Bound
	2	-.438	.544	.964	-1.932	1.057
1	3	-1.438	.658	.187	-3.244	.369
	4	-1.688	.689	.104	-3.581	.206
	1	.438	.544	.964	-1.057	1.932
2	3	-1.000	.520	.312	-2.428	.428
	4	-1.250	.495	.087	-2.610	.110
	1	1.438	.658	.187	-.369	3.244
3	2	1.000	.520	.312	-.428	2.428
	4	-.250	.301	.958	-1.078	.578
	1	1.688	.689	.104	-.206	3.581
4	2	1.250	.495	.087	-.110	2.610
	3	.250	.301	.958	-.578	1.078

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.
Pillai's trace	.140	2.435[a]	3.000	45.000	.077
Wilks' lambda	.860	2.435[a]	3.000	45.000	.077
Hotelling's trace	.162	2.435[a]	3.000	45.000	.077
Roy's largest root	.162	2.435[a]	3.000	45.000	.077

Each F tests the multivariate effect of Frame. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

Multiple Gains

Within-Subjects Factors

Measure: MEASURE_1

Frame	Dependent Variable
1	Control
2	Absolute
3	Dual
4	Relative

Descriptive Statistics

	Mean	Std. Deviation	N
Control	7.5778	2.64995	45
Absolute	9.4889	2.41795	45
Dual	9.8889	2.21793	45
Relative	9.7556	2.64709	45

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Frame	Pillai's Trace	.304	6.125[b]	3.000	42.000	.001
	Wilks' Lambda	.696	6.125[b]	3.000	42.000	.001
	Hotelling's Trace	.437	6.125[b]	3.000	42.000	.001
	Roy's Largest Root	.437	6.125[b]	3.000	42.000	.001

a. Design: Intercept
Within Subjects Design: Frame

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Frame	.445	34.590	5	.000	.738	.779	.333

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept
Within Subjects Design: Frame

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Frame	Sphericity Assumed	157.333	3	52.444	9.315	.000
	Greenhouse-Geisser	157.333	2.214	71.053	9.315	.000
	Huynh-Feldt	157.333	2.337	67.329	9.315	.000
	Lower-bound	157.333	1.000	157.333	9.315	.004
Error (Frame)	Sphericity Assumed	743.167	132	5.630		
	Greenhouse-Geisser	743.167	97.429	7.628		
	Huynh-Feldt	743.167	102.818	7.228		
	Lower-bound	743.167	44.000	16.890		

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Frame	Type III Sum of Squares	df	Mean Square	F	Sig.
Frame	Linear	108.160	1	108.160	13.229	.001
	Quadratic	47.022	1	47.022	9.217	.004
	Cubic	2.151	1	2.151	.595	.444
Error (Frame)	Linear	359.740	44	8.176		
	Quadratic	224.478	44	5.102		
	Cubic	158.949	44	3.612		

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	15161.689	1	15161.689	1918.036	.000
Error	347.811	44	7.905		

Transformation Coefficients (M Matrix)

Average

Measure: MEASURE_1

Transformed Variable:

AVERAGE

Control	.500
Absolute	.500
Dual	.500
Relative	.500

Frame[a]

Measure: MEASURE_1

Dependent Variable	Frame		
	Linear	Quadratic	Cubic
Control	-.671	.500	-.224
Absolute	-.224	-.500	.671
Dual	.224	-.500	-.671
Relative	.671	.500	.224

a. The contrasts for the within subjects factors are:

Frame: Polynomial contrast

Estimated Marginal Means

Frame

Transformation Coefficients (M Matrix)

Measure: MEASURE_1

Dependent Variable	Frame			
	1	2	3	4
Control	1	0	0	0
Absolute	0	1	0	0
Dual	0	0	1	0
Relative	0	0	0	1

Estimates

Measure: MEASURE_1

Frame	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	7.578	.395	6.782	8.374
2	9.489	.360	8.762	10.215
3	9.889	.331	9.223	10.555
4	9.756	.395	8.960	10.551

Pairwise Comparisons

Measure: MEASURE_1

(I) Frame	(J) Frame	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	-1.911*	.610	.018	-3.590	-.232
	3	-2.311*	.531	.000	-3.773	-.849
	4	-2.178*	.599	.004	-3.828	-.528
2	1	1.911*	.610	.018	.232	3.590
	3	-.400	.406	.910	-1.519	.719
	4	-.267	.497	.996	-1.635	1.102
3	1	2.311*	.531	.000	.849	3.773
	2	.400	.406	.910	-.719	1.519
	4	.133	.278	.998	-.633	.900
4	1	2.178*	.599	.004	.528	3.828
	2	.267	.497	.996	-1.102	1.635
	3	-.133	.278	.998	-.900	.633

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.
Pillai's trace	.304	6.125[a]	3.000	42.000	.001
Wilks' lambda	.696	6.125[a]	3.000	42.000	.001
Hotelling's trace	.437	6.125[a]	3.000	42.000	.001
Roy's largest root	.437	6.125[a]	3.000	42.000	.001

Each F tests the multivariate effect of Frame. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

Multiple Losses

Within-Subjects Factors

Measure: MEASURE_1

Frame	Dependent Variable
1	Control
2	Absolute
3	Dual
4	Relative

Descriptive Statistics

	Mean	Std. Deviation	N
Control	9.2444	3.05373	45
Absolute	8.8889	3.09855	45
Dual	9.8000	3.01963	45
Relative	10.0444	2.75479	45

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Frame	Pillai's Trace	.116	1.837[b]	3.000	42.000	.155
	Wilks' Lambda	.884	1.837[b]	3.000	42.000	.155
	Hotelling's Trace	.131	1.837[b]	3.000	42.000	.155
	Roy's Largest Root	.131	1.837[b]	3.000	42.000	.155

a. Design: Intercept

Within Subjects Design: Frame

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Frame	.582	23.144	5	.000	.814	.865	.333

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept

Within Subjects Design: Frame

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Frame	Sphericity Assumed	37.128	3	12.376	2.376	.073
	Greenhouse-Geisser	37.128	2.441	15.210	2.376	.087
	Huynh-Feldt	37.128	2.595	14.307	2.376	.083
	Lower-bound	37.128	1.000	37.128	2.376	.130
Error (Frame)	Sphericity Assumed	687.622	132	5.209		
	Greenhouse-Geisser	687.622	107.405	6.402		
	Huynh-Feldt	687.622	114.180	6.022		
	Lower-bound	687.622	44.000	15.628		

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Frame	Type III Sum of Squares	df	Mean Square	F	Sig.
Frame	Linear	24.668	1	24.668	3.769	.059
	Quadratic	4.050	1	4.050	.918	.343
	Cubic	8.410	1	8.410	1.801	.186
Error (Frame)	Linear	287.982	44	6.545		
	Quadratic	194.200	44	4.414		
	Cubic	205.440	44	4.669		

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	16226.006	1	16226.006	811.075	.000
Error	880.244	44	20.006		

Transformation Coefficients (M Matrix)

Average

Measure: MEASURE_1

Transformed Variable:

AVERAGE

Control	.500
Absolute	.500
Dual	.500
Relative	.500

Frame[a]

Measure: MEASURE_1

Dependent Variable	Frame		
	Linear	Quadratic	Cubic
Control	-.671	.500	-.224
Absolute	-.224	-.500	.671
Dual	.224	-.500	-.671
Relative	.671	.500	.224

a. The contrasts for the within subjects factors are:

Frame: Polynomial contrast

Estimated Marginal Means

Frame

Transformation Coefficients (M Matrix)

Measure: MEASURE_1

Dependent Variable	Frame			
	1	2	3	4
Control	1	0	0	0
Absolute	0	1	0	0
Dual	0	0	1	0
Relative	0	0	0	1

Estimates

Measure: MEASURE_1

Frame	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	9.244	.455	8.327	10.162
2	8.889	.462	7.958	9.820
3	9.800	.450	8.893	10.707
4	10.044	.411	9.217	10.872

Pairwise Comparisons

Measure: MEASURE_1

(I) Frame	(J) Frame	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a]	
					Lower Bound	Upper Bound
1	2	.356	.545	.987	-1.146	1.857
	3	-.556	.511	.864	-1.963	.852
	4	-.800	.497	.518	-2.169	.569
2	1	-.356	.545	.987	-1.857	1.146
	3	-.911	.501	.378	-2.292	.470
	4	-1.156	.506	.154	-2.551	.240
3	1	.556	.511	.864	-.852	1.963
	2	.911	.501	.378	-.470	2.292
	4	-.244	.276	.943	-1.003	.515
4	1	.800	.497	.518	-.569	2.169
	2	1.156	.506	.154	-.240	2.551
	3	.244	.276	.943	-.515	1.003

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.
Pillai's trace	.116	1.837[a]	3.000	42.000	.155
Wilks' lambda	.884	1.837[a]	3.000	42.000	.155
Hotelling's trace	.131	1.837[a]	3.000	42.000	.155
Roy's largest root	.131	1.837[a]	3.000	42.000	.155

Each F tests the multivariate effect of Frame. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

Appendix 1C - Wilcoxon signed-rank tests

Mixed Gains

Descriptive Statistics

	N	Percentiles		
		25th	50th (Median)	75th
Absolute	48	5.0000	8.0000	11.0000
Dual	48	7.2500	9.0000	11.0000
Relative	48	6.2500	9.5000	12.0000

Friedman Test

Ranks

	Mean Rank
Absolute	1.76
Dual	2.04
Relative	2.20

Test Statistics[a]

N	48
Chi-Square	7.248
df	2
Asymp. Sig.	.027

a. Friedman Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
Absolute	48	8.0208	3.48547	2.00	15.00	5.0000	8.0000	11.0000
Dual	48	8.8125	3.33043	2.00	14.00	7.2500	9.0000	11.0000
Relative	48	8.8542	3.87567	1.00	15.00	6.2500	9.5000	12.0000

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
Dual - Absolute	Negative Ranks	9[a]	16.11	145.00
	Positive Ranks	21[b]	15.24	320.00
	Ties	18[c]		
	Total	48		
Relative - Dual	Negative Ranks	8[d]	13.31	106.50
	Positive Ranks	16[e]	12.09	193.50
	Ties	24[f]		
	Total	48		
Relative - Absolute	Negative Ranks	12[g]	19.21	230.50
	Positive Ranks	23[h]	17.37	399.50
	Ties	13[i]		
	Total	48		

a. Dual < Absolute

b. Dual > Absolute

c. Dual = Absolute

d. Relative < Dual

e. Relative > Dual

f. Relative = Dual

g. Relative < Absolute

h. Relative > Absolute

i. Relative = Absolute

Test Statistics[a]

	Dual - Absolute	Relative - Dual	Relative - Absolute
Z	-1.808[b]	-1.258[b]	-1.387[b]
Asymp. Sig. (2-tailed)	.071	.208	.166

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

Mixed Losses

Descriptive Statistics

	N	Percentiles		
		25th	50th (Median)	75th
Absolute	48	5.0000	8.0000	10.0000
Dual	48	6.0000	9.0000	12.0000
Relative	48	6.2500	9.0000	11.7500

Friedman Test

Ranks

	Mean Rank
Absolute	1.70
Dual	2.06
Relative	2.24

Test Statistics[a]

N	48
Chi-Square	10.493
df	2
Asymp. Sig.	.005

a. Friedman Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
Absolute	48	7.7083	3.38305	1.00	14.00	5.0000	8.0000	10.0000
Dual	48	8.7083	3.47611	2.00	15.00	6.0000	9.0000	12.0000
Relative	48	8.9583	3.46998	2.00	15.00	6.2500	9.0000	11.7500

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
Dual - Absolute	Negative Ranks	10[a]	15.50	155.00
	Positive Ranks	21[b]	16.24	341.00
	Ties	17[c]		
	Total	48		
Relative - Absolute	Negative Ranks	9[d]	16.89	152.00
	Positive Ranks	27[e]	19.04	514.00
	Ties	12[f]		
	Total	48		
Relative - Dual	Negative Ranks	12[g]	13.92	167.00
	Positive Ranks	17[h]	15.76	268.00
	Ties	19[i]		
	Total	48		

a. Dual < Absolute

b. Dual > Absolute

c. Dual = Absolute

d. Relative < Absolute

e. Relative > Absolute

f. Relative = Absolute

g. Relative < Dual

h. Relative > Dual

i. Relative = Dual

Test Statistics[a]

	Dual - Absolute	Relative - Absolute	Relative - Dual
Z	-1.830[b]	-2.873[b]	-1.109[b]
Asymp. Sig. (2-tailed)	.067	.004	.267

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

Multiple Gains

Descriptive Statistics

	N	Percentiles		
		25th	50th (Median)	75th
Absolute	45	8.0000	9.0000	11.0000
Dual	45	8.0000	10.0000	11.5000
Relative	45	8.0000	10.0000	12.0000

Friedman Test

Ranks

	Mean Rank
Absolute	1.84
Dual	2.02
Relative	2.13

Test Statistics[a]

N	45
Chi-Square	3.185
df	2
Asymp. Sig.	.203

a. Friedman Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
Absolute	45	9.4889	2.41795	3.00	14.00	8.0000	9.0000	11.0000
Dual	45	9.8889	2.21793	5.00	15.00	8.0000	10.0000	11.5000
Relative	45	9.7556	2.64709	3.00	15.00	8.0000	10.0000	12.0000

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
Dual - Absolute	Negative Ranks	9[a]	11.22	101.00
	Positive Ranks	14[b]	12.50	175.00
	Ties	22[c]		
	Total	45		
Relative - Absolute	Negative Ranks	11[d]	20.36	224.00
	Positive Ranks	20[e]	13.60	272.00
	Ties	14[f]		
	Total	45		
Relative - Dual	Negative Ranks	10[g]	14.25	142.50
	Positive Ranks	13[h]	10.27	133.50
	Ties	22[i]		
	Total	45		

a. Dual < Absolute

b. Dual > Absolute

c. Dual = Absolute

d. Relative < Absolute

e. Relative > Absolute

f. Relative = Absolute

g. Relative < Dual

h. Relative > Dual

i. Relative = Dual

Test Statistics[a]

	Dual - Absolute	Relative - Absolute	Relative - Dual
Z	-1.133[b]	-.473[b]	-.139[c]
Asymp. Sig. (2-tailed)	.257	.636	.890

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

c. Based on positive ranks.

Multiple Losses

Descriptive Statistics

	N	Percentiles		
		25th	50th (Median)	75th
Absolute	45	7.0000	8.0000	12.0000
Dual	45	8.0000	10.0000	12.0000
Relative	45	8.0000	10.0000	11.5000

Friedman Test

Ranks

	Mean Rank
Absolute	1.71
Dual	2.10
Relative	2.19

Test Statistics[a]

N	45
Chi-Square	9.596
df	2
Asymp. Sig.	.008

a. Friedman Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
Absolute	45	8.8889	3.09855	1.00	15.00	7.0000	8.0000	12.0000
Dual	45	9.8000	3.01963	2.00	15.00	8.0000	10.0000	12.0000
Relative	45	10.0444	2.75479	4.00	15.00	8.0000	10.0000	11.5000

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
Dual - Absolute	Negative Ranks	7[a]	14.79	103.50
	Positive Ranks	19[b]	13.03	247.50
	Ties	19[c]		
	Total	45		
Relative - Absolute	Negative Ranks	9[d]	15.33	138.00
	Positive Ranks	23[e]	16.96	390.00
	Ties	13[f]		
	Total	45		
Relative - Dual	Negative Ranks	8[g]	10.38	83.00
	Positive Ranks	11[h]	9.73	107.00
	Ties	26[i]		
	Total	45		

a. Dual < Absolute

b. Dual > Absolute

c. Dual = Absolute

d. Relative < Absolute

e. Relative > Absolute

f. Relative = Absolute

g. Relative < Dual

h. Relative > Dual

i. Relative = Dual

Test Statistics[a]

	Dual - Absolute	Relative - Absolute	Relative - Dual
Z	-1.836[b]	-2.373[b]	-.491[b]
Asymp. Sig. (2-tailed)	.066	.018	.623

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

APPENDIXES 2 & 3 (CHAPTER 5)

Questionnaires, Analysis of repeated measures ANOVA, Linear mixed model and Wilcoxon signed-rank test

Appendix 2A - Questionnaires (Competitor's current prices)

In the scenarios below, you are asked to judge whether Mr. A or Mr. B is happier i.e. would you rather be Mr. A or Mr. B.

On a scale of 1 to 15, kindly rate the relative happiness of Mr. A and Mr. B.

Scale of 1 to 7 – Mr. A is happier than Mr. B *(with 7 being highest level of happiness)*

At midpoint 8 – Mr. A and Mr. B are equally happy

Scale of 9 to 15 – Mr. B is happier than Mr. A *(with 15 being highest level of happiness)*

<u>Mixed Gains</u>

<u>SCENARIO 1</u>

Mr. A expected a Christmas bonus of £300. He received his check and found it was for £250. Mr. B expected a Christmas bonus of $300. He received his check and the amount was indeed £300. A week later he received a note saying that there had been an error in this bonus check. The check was £50 too high. He must return the £50.

Who is happier? Mr. A or Mr. B

	Mr. A is happier							Both are equally happy	Mr. B is happier						
Scale of happiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

<u>SCENARIO 2</u>

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the price of the £1300 couch he set out to buy has been reduced to £1250; a competitor's couch of the same quality and within the same store is priced at £1250. Mr. B finds that the prices of the £200 chair and £1100 couch he set out to buy have been reduced to £100 and increased to £1150 respectively. A competitor's chair and couch of the same quality and within the same store goes for £100 and £1150 respectively.

Who is happier? Mr. A or Mr. B

	Mr. A is happier							Both are equally happy	Mr. B is happier						
Scale of happiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 3

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the price of the £1300 couch he set out to buy has been reduced by 3.84% to £1250; a competitor's couch of the same quality and within the same store is priced at £1250. Mr. B finds that the prices of the £200 chair and £1100 couch he set out to buy have been reduced by 50% to £100 and increased by 4.5% to £1150 respectively. A competitor's chair and couch of the same quality and within the same store goes for £100 and £1150 respectively.

Who is happier? Mr. A or Mr. B

	Mr. A is happier							Both are equally happy	Mr. B is happier						
Scale of happiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 4

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the price of the £1300 couch he set out to buy has been reduced by 3.84%; a competitor's couch of the same quality and within the same store is priced at £1250. Mr. B finds that the prices of the £200 chair and £1100 couch he set out to buy have been reduced by 50% and increased by 4.5% respectively. A competitor's chair and couch of the same quality and within the same store goes for £100 and £1150 respectively.

Who is happier? Mr. A or Mr. B

	Mr. A is happier							Both are equally happy	Mr. B is happier						
Scale of happiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Mixed Losses

In the scenarios below, you are asked to judge whether Mr. A or Mr. B is unhappier.

On a scale of 1 to 15, kindly rate the relative unhappiness of Mr. A and Mr. B.

Scale of 1 to 7 – Mr. A is unhappier than Mr. B *(with 7 being highest level of unhappiness)*

At midpoint 8 – Mr. A and Mr. B are equally unhappy

Scale of 9 to 15 – Mr. B is unhappier than Mr. A *(with 15 being highest level of unhappiness*

SCENARIO 1

Mr. A's car was damaged in a parking lot. He had to spend £150 to repair the damage. Mr. B's car was damaged in a parking lot. He had to spend £200 to repair the damage. The same day the car was damaged, he won £50 in the office football pool.

Who is unhappier? Mr. A or Mr. B

	Mr. A is unhappier							Both are equally unhappy	Mr. B is unhappier						
Scale of unhappiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 2

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the price of the £1250 couch he set out to buy has been increased to £1300; a competitor's couch of the same quality and within the same store is priced at £1300. Mr. B finds that the prices of the £200 chair and £1050 couch he set out to buy have been reduced to £150 and increased to £1150 respectively. A competitor's chair and couch of the same quality and within the same store goes for £150 and £1150 respectively.

Who is unhappier? Mr. A or Mr. B

	Mr. A is unhappier							Both are equally unhappy	Mr. B is unhappier						
Scale of unhappiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 3

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the price of the £1250 couch he set out to buy has been increased by 4% to £1300; a competitor's couch of the same quality and within the same store is priced at £1300. Mr. B finds that the prices of the £200 chair and £1050 couch he set out to buy have been reduced by 25% to £150 and increased by 9.5% to £1150 respectively. A competitor's chair and couch of the same quality and within the same store goes for £150 and £1150 respectively.

Who is unhappier? Mr. A or Mr. B

	Mr. A is unhappier							Both are equally unhappy	Mr. B is unhappier						
Scale of unhappiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 4

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the price of the £1250 couch he set out to buy has been increased by 4%; a competitor's couch of the same quality and within the same store is priced at £1300. Mr. B finds that the prices of the £200 chair and £1050 couch he set out to buy have been reduced by 25% and increased by 9.5% respectively. A competitor's chair and couch of the same quality and within the same store goes for £150 and £1150 respectively.

Who is unhappier? Mr. A or Mr. B

	Mr. A is unhappier							Both are equally unhappy	Mr. B is unhappier						
Scale of unhappiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Multiple Gains

In the scenarios below, you are asked to judge whether Mr. A or Mr. B is happier i.e. would you rather be Mr. A or Mr. B.

On a scale of 1 to 15, kindly rate the relative happiness of Mr. A and Mr. B.

Scale of 1 to 7 – Mr. A is happier than Mr. B *(with 7 being highest level of happiness)*

At midpoint 8 – Mr. A and Mr. B are equally happy

Scale of 9 to 15 – Mr. B is happier than Mr. A *(with 15 being highest level of happiness)*

SCENARIO 1

Mr. A was given a ticket to a lottery. He won £100. Mr. B was given tickets. He won £75 in one lottery and £25 in the other.

Who was happier? Mr. A or Mr. B

	Mr. A is happier							Both are equally happy	Mr. B is happier						
Scale of happiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 2

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the price of the £1300 couch he set out to buy has been reduced to £1200; a competitor's couch of the same quality and within the same store is priced at £1300. Mr. B finds that the prices of the £200 chair and £1100 couch he set out to buy have been reduced to £150 and £1050 respectively. A competitor's chair and couch of the same quality and within the same store goes for £200 and £1100 respectively.

Who was happier? Mr. A or Mr. B

	Mr. A is happier							Both are equally happy	Mr. B is happier						
Scale of happiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 3

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the price of the £1300 couch he set out to buy has been reduced by 7.69% to £1200; a competitor's couch of the same quality and within the same store is priced at £1300. Mr. B finds that the prices of the £200 chair and £1100 couch he set out to buy have been reduced by 25% and 4.54% to £150 and £1050 respectively. A competitor's chair and couch of the same quality and within the same store goes for £200 and £1100 respectively.

Who was happier? Mr. A or Mr. B

	Mr. A is happier							Both are equally happy	Mr. B is happier						
Scale of happiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 4

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the price of the £1300 couch he set out to buy has been reduced by 7.69%; a competitor's couch of the same quality and within the same store is priced at £1300. Mr. B finds that the prices of the £200 chair and £1100 couch he set out to buy have been reduced by 25% and 4.54% respectively. A competitor's chair and couch of the same quality and within the same store goes for £200 and £1100 respectively.

Who was happier? Mr. A or Mr. B

	Mr. A is happier							Both are equally happy	Mr. B is happier						
Scale of happiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Multiple Losses

In the scenarios below, you are asked to judge whether Mr. A or Mr. B is unhappier.
On a scale of 1 to 15, kindly rate the relative unhappiness of Mr. A and Mr. B.

Scale of 1 to 7 – Mr. A is unhappier than Mr. B *(with 7 being highest level of unhappiness)*

At midpoint 8 – Mr. A and Mr. B are equally unhappy
Scale of 9 to 15 – Mr. B is unhappier than Mr. A *(with 15 being highest level of unhappiness*

SCENARIO 1

Mr. A received a letter from the HM Revenue and Customs saying that he made a minor arithmetical mistake on his tax return and owed £100. There was no repercussion from the mistake. Mr. B received a letter from the HM Revenue and Customs saying that he made a minor arithmetical mistake on his tax return and owed £75. He received a similar letter the same day from the Council saying he owed £25 in council taxes. There were no repercussions from either mistake.

Who was unhappier? Mr. A or Mr. B

	Mr. A is unhappier							Both are equally unhappy	Mr. B is unhappier						
Scale of unhappiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 2

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.
At the store, Mr. A finds that the price of the £1200 couch he set out to buy has been increased to £1300; a competitor's couch of the same quality and within the same store is priced at £1300. Mr. B finds that the prices of the £200 chair and £1000 couch he set out to buy have been increased to £250 and £1050 respectively. A competitor's chair and couch of the same quality and within the same store goes for £250 and £1050 respectively.

Who was unhappier? Mr. A or Mr. B

	Mr. A is unhappier							Both are equally unhappy	Mr. B is unhappier						
Scale of unhappiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 3

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the price of the £1200 couch he set out to buy has been increased by 8.33% to £1300; a competitor's couch of the same quality and within the same store is priced at £1300. Mr. B finds that the prices of the £200 chair and £1000 couch he set out to buy have been increased by 25% and 5% to £250 and £1050 respectively. A competitor's chair and couch of the same quality and within the same store goes for £250 and £1050 respectively.

Who was unhappier? Mr. A or Mr. B

	Mr. A is unhappier							Both are equally unhappy	Mr. B is unhappier						
Scale of unhappiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 4

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the price of the £1200 couch he set out to buy has been increased by 8.33%; a competitor's couch of the same quality and within the same store is priced at £1300. Mr. B finds that the prices of the £200 chair and £1000 couch he set out to buy have been increased by 25% and 5% respectively. A competitor's chair and couch of the same quality and within the same store goes for £250 and £1050 respectively.

Who was unhappier? Mr. A or Mr. B

	Mr. A is unhappier							Both are equally unhappy	Mr. B is unhappier						
Scale of unhappiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Appendix 2B - Analysis of repeated measures ANOVA (Competitor's current prices)

Mixed Gains

Within-Subjects Factors

Measure: MEASURE_1

Frame	Dependent Variable
1	Control
2	Absolute
3	Dual
4	Relative

Descriptive Statistics

	Mean	Std. Deviation	N
Control	5.3333	2.93329	33
Absolute	8.1212	3.29543	33
Dual	8.0909	3.68581	33
Relative	9.3939	3.05102	33

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Frame	Pillai's Trace	.542	11.815[b]	3.000	30.000	.000
	Wilks' Lambda	.458	11.815[b]	3.000	30.000	.000
	Hotelling's Trace	1.181	11.815[b]	3.000	30.000	.000
	Roy's Largest Root	1.181	11.815[b]	3.000	30.000	.000

a. Design: Intercept

Within Subjects Design: Frame

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Frame	.827	5.825	5	.324	.900	.991	.333

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept

Within Subjects Design: Frame

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Frame	Sphericity Assumed	290.265	3	96.755	14.010	.000
	Greenhouse-Geisser	290.265	2.700	107.507	14.010	.000
	Huynh-Feldt	290.265	2.973	97.645	14.010	.000
	Lower-bound	290.265	1.000	290.265	14.010	.001
Error (Frame)	Sphericity Assumed	662.985	96	6.906		
	Greenhouse-Geisser	662.985	86.399	7.674		
	Huynh-Feldt	662.985	95.125	6.970		
	Lower-bound	662.985	32.000	20.718		

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Frame	Type III Sum of Squares	df	Mean Square	F	Sig.
Frame	Linear	243.638	1	243.638	30.276	.000
	Quadratic	18.189	1	18.189	2.471	.126
	Cubic	28.438	1	28.438	5.356	.027
Error (Frame)	Linear	257.512	32	8.047		
	Quadratic	235.561	32	7.361		
	Cubic	169.912	32	5.310		

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	7897.280	1	7897.280	364.944	.000
Error	692.470	32	21.640		

Transformation Coefficients (M Matrix)

Average

Measure:
MEASURE_1

Transformed Variable:
AVERAGE

Control	.500
Absolute	.500
Dual	.500
Relative	.500

Frame[a]

Measure: MEASURE_1

Dependent Variable	Frame		
	Linear	Quadratic	Cubic
Control	-.671	.500	-.224
Absolute	-.224	-.500	.671
Dual	.224	-.500	-.671
Relative	.671	.500	.224

a. The contrasts for the within subjects factors are:
Frame: Polynomial contrast

Estimated Marginal Means

Frame

Transformation Coefficients (M Matrix)

Measure: MEASURE_1

Dependent Variable	Frame			
	1	2	3	4
Control	1	0	0	0
Absolute	0	1	0	0
Dual	0	0	1	0
Relative	0	0	0	1

Estimates

Measure: MEASURE_1

Frame	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	5.333	.511	4.293	6.373
2	8.121	.574	6.953	9.290
3	8.091	.642	6.784	9.398
4	9.394	.531	8.312	10.476

Pairwise Comparisons

Measure: MEASURE_1

(I) Frame	(J) Frame	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	-2.788*	.725	.003	-4.828	-.748
	3	-2.758*	.714	.003	-4.765	-.750
	4	-4.061*	.674	.000	-5.956	-2.165
2	1	2.788*	.725	.003	.748	4.828
	3	.030	.596	1.000	-1.646	1.706
	4	-1.273	.643	.339	-3.081	.535
3	1	2.758*	.714	.003	.750	4.765
	2	-.030	.596	1.000	-1.706	1.646
	4	-1.303	.503	.086	-2.717	.111
4	1	4.061*	.674	.000	2.165	5.956
	2	1.273	.643	.339	-.535	3.081
	3	1.303	.503	.086	-.111	2.717

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.
Pillai's trace	.542	11.815[a]	3.000	30.000	.000
Wilks' lambda	.458	11.815[a]	3.000	30.000	.000
Hotelling's trace	1.181	11.815[a]	3.000	30.000	.000
Roy's largest root	1.181	11.815[a]	3.000	30.000	.000

Each F tests the multivariate effect of Frame. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

Mixed Losses

Within-Subjects Factors

Measure: MEASURE_1

Frame	Dependent Variable
1	Control
2	Absolute
3	Dual
4	Relative

Descriptive Statistics

	Mean	Std. Deviation	N
Control	6.6970	3.28334	33
Absolute	6.4242	2.98988	33
Dual	7.0000	2.64575	33
Relative	7.9697	2.84479	33

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Frame	Pillai's Trace	.193	2.386[b]	3.000	30.000	.089
	Wilks' Lambda	.807	2.386[b]	3.000	30.000	.089
	Hotelling's Trace	.239	2.386[b]	3.000	30.000	.089
	Roy's Largest Root	.239	2.386[b]	3.000	30.000	.089

a. Design: Intercept

Within Subjects Design: Frame

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Frame	.749	8.889	5	.114	.850	.929	.333

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept
Within Subjects Design: Frame

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Frame	Sphericity Assumed	44.932	3	14.977	2.158	.098
	Greenhouse-Geisser	44.932	2.549	17.627	2.158	.109
	Huynh-Feldt	44.932	2.788	16.115	2.158	.103
	Lower-bound	44.932	1.000	44.932	2.158	.152
Error (Frame)	Sphericity Assumed	666.318	96	6.941		
	Greenhouse-Geisser	666.318	81.568	8.169		
	Huynh-Feldt	666.318	89.224	7.468		
	Lower-bound	666.318	32.000	20.822		

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Frame	Type III Sum of Squares	df	Mean Square	F	Sig.
Frame	Linear	31.856	1	31.856	3.075	.089
	Quadratic	12.735	1	12.735	2.931	.097
	Cubic	.341	1	.341	.056	.815
Error (Frame)	Linear	331.494	32	10.359		
	Quadratic	139.015	32	4.344		
	Cubic	195.809	32	6.119		

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	6510.068	1	6510.068	465.335	.000
Error	447.682	32	13.990		

Transformation Coefficients (M Matrix)

Average

Measure: MEASURE_1

Transformed Variable:

AVERAGE

Control	.500
Absolute	.500
Dual	.500
Relative	.500

Frame[a]

Measure: MEASURE_1

Dependent Variable	Frame		
	Linear	Quadratic	Cubic
Control	-.671	.500	-.224
Absolute	-.224	-.500	.671
Dual	.224	-.500	-.671
Relative	.671	.500	.224

a. The contrasts for the within subjects factors are:

Frame: Polynomial contrast

Estimated Marginal Means

Frame

Transformation Coefficients (M Matrix)

Measure: MEASURE_1

	Frame			
Dependent Variable	1	2	3	4
Control	1	0	0	0
Absolute	0	1	0	0
Dual	0	0	1	0
Relative	0	0	0	1

Estimates

Measure: MEASURE_1

			95% Confidence Interval	
Frame	Mean	Std. Error	Lower Bound	Upper Bound
1	6.697	.572	5.533	7.861
2	6.424	.520	5.364	7.484
3	7.000	.461	6.062	7.938
4	7.970	.495	6.961	8.978

Pairwise Comparisons

Measure: MEASURE_1

					95% Confidence Interval for Difference[a]	
(I) Frame	(J) Frame	Mean Difference (I-J)	Std. Error	Sig.[a]	Lower Bound	Upper Bound
1	2	.273	.666	1.000	-1.601	2.146
	3	-.303	.680	1.000	-2.217	1.611
	4	-1.273	.778	.669	-3.460	.914
2	1	-.273	.666	1.000	-2.146	1.601
	3	-.576	.628	1.000	-2.341	1.190
	4	-1.545	.611	.099	-3.264	.173
3	1	.303	.680	1.000	-1.611	2.217
	2	.576	.628	1.000	-1.190	2.341
	4	-.970	.495	.354	-2.362	.423
4	1	1.273	.778	.669	-.914	3.460
	2	1.545	.611	.099	-.173	3.264
	3	.970	.495	.354	-.423	2.362

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.
Pillai's trace	.193	2.386[a]	3.000	30.000	.089
Wilks' lambda	.807	2.386[a]	3.000	30.000	.089
Hotelling's trace	.239	2.386[a]	3.000	30.000	.089
Roy's largest root	.239	2.386[a]	3.000	30.000	.089

Each F tests the multivariate effect of Frame. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

Multiple Gains

Within-Subjects Factors

Measure: MEASURE_1

Frame	Dependent Variable
1	Control
2	Absolute
3	Dual
4	Relative

Descriptive Statistics

	Mean	Std. Deviation	N
Control	7.7895	3.37044	38
Absolute	8.2895	2.85608	38
Dual	10.3684	2.40968	38
Relative	10.5526	2.84460	38

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Frame	Pillai's Trace	.388	7.406[b]	3.000	35.000	.001
	Wilks' Lambda	.612	7.406[b]	3.000	35.000	.001
	Hotelling's Trace	.635	7.406[b]	3.000	35.000	.001
	Roy's Largest Root	.635	7.406[b]	3.000	35.000	.001

a. Design: Intercept

Within Subjects Design: Frame

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Frame	.452	28.390	5	.000	.740	.789	.333

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept
Within Subjects Design: Frame

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Frame	Sphericity Assumed	228.132	3	76.044	9.874	.000
	Greenhouse-Geisser	228.132	2.219	102.820	9.874	.000
	Huynh-Feldt	228.132	2.367	96.397	9.874	.000
	Lower-bound	228.132	1.000	228.132	9.874	.003
Error(Frame)	Sphericity Assumed	854.868	111	7.702		
	Greenhouse-Geisser	854.868	82.094	10.413		
	Huynh-Feldt	854.868	87.563	9.763		
	Lower-bound	854.868	37.000	23.105		

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Frame	Type III Sum of Squares	df	Mean Square	F	Sig.
Frame	Linear	204.258	1	204.258	16.410	.000
	Quadratic	.947	1	.947	.177	.676
	Cubic	22.926	1	22.926	4.322	.045
Error (Frame)	Linear	460.542	37	12.447		
	Quadratic	198.053	37	5.353		
	Cubic	196.274	37	5.305		

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	13005.500	1	13005.500	1261.346	.000
Error	381.500	37	10.311		

Transformation Coefficients (M Matrix)

Average

Measure: MEASURE_1

Transformed Variable:

AVERAGE

Control	.500
Absolute	.500
Dual	.500
Relative	.500

Frame[a]

Measure: MEASURE_1

Dependent Variable	Frame		
	Linear	Quadratic	Cubic
Control	-.671	.500	-.224
Absolute	-.224	-.500	.671
Dual	.224	-.500	-.671
Relative	.671	.500	.224

a. The contrasts for the within subjects factors are:

Frame: Polynomial contrast

Estimated Marginal Means

Frame

Transformation Coefficients (M Matrix)

Measure: MEASURE_1

Dependent Variable	Frame			
	1	2	3	4
Control	1	0	0	0
Absolute	0	1	0	0
Dual	0	0	1	0
Relative	0	0	0	1

Estimates

Measure: MEASURE_1

Frame	Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
1	7.789	.547	6.682	8.897
2	8.289	.463	7.351	9.228
3	10.368	.391	9.576	11.160
4	10.553	.461	9.618	11.488

Pairwise Comparisons

Measure: MEASURE_1

(I) Frame	(J) Frame	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b] Lower Bound	95% Confidence Interval for Difference[b] Upper Bound
1	2	-.500	.726	1.000	-2.524	1.524
	3	-2.579*	.654	.002	-4.402	-.756
	4	-2.763*	.797	.008	-4.985	-.542
2	1	.500	.726	1.000	-1.524	2.524
	3	-2.079*	.547	.003	-3.604	-.554
	4	-2.263*	.641	.007	-4.050	-.477
3	1	2.579*	.654	.002	.756	4.402
	2	2.079*	.547	.003	.554	3.604
	4	-.184	.363	1.000	-1.197	.829
4	1	2.763*	.797	.008	.542	4.985
	2	2.263*	.641	.007	.477	4.050
	3	.184	.363	1.000	-.829	1.197

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.
Pillai's trace	.388	7.406[a]	3.000	35.000	.001
Wilks' lambda	.612	7.406[a]	3.000	35.000	.001
Hotelling's trace	.635	7.406[a]	3.000	35.000	.001
Roy's largest root	.635	7.406[a]	3.000	35.000	.001

Each F tests the multivariate effect of Frame. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

Multiple Losses

Within-Subjects Factors

Measure: MEASURE_1

Frame	Dependent Variable
1	Control
2	Absolute
3	Dual
4	Relative

Descriptive Statistics

	Mean	Std. Deviation	N
Control	9.6316	3.06172	38
Absolute	8.2895	2.85608	38
Dual	9.3684	3.02620	38
Relative	9.9737	3.06230	38

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Frame	Pillai's Trace	.259	4.084[b]	3.000	35.000	.014
	Wilks' Lambda	.741	4.084[b]	3.000	35.000	.014
	Hotelling's Trace	.350	4.084[b]	3.000	35.000	.014
	Roy's Largest Root	.350	4.084[b]	3.000	35.000	.014

a. Design: Intercept
Within Subjects Design: Frame

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Frame	.678	13.896	5	.016	.783	.839	.333

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept
Within Subjects Design: Frame

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Frame	Sphericity Assumed	60.368	3	20.123	3.476	.018
	Greenhouse-Geisser	60.368	2.349	25.702	3.476	.029
	Huynh-Feldt	60.368	2.518	23.975	3.476	.025
	Lower-bound	60.368	1.000	60.368	3.476	.070
Error (Frame)	Sphericity Assumed	642.632	111	5.789		
	Greenhouse-Geisser	642.632	86.904	7.395		
	Huynh-Feldt	642.632	93.167	6.898		
	Lower-bound	642.632	37.000	17.368		

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Frame	Type III Sum of Squares	df	Mean Square	F	Sig.
Frame	Linear	8.421	1	8.421	.871	.357
	Quadratic	36.026	1	36.026	9.592	.004
	Cubic	15.921	1	15.921	4.038	.052
Error (Frame)	Linear	357.779	37	9.670		
	Quadratic	138.974	37	3.756		
	Cubic	145.879	37	3.943		

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	13191.158	1	13191.158	705.469	.000
Error	691.842	37	18.698		

Transformation Coefficients (M Matrix)

Average

Measure: MEASURE_1

Transformed Variable: AVERAGE

Control	.500
Absolute	.500
Dual	.500
Relative	.500

Frame[a]

Measure: MEASURE_1

Dependent Variable	Frame		
	Linear	Quadratic	Cubic
Control	-.671	.500	-.224
Absolute	-.224	-.500	.671
Dual	.224	-.500	-.671
Relative	.671	.500	.224

a. The contrasts for the within subjects factors are:

Frame: Polynomial contrast

Estimated Marginal Means

Frame

Transformation Coefficients (M Matrix)

Measure: MEASURE_1

Dependent Variable	Frame			
	1	2	3	4
Control	1	0	0	0
Absolute	0	1	0	0
Dual	0	0	1	0
Relative	0	0	0	1

Estimates

Measure: MEASURE_1

Frame	Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
1	9.632	.497	8.625	10.638
2	8.289	.463	7.351	9.228
3	9.368	.491	8.374	10.363
4	9.974	.497	8.967	10.980

Pairwise Comparisons

Measure: MEASURE_1

(I) Frame	(J) Frame	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b] Lower Bound	95% Confidence Interval for Difference[b] Upper Bound
1	2	1.342	.482	.050	-.001	2.686
	3	.263	.604	1.000	-1.421	1.948
	4	-.342	.657	1.000	-2.173	1.489
2	1	-1.342	.482	.050	-2.686	.001
	3	-1.079	.534	.303	-2.567	.409
	4	-1.684*	.587	.040	-3.320	-.048
3	1	-.263	.604	1.000	-1.948	1.421
	2	1.079	.534	.303	-.409	2.567
	4	-.605	.412	.904	-1.755	.544
4	1	.342	.657	1.000	-1.489	2.173
	2	1.684*	.587	.040	.048	3.320
	3	.605	.412	.904	-.544	1.755

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.
Pillai's trace	.259	4.084[a]	3.000	35.000	.014
Wilks' lambda	.741	4.084[a]	3.000	35.000	.014
Hotelling's trace	.350	4.084[a]	3.000	35.000	.014
Roy's largest root	.350	4.084[a]	3.000	35.000	.014

Each F tests the multivariate effect of Frame. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

Appendix 2C - Wilcoxon signed-rank tests

Descriptive Statistics

		Percentiles		
	N	25th	50th (Median)	75th
Absolute	33	6.0000	8.0000	11.0000
Dual	33	6.0000	8.0000	10.5000
Relative	33	8.0000	9.0000	11.5000

Friedman Test

Ranks

	Mean Rank
Absolute	1.79
Dual	1.86
Relative	2.35

Test Statistics[a]

N	33
Chi-Square	8.956
df	2
Asymp. Sig.	.011

a. Friedman Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
Absolute	33	8.1212	3.29543	1.00	15.00	6.0000	8.0000	11.0000
Dual	33	8.0909	3.68581	1.00	15.00	6.0000	8.0000	10.5000
Relative	33	9.3939	3.05102	1.00	15.00	8.0000	9.0000	11.5000

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
Dual - Absolute	Negative Ranks	12[a]	12.54	150.50
	Positive Ranks	12[b]	12.46	149.50
	Ties	9[c]		
	Total	33		
Relative - Absolute	Negative Ranks	4[d]	14.88	59.50
	Positive Ranks	18[e]	10.75	193.50
	Ties	11[f]		
	Total	33		
Relative - Dual	Negative Ranks	4[g]	7.00	28.00
	Positive Ranks	13[h]	9.62	125.00
	Ties	16[i]		
	Total	33		

a. Dual < Absolute

b. Dual > Absolute

c. Dual = Absolute

d. Relative < Absolute

e. Relative > Absolute

f. Relative = Absolute

g. Relative < Dual

h. Relative > Dual

i. Relative = Dual

Test Statistics[a]

	Dual - Absolute	Relative - Absolute	Relative - Dual
Z	-.014[b]	-2.184[c]	-2.316[c]
Asymp. Sig. (2-tailed)	.989	.029	.021

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

c. Based on negative ranks.

Mixed Losses

Descriptive Statistics

	N	Percentiles		
		25th	50th (Median)	75th
Absolute	33	4.0000	8.0000	8.0000
Dual	33	5.0000	8.0000	8.0000
Relative	33	6.0000	8.0000	9.5000

Friedman Test

Ranks

	Mean Rank
Absolute	1.82
Dual	1.89
Relative	2.29

Test Statistics[a]

N	33
Chi-Square	6.840
df	2
Asymp. Sig.	.033

a. Friedman Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
Absolute	33	6.4242	2.98988	1.00	12.00	4.0000	8.0000	8.0000
Dual	33	7.0000	2.64575	2.00	15.00	5.0000	8.0000	8.0000
Relative	33	7.9697	2.84479	2.00	15.00	6.0000	8.0000	9.5000

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
Dual - Absolute	Negative Ranks	9[a]	9.22	83.00
	Positive Ranks	11[b]	11.55	127.00
	Ties	13[c]		
	Total	33		
Relative - Absolute	Negative Ranks	6[d]	9.17	55.00
	Positive Ranks	16[e]	12.38	198.00
	Ties	11[f]		
	Total	33		
Relative - Dual	Negative Ranks	3[g]	7.33	22.00
	Positive Ranks	12[h]	8.17	98.00
	Ties	18[i]		
	Total	33		

a. Dual < Absolute

b. Dual > Absolute

c. Dual = Absolute

d. Relative < Absolute

e. Relative > Absolute

f. Relative = Absolute

g. Relative < Dual

h. Relative > Dual

i. Relative = Dual

Test Statistics[a]

	Dual - Absolute	Relative - Absolute	Relative - Dual
Z	-.826[b]	-2.329[b]	-2.170[b]
Asymp. Sig. (2-tailed)	.409	.020	.030

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

Multiple Gains

Descriptive Statistics

	N	Percentiles		
		25th	50th (Median)	75th
Absolute	38	8.0000	8.0000	10.0000
Dual	38	8.0000	10.0000	12.0000
Relative	38	8.0000	10.0000	13.0000

Friedman Test

Ranks

	Mean Rank
Absolute	1.68
Dual	2.14
Relative	2.17

Test Statistics[a]

N	38
Chi-Square	9.312
df	2
Asymp. Sig.	.010

a. Friedman Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
Absolute	38	8.2895	2.85608	1.00	15.00	8.0000	8.0000	10.0000
Dual	38	10.3684	2.40968	7.00	15.00	8.0000	10.0000	12.0000
Relative	38	10.5526	2.84460	3.00	15.00	8.0000	10.0000	13.0000

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
Dual - Absolute	Negative Ranks	3[a]	5.83	17.50
	Positive Ranks	17[b]	11.32	192.50
	Ties	18[c]		
	Total	38		
Relative - Absolute	Negative Ranks	8[d]	6.88	55.00
	Positive Ranks	18[e]	16.44	296.00
	Ties	12[f]		
	Total	38		
Relative - Dual	Negative Ranks	8[g]	10.25	82.00
	Positive Ranks	11[h]	9.82	108.00
	Ties	19[i]		
	Total	38		

a. Dual < Absolute

b. Dual > Absolute

c. Dual = Absolute

d. Relative < Absolute

e. Relative > Absolute

f. Relative = Absolute

g. Relative < Dual

h. Relative > Dual

i. Relative = Dual

Test Statistics[a]

	Dual - Absolute	Relative - Absolute	Relative - Dual
Z	-3.274[b]	-3.067[b]	-.527[b]
Asymp. Sig. (2-tailed)	.001	.002	.598

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

Multiple Losses

Descriptive Statistics

	N	Percentiles		
		25th	50th (Median)	75th
Absolute	38	7.0000	8.0000	10.0000
Dual	38	8.0000	9.0000	11.0000
Relative	38	8.0000	10.0000	12.2500

Friedman Test

Ranks

	Mean Rank
Absolute	1.74
Dual	2.03
Relative	2.24

Test Statistics[a]

N	38
Chi-Square	8.000
df	2
Asymp. Sig.	.018

a. Friedman Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
Absolute	38	8.2895	2.85608	2.00	14.00	7.0000	8.0000	10.0000
Dual	38	9.3684	3.02620	2.00	15.00	8.0000	9.0000	11.0000
Relative	38	9.9737	3.06230	3.00	15.00	8.0000	10.0000	12.2500

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
Dual - Absolute	Negative Ranks	5[a]	8.30	41.50
	Positive Ranks	13[b]	9.96	129.50
	Ties	20[c]		
	Total	38		
Relative - Absolute	Negative Ranks	6[d]	9.75	58.50
	Positive Ranks	18[e]	13.42	241.50
	Ties	14[f]		
	Total	38		
Relative - Dual	Negative Ranks	8[g]	10.81	86.50
	Positive Ranks	14[h]	11.89	166.50
	Ties	16[i]		
	Total	38		

a. Dual < Absolute

b. Dual > Absolute

c. Dual = Absolute

d. Relative < Absolute

e. Relative > Absolute

f. Relative = Absolute

g. Relative < Dual

h. Relative > Dual

i. Relative = Dual

Test Statistics[a]

	Dual - Absolute	Relative - Absolute	Relative - Dual
Z	-1.924[b]	-2.628[b]	-1.308[b]
Asymp. Sig. (2-tailed)	.054	.009	.191

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

Appendix 3A - Questionnaires (Competitor's past prices)

In the scenarios below, you are asked to judge whether Mr. A or Mr. B is happier i.e. would you rather be Mr. A or Mr. B.

On a scale of 1 to 15, kindly rate the relative happiness of Mr. A and Mr. B.

Scale of 1 to 7 – Mr. A is happier than Mr. B *(with 7 being highest level of happiness)*
At midpoint 8 – Mr. A and Mr. B are equally happy
Scale of 9 to 15 – Mr. B is happier than Mr. A *(with 15 being highest level of happiness)*

Mixed Gains

SCENARIO 1

Mr. A expected a Christmas bonus of £300. He received his check and found it was for £250.

Mr. B expected a Christmas bonus of £300. He received his check and the amount was indeed £300. A week later he received a note saying that there had been an error in this bonus check. The check was £50 too high. He must return the £50.

Who was happier? Mr. A or Mr. B

	Mr. A is happier							Both are equally happy	Mr. B is happier						
Scale of happiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 2

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the price of the £1300 couch he set out to buy has been reduced to £1250. He had visited the store the previous week and a competitor's couch of the same quality and within the same store had been priced at £1300. Mr. B finds that the prices of the £200 chair and £1100 couch he set out to buy have been reduced to £100 and increased to £1150 respectively. He had visited the store the previous week and a competitor's chair and couch of the same quality and within the same store had been priced at £200 and £1100 respectively.

Who was happier? Mr. A or Mr. B

	Mr. A is happier							Both are equally happy	Mr. B is happier						
Scale of happiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 3

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the price of the £1300 couch he set out to buy has been reduced by 3.84% to £1250. He had visited the store the previous week and a competitor's couch of the same quality and within the same store had been priced at £1300. Mr. B finds that the prices of the £200 chair and £1100 couch he set out to buy have been reduced by 50% to £100 and increased by 4.54% to £1150 respectively. He had visited the store the previous week and a competitor's chair and couch of the same quality and within the same store had been priced at £200 and £1100 respectively.

Who was happier? Mr. A or Mr. B

	Mr. A is happier							Both are equally happy	Mr. B is happier						
Scale of happiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 4

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the price of the £1300 couch he set out to buy has been reduced by 3.84%. He had visited the store the previous week and a competitor's couch of the same quality and within the same store had been priced at £1300. Mr. B finds that the prices of the £200 chair and £1100 couch he set out to buy have been reduced respectively by 50% and increased by 4.54%. He had visited the store the previous week and a competitor's chair and couch of the same quality and within the same store had been priced at £200 and £1100 respectively.

Who was happier? Mr. A or Mr. B

	Mr. A is happier							Both are equally happy	Mr. B is happier						
Scale of happiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Mixed Losses

In the scenarios below, you are asked to judge whether Mr. A or Mr. B is unhappier.

On a scale of 1 to 15, kindly rate the relative unhappiness of Mr. A and Mr. B.

Scale of 1 to 7 – Mr. A is unhappier than Mr. B *(with 7 being highest level of unhappiness)*

At midpoint 8 – Mr. A and Mr. B are equally unhappy

Scale of 9 to 15 – Mr. B is unhappier than Mr. A *(with 15 being highest level of unhappiness*

SCENARIO 1

Mr. A's car was damaged in a parking lot. He had to spend £150 to repair the damage. Mr. B's car was damaged in a parking lot. He had to spend £200 to repair the damage. The same day the car was damaged, he won £50 in the office football pool.

Who was unhappier? Mr. A or Mr. B

	Mr. A is unhappier							Both are equally unhappy	Mr. B is unhappier						
Scale of unhappiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 2

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the price of the £1250 couch he set out to buy has been increased to £1300. He had visited the store the previous week and a competitor's couch of the same quality and within the same store had been priced at £1250. Mr. B finds that the prices of the £200 chair and £1050 couch he set out to buy have been reduced to £150 and increased to £1150 respectively. He had visited the store the previous week and a competitor's chair and couch of the same quality and within the same store had been priced at £200 and £1050 respectively.

Who was unhappier? Mr. A or Mr. B

	Mr. A is unhappier							Both are equally unhappy	Mr. B is unhappier						
Scale of unhappiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 3

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the price of the £1250 couch he set out to buy has been increased by 4% to £1300. He had visited the store the previous week and a competitor's couch of the same quality and within the same store had been priced at £1250. Mr. B finds that the prices of the £200 chair and £1050 couch he set out to buy have been reduced by 25% to £150 and increased by 9.52% to £1150 respectively. He had visited the store the previous week and a competitor's chair and couch of the same quality and within the same store had been priced at £200 and £1050 respectively.

Who was unhappier? Mr. A or Mr. B

	Mr. A is unhappier							Both are equally unhappy	Mr. B is unhappier						
Scale of unhappiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 4

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the price of the £1250 couch he set out to buy has been increased by 4%. He had visited the store the previous week and a competitor's couch of the same quality and within the same store had been priced at £1250. Mr. B finds that the prices of the £200 chair and £1050 couch he set out to buy have been reduced by 25% and increased by 9.52% respectively. He had visited the store the previous week and a competitor's chair and couch of the same quality and within the same store had been priced at £200 and £1050 respectively.

Who was unhappier? Mr. A or Mr. B

	Mr. A is unhappier							Both are equally unhappy	Mr. B is unhappier						
Scale of unhappiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Multiple Gains

In the scenarios below, you are asked to judge whether Mr. A or Mr. B is happier i.e. would you rather be Mr. A or Mr. B.

On a scale of 1 to 15, kindly rate the relative happiness of Mr. A and Mr. B.

Scale of 1 to 7 – Mr. A is happier than Mr. B *(with 7 being highest level of happiness)*

At midpoint 8 – Mr. A and Mr. B are equally happy

Scale of 9 to 15 – Mr. B is happier than Mr. A *(with 15 being highest level of happiness)*

SCENARIO 1

Mr. A was given a ticket to a lottery. He won £100. Mr. B was given tickets to 2 lotteries. He won £75 in one lottery and £25 in the other.

Who was happier? Mr. A or Mr. B

	Mr. A is happier							Both are equally happy	Mr. B is happier						
Scale of happiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

<u>SCENARIO 2</u>

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the price of the £1300 couch he set out to buy has been reduced to £1200. He had visited the store the previous week and a competitor's couch of the same quality and within the same store had been priced at £1300. Mr. B finds that the prices of the £200 chair and £1100 couch he set out to buy have been reduced to £150 and £1050 respectively. He had visited the store the previous week and a competitor's couch of the same quality and within the same store had been priced at £200 and £1100 respectively.

Who was happier? Mr. A or Mr. B

	Mr. A is happier							Both are equally happy	Mr. B is happier						
Scale of happiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

<u>SCENARIO 3</u>

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the price of the £1300 couch he set out to buy has been reduced by 7.69% to £1200. He had visited the store the previous week and a competitor's couch of the same quality and within the same store had been priced at £1300. Mr. B finds that the prices of the £200 chair and £1100 couch he set out to buy have been reduced by 25% and 4.54% to £150 and £1050 respectively. He had visited the store the previous week and a competitor's couch of the same quality and within the same store had been priced at £200 and £1100 respectively.

Who was happier? Mr. A or Mr. B

	Mr. A is happier							Both are equally happy	Mr. B is happier						
Scale of happiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 4

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the price of the £1300 couch he set out to buy has been reduced by 7.69%. He had visited the store the previous week and a competitor's couch of the same quality and within the same store had been priced at £1300. Mr. B finds that the prices of the £200 chair and £1100 couch he set out to buy have been reduced by 25% and 4.54% respectively. He had visited the store the previous week and a competitor's couch of the same quality and within the same store had been priced at £200 and £1100 respectively.

Who was happier? Mr. A or Mr. B

	Mr. A is happier							Both are equally happy	Mr. B is happier						
Scale of happiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Multiple Losses

In the scenarios below, you are asked to judge whether Mr. A or Mr. B is unhappier.

On a scale of 1 to 15, kindly rate the relative unhappiness of Mr. A and Mr. B.

Scale of 1 to 7 – Mr. A is unhappier than Mr. B *(with 7 being highest level of unhappiness)*

At midpoint 8 – Mr. A and Mr. B are equally unhappy

Scale of 9 to 15 – Mr. B is unhappier than Mr. A *(with 15 being highest level of unhappiness*

SCENARIO 1

Mr. A received a letter from the HM Revenue and Customs saying that he made a minor arithmetical mistake on his tax return and owed £100. There was no repercussion from the mistake. Mr. B received a letter from the HM Revenue and Customs saying that he made a minor arithmetical mistake on his tax return and owed £75. He received a similar letter the same day from the Council saying he owed £25 in council taxes. There were no repercussions from either mistake.

Who was unhappier? Mr. A or Mr. B

	Mr. A is unhappier							Both are equally unhappy	Mr. B is unhappier						
Scale of unhappiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 2

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the price of the £1200 couch he set out to buy has been increased to £1300. He had visited the store the previous week and a competitor's couch of the same quality and within the same store had been priced at £1200. Mr. B finds that the prices of the £200 chair and £1000 couch he set out to buy have been increased to £250 and £1050 respectively. He had visited the store the previous week and a competitor's couch of the same quality and within the same store had been priced at £200 and £1000 respectively.

Who was unhappier? Mr. A or Mr. B

	Mr. A is unhappier							Both are equally unhappy	Mr. B is unhappier						
Scale of unhappiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 3

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the price of the £1200 couch he set out to buy has been increased by 8.33% to £1300. He had visited the store the previous week and a competitor's couch of the same quality and within the same store had been priced at £1200. Mr. B finds that the prices of the £200 chair and £1000 couch he set out to buy have been increased by 25% and 5% to £250 and £1050 respectively. He had visited the store the previous week and a competitor's couch of the same quality and within the same store had been priced at £200 and £1000 respectively.

Who was unhappier? Mr. A or Mr. B

	Mr. A is unhappier							Both are equally unhappy	Mr. B is unhappier						
Scale of unhappiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 4

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the price of the £1200 couch he set out to buy has been increased by 8.33%. He had visited the store the previous week and a competitor's couch of the same quality and within the same store had been priced at £1200. Mr. B finds that the prices of the £200 chair and £1000 couch he set out to buy have been increased by 25% and 5% respectively. He had visited the store the previous week and a competitor's couch of the same quality and within the same store had been priced at £200 and £1000 respectively

Who was unhappier? Mr. A or Mr. B

	Mr. A is unhappier							Both are equally unhappy	Mr. B is unhappier						
Scale of unhappiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Appendix 3B - Analysis of repeated measures ANOVA (Competitor's past prices)

Mixed Gains

Within-Subjects Factors

Measure: MEASURE_1

Frame	Dependent Variable
1	Control
2	Absolute
3	Dual
4	Relative

Descriptive Statistics

	Mean	Std. Deviation	N
Control	5.0000	3.59092	39
Absolute	7.5128	2.92783	39
Dual	8.4359	3.54516	39
Relative	8.3846	2.97901	39

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Frame	Pillai's Trace	.418	8.616[b]	3.000	36.000	.000
	Wilks' Lambda	.582	8.616[b]	3.000	36.000	.000
	Hotelling's Trace	.718	8.616[b]	3.000	36.000	.000
	Roy's Largest Root	.718	8.616[b]	3.000	36.000	.000

a. Design: Intercept
 Within Subjects Design: Frame
b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Frame	.771	9.530	5	.090	.857	.924	.333

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.
a. Design: Intercept
 Within Subjects Design: Frame
b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Frame	Sphericity Assumed	304.103	3	101.368	12.576	.000
	Greenhouse-Geisser	304.103	2.571	118.296	12.576	.000
	Huynh-Feldt	304.103	2.773	109.653	12.576	.000
	Lower-bound	304.103	1.000	304.103	12.576	.001
Error (Frame)	Sphericity Assumed	918.897	114	8.061		
	Greenhouse-Geisser	918.897	97.686	9.407		
	Huynh-Feldt	918.897	105.386	8.719		
	Lower-bound	918.897	38.000	24.182		

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Frame	Type III Sum of Squares	df	Mean Square	F	Sig.
Frame	Linear	239.262	1	239.262	21.796	.000
	Quadratic	64.103	1	64.103	8.260	.007
	Cubic	.738	1	.738	.136	.715
Error (Frame)	Linear	417.138	38	10.977		
	Quadratic	294.897	38	7.760		
	Cubic	206.862	38	5.444		

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	8389.333	1	8389.333	447.955	.000
Error	711.667	38	18.728		

Transformation Coefficients (M Matrix)

Average

Measure: MEASURE_1

Transformed Variable:

AVERAGE

Control	.500
Absolute	.500
Dual	.500
Relative	.500

Frame[a]

Measure: MEASURE_1

Dependent Variable	Frame Linear	Quadratic	Cubic
Control	-.671	.500	-.224
Absolute	-.224	-.500	.671
Dual	.224	-.500	-.671
Relative	.671	.500	.224

a. The contrasts for the within subjects factors are:

Frame: Polynomial contrast

Estimated Marginal Means

Frame

Transformation Coefficients (M Matrix)

Measure: MEASURE_1

Dependent Variable	Frame 1	2	3	4
Control	1	0	0	0
Absolute	0	1	0	0
Dual	0	0	1	0
Relative	0	0	0	1

Estimates

Measure: MEASURE_1

Frame	Mean	Std. Error	95% Confidence Interval Lower Bound	Upper Bound
1	5.000	.575	3.836	6.164
2	7.513	.469	6.564	8.462
3	8.436	.568	7.287	9.585
4	8.385	.477	7.419	9.350

Pairwise Comparisons

Measure: MEASURE_1

(I) Frame	(J) Frame	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	-2.513*	.676	.004	-4.395	-.630
	3	-3.436*	.689	.000	-5.354	-1.518
	4	-3.385*	.781	.001	-5.558	-1.212
2	1	2.513*	.676	.004	.630	4.395
	3	-.923	.482	.379	-2.266	.419
	4	-.872	.574	.823	-2.470	.726
3	1	3.436*	.689	.000	1.518	5.354
	2	.923	.482	.379	-.419	2.266
	4	.051	.614	1.000	-1.657	1.759
4	1	3.385*	.781	.001	1.212	5.558
	2	.872	.574	.823	-.726	2.470
	3	-.051	.614	1.000	-1.759	1.657

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.
Pillai's trace	.418	8.616[a]	3.000	36.000	.000
Wilks' lambda	.582	8.616[a]	3.000	36.000	.000
Hotelling's trace	.718	8.616[a]	3.000	36.000	.000
Roy's largest root	.718	8.616[a]	3.000	36.000	.000

Each F tests the multivariate effect of Frame. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

Mixed Losses

Within-Subjects Factors

Measure: MEASURE_1

Frame	Dependent Variable
1	Control
2	Absolute
3	Dual
4	Relative

Descriptive Statistics

	Mean	Std. Deviation	N
Control	7.7179	3.60518	39
Absolute	8.2051	3.23777	39
Dual	7.4615	2.40445	39
Relative	7.7692	2.90609	39

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Frame	Pillai's Trace	.044	.559[b]	3.000	36.000	.646
	Wilks' Lambda	.956	.559[b]	3.000	36.000	.646
	Hotelling's Trace	.047	.559[b]	3.000	36.000	.646
	Roy's Largest Root	.047	.559[b]	3.000	36.000	.646

a. Design: Intercept

Within Subjects Design: Frame

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Frame	.737	11.193	5	.048	.852	.918	.333

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept

Within Subjects Design: Frame

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Frame	Sphericity Assumed	11.147	3	3.716	.514	.674
	Greenhouse-Geisser	11.147	2.555	4.364	.514	.645
	Huynh-Feldt	11.147	2.754	4.047	.514	.658
	Lower-bound	11.147	1.000	11.147	.514	.478
Error (Frame)	Sphericity Assumed	824.603	114	7.233		
	Greenhouse-Geisser	824.603	97.077	8.494		
	Huynh-Feldt	824.603	104.668	7.878		
	Lower-bound	824.603	38.000	21.700		

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Frame	Type III Sum of Squares	df	Mean Square	F	Sig.
Frame	Linear	.678	1	.678	.071	.792
	Quadratic	.314	1	.314	.057	.813
	Cubic	10.155	1	10.155	1.550	.221
Error (Frame)	Linear	364.772	38	9.599		
	Quadratic	210.936	38	5.551		
	Cubic	248.895	38	6.550		

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	9462.981	1	9462.981	591.175	.000
Error	608.269	38	16.007		

Transformation Coefficients (M Matrix)

Average

Measure: MEASURE_1

Transformed Variable: AVERAGE

Control	.500
Absolute	.500
Dual	.500
Relative	.500

Frame[a]

Measure: MEASURE_1

Dependent Variable	Frame		
	Linear	Quadratic	Cubic
Control	-.671	.500	-.224
Absolute	-.224	-.500	.671
Dual	.224	-.500	-.671
Relative	.671	.500	.224

a. The contrasts for the within subjects factors are:

Frame: Polynomial contrast

Estimated Marginal Means

Frame

Transformation Coefficients (M Matrix)

Measure: MEASURE_1

Dependent Variable	Frame			
	1	2	3	4
Control	1	0	0	0
Absolute	0	1	0	0
Dual	0	0	1	0
Relative	0	0	0	1

Estimates

Measure: MEASURE_1

Frame	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	7.718	.577	6.549	8.887
2	8.205	.518	7.156	9.255
3	7.462	.385	6.682	8.241
4	7.769	.465	6.827	8.711

Pairwise Comparisons

Measure: MEASURE_1

(I) Frame	(J) Frame	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a]	
					Lower Bound	Upper Bound
1	2	-.487	.702	1.000	-2.440	1.466
	3	.256	.609	1.000	-1.438	1.951
	4	-.051	.711	1.000	-2.031	1.929
2	1	.487	.702	1.000	-1.466	2.440
	3	.744	.568	1.000	-.836	2.323
	4	.436	.579	1.000	-1.177	2.049
3	1	-.256	.609	1.000	-1.951	1.438
	2	-.744	.568	1.000	-2.323	.836
	4	-.308	.446	1.000	-1.548	.933
4	1	.051	.711	1.000	-1.929	2.031
	2	-.436	.579	1.000	-2.049	1.177
	3	.308	.446	1.000	-.933	1.548

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.
Pillai's trace	.044	.559[a]	3.000	36.000	.646
Wilks' lambda	.956	.559[a]	3.000	36.000	.646
Hotelling's trace	.047	.559[a]	3.000	36.000	.646
Roy's largest root	.047	.559[a]	3.000	36.000	.646

Each F tests the multivariate effect of Frame. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

<u>Multiple Gains</u>

Within-Subjects Factors

Measure: MEASURE_1

Frame	Dependent Variable
1	Control
2	Absolute
3	Dual
4	Relative

Descriptive Statistics

	Mean	Std. Deviation	N
Control	7.9091	3.20478	44
Absolute	9.6364	3.18493	44
Dual	9.4318	3.30889	44
Relative	9.8182	3.04442	44

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Frame	Pillai's Trace	.211	3.658[b]	3.000	41.000	.020
	Wilks' Lambda	.789	3.658[b]	3.000	41.000	.020
	Hotelling's Trace	.268	3.658[b]	3.000	41.000	.020
	Roy's Largest Root	.268	3.658[b]	3.000	41.000	.020

a. Design: Intercept

Within Subjects Design: Frame

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Frame	.725	13.427	5	.020	.813	.865	.333

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept

Within Subjects Design: Frame

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Frame	Sphericity Assumed	100.881	3	33.627	4.405	.006
	Greenhouse-Geisser	100.881	2.438	41.375	4.405	.010
	Huynh-Feldt	100.881	2.596	38.866	4.405	.008
	Lower-bound	100.881	1.000	100.881	4.405	.042
Error (Frame)	Sphericity Assumed	984.869	129	7.635		
	Greenhouse-Geisser	984.869	104.843	9.394		
	Huynh-Feldt	984.869	111.610	8.824		
	Lower-bound	984.869	43.000	22.904		

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Frame	Type III Sum of Squares	df	Mean Square	F	Sig.
Frame	Linear	67.101	1	67.101	10.594	.002
	Quadratic	19.778	1	19.778	1.763	.191
	Cubic	14.001	1	14.001	2.617	.113
Error (Frame)	Linear	272.349	43	6.334		
	Quadratic	482.472	43	11.220		
	Cubic	230.049	43	5.350		

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	14892.960	1	14892.960	840.097	.000
Error	762.290	43	17.728		

Transformation Coefficients (M Matrix)

Average

Measure: MEASURE_1

Transformed Variable:

AVERAGE

Control	.500
Absolute	.500
Dual	.500
Relative	.500

Frame[a]

Measure: MEASURE_1

Dependent Variable	Frame		
	Linear	Quadratic	Cubic
Control	-.671	.500	-.224
Absolute	-.224	-.500	.671
Dual	.224	-.500	-.671
Relative	.671	.500	.224

a. The contrasts for the within subjects factors are:

Frame: Polynomial contrast

Estimated Marginal Means

Frame

Transformation Coefficients (M Matrix)

Measure: MEASURE_1

Dependent Variable	Frame			
	1	2	3	4
Control	1	0	0	0
Absolute	0	1	0	0
Dual	0	0	1	0
Relative	0	0	0	1

Estimates

Measure: MEASURE_1

Frame	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	7.909	.483	6.935	8.883
2	9.636	.480	8.668	10.605
3	9.432	.499	8.426	10.438
4	9.818	.459	8.893	10.744

Pairwise Comparisons

Measure: MEASURE_1

(I) Frame	(J) Frame	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	-1.727	.712	.117	-3.696	.242
	3	-1.523	.676	.177	-3.393	.347
	4	-1.909*	.564	.009	-3.469	-.349
2	1	1.727	.712	.117	-.242	3.696
	3	.205	.462	1.000	-1.072	1.481
	4	-.182	.535	1.000	-1.660	1.297
3	1	1.523	.676	.177	-.347	3.393
	2	-.205	.462	1.000	-1.481	1.072
	4	-.386	.549	1.000	-1.905	1.132
4	1	1.909*	.564	.009	.349	3.469
	2	.182	.535	1.000	-1.297	1.660
	3	.386	.549	1.000	-1.132	1.905

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.
Pillai's trace	.211	3.658[a]	3.000	41.000	.020
Wilks' lambda	.789	3.658[a]	3.000	41.000	.020
Hotelling's trace	.268	3.658[a]	3.000	41.000	.020
Roy's largest root	.268	3.658[a]	3.000	41.000	.020

Each F tests the multivariate effect of Frame. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

Multiple Losses

Within-Subjects Factors

Measure: MEASURE_1

Frame	Dependent Variable
1	Control
2	Absolute
3	Dual
4	Relative

Descriptive Statistics

	Mean	Std. Deviation	N
Control	10.4773	2.67189	44
Absolute	9.4318	2.78198	44
Dual	9.5000	2.88944	44
Relative	9.6591	2.97230	44

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Frame	Pillai's Trace	.130	2.038[b]	3.000	41.000	.124
	Wilks' Lambda	.870	2.038[b]	3.000	41.000	.124
	Hotelling's Trace	.149	2.038[b]	3.000	41.000	.124
	Roy's Largest Root	.149	2.038[b]	3.000	41.000	.124

a. Design: Intercept
 Within Subjects Design: Frame
b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Frame	.850	6.774	5	.238	.908	.975	.333

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.
a. Design: Intercept
 Within Subjects Design: Frame
b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Frame	Sphericity Assumed	30.790	3	10.263	1.848	.142
	Greenhouse-Geisser	30.790	2.724	11.303	1.848	.148
	Huynh-Feldt	30.790	2.926	10.522	1.848	.143
	Lower-bound	30.790	1.000	30.790	1.848	.181
Error (Frame)	Sphericity Assumed	716.460	129	5.554		
	Greenhouse-Geisser	716.460	117.134	6.117		
	Huynh-Feldt	716.460	125.830	5.694		
	Lower-bound	716.460	43.000	16.662		

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Frame	Type III Sum of Squares	df	Mean Square	F	Sig.
Frame	Linear	12.528	1	12.528	1.682	.202
	Quadratic	15.960	1	15.960	4.551	.039
	Cubic	2.301	1	2.301	.403	.529
Error (Frame)	Linear	320.222	43	7.447		
	Quadratic	150.790	43	3.507		
	Cubic	245.449	43	5.708		

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	16789.551	1	16789.551	1090.232	.000
Error	662.199	43	15.400		

Transformation Coefficients (M Matrix)

Average

Measure: MEASURE_1

Transformed Variable:

AVERAGE

Control	.500
Absolute	.500
Dual	.500
Relative	.500

Frame[a]

Measure: MEASURE_1

Dependent Variable	Frame		
	Linear	Quadratic	Cubic
Control	-.671	.500	-.224
Absolute	-.224	-.500	.671
Dual	.224	-.500	-.671
Relative	.671	.500	.224

a. The contrasts for the within subjects factors are:

Frame: Polynomial contrast

Estimated Marginal Means

Frame

Transformation Coefficients (M Matrix)

Measure: MEASURE_1

Dependent Variable	Frame			
	1	2	3	4
Control	1	0	0	0
Absolute	0	1	0	0
Dual	0	0	1	0
Relative	0	0	0	1

Estimates

Measure: MEASURE_1

Frame	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	10.477	.403	9.665	11.290
2	9.432	.419	8.586	10.278
3	9.500	.436	8.622	10.378
4	9.659	.448	8.755	10.563

Pairwise Comparisons

Measure: MEASURE_1

(I) Frame	(J) Frame	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a] Lower Bound	Upper Bound
1	2	1.045	.470	.189	-.254	2.345
	3	.977	.507	.364	-.426	2.380
	4	.818	.556	.890	-.719	2.356
2	1	-1.045	.470	.189	-2.345	.254
	3	-.068	.538	1.000	-1.555	1.419
	4	-.227	.504	1.000	-1.620	1.165
3	1	-.977	.507	.364	-2.380	.426
	2	.068	.538	1.000	-1.419	1.555
	4	-.159	.430	1.000	-1.348	1.030
4	1	-.818	.556	.890	-2.356	.719
	2	.227	.504	1.000	-1.165	1.620
	3	.159	.430	1.000	-1.030	1.348

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.
Pillai's trace	.130	2.038[a]	3.000	41.000	.124
Wilks' lambda	.870	2.038[a]	3.000	41.000	.124
Hotelling's trace	.149	2.038[a]	3.000	41.000	.124
Roy's largest root	.149	2.038[a]	3.000	41.000	.124

Each F tests the multivariate effect of Frame. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

Appendix 3C - Wilcoxon signed-rank tests

Mixed Gains

Descriptive Statistics

	N	Percentiles		
		25th	50th (Median)	75th
Absolute	39	5.0000	8.0000	9.0000
Dual	39	6.0000	8.0000	10.0000
Relative	39	7.0000	8.0000	10.0000

Friedman Test

Ranks

	Mean Rank
Absolute	1.73
Dual	2.10
Relative	2.17

Test Statistics[a]

N	39
Chi-Square	6.358
df	2
Asymp. Sig.	.042

a. Friedman Test

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
Dual - Absolute	Negative Ranks	7[a]	11.86	83.00
	Positive Ranks	16[b]	12.06	193.00
	Ties	16[c]		
	Total	39		
Relative - Absolute	Negative Ranks	8[d]	16.31	130.50
	Positive Ranks	20[e]	13.78	275.50
	Ties	11[f]		
	Total	39		
Relative - Dual	Negative Ranks	11[g]	12.55	138.00
	Positive Ranks	12[h]	11.50	138.00
	Ties	16[i]		
	Total	39		

a. Dual < Absolute

b. Dual > Absolute

c. Dual = Absolute

d. Relative < Absolute

e. Relative > Absolute

f. Relative = Absolute

g. Relative < Dual

h. Relative > Dual

i. Relative = Dual

Test Statistics[a]

	Dual - Absolute	Relative - Absolute	Relative - Dual
Z	-1.681[b]	-1.657[b]	.000[c]
Asymp. Sig. (2-tailed)	.093	.097	1.000

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

c. The sum of negative ranks equals the sum of positive ranks.

Mixed Losses

Descriptive Statistics

	N	Percentiles		
		25th	50th (Median)	75th
Absolute	39	6.0000	8.0000	11.0000
Dual	39	5.0000	8.0000	9.0000
Relative	39	5.0000	8.0000	10.0000

Friedman Test

Ranks

	Mean Rank
Absolute	2.19
Dual	1.87
Relative	1.94

Test Statistics[a]

N	39
Chi-Square	3.500
df	2
Asymp. Sig.	.174

a. Friedman Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles 25th	50th (Median)	75th
Absolute	39	8.2051	3.23777	2.00	15.00	6.0000	8.0000	11.0000
Dual	39	7.4615	2.40445	2.00	12.00	5.0000	8.0000	9.0000
Relative	39	7.7692	2.90609	2.00	13.00	5.0000	8.0000	10.0000

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
Dual - Absolute	Negative Ranks	15[a]	11.03	165.50
	Positive Ranks	7[b]	12.50	87.50
	Ties	17[c]		
	Total	39		
Relative - Absolute	Negative Ranks	17[d]	13.68	232.50
	Positive Ranks	10[e]	14.55	145.50
	Ties	12[f]		
	Total	39		
Relative - Dual	Negative Ranks	10[g]	10.70	107.00
	Positive Ranks	12[h]	12.17	146.00
	Ties	17[i]		
	Total	39		

a. Dual < Absolute

b. Dual > Absolute

c. Dual = Absolute

d. Relative < Absolute

e. Relative > Absolute

f. Relative = Absolute

g. Relative < Dual

h. Relative > Dual

i. Relative = Dual

Test Statistics[a]

	Dual - Absolute	Relative - Absolute	Relative - Dual
Z	-1.270[b]	-1.049[b]	-.637[c]
Asymp. Sig. (2-tailed)	.204	.294	.524

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

c. Based on negative ranks.

Multiple Gains

Descriptive Statistics

	N	Percentiles		
		25th	50th (Median)	75th
Absolute	44	8.0000	9.0000	11.7500
Dual	44	8.0000	9.0000	12.0000
Relative	44	8.0000	9.0000	12.0000

Friedman Test

Ranks

	Mean Rank
Absolute	1.92
Dual	1.94
Relative	2.14

Test Statistics[a]

N	44
Chi-Square	1.847
df	2
Asymp. Sig.	.397

a. Friedman Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
Absolute	44	9.6364	3.18493	3.00	15.00	8.0000	9.0000	11.7500
Dual	44	9.4318	3.30889	2.00	15.00	8.0000	9.0000	12.0000
Relative	44	9.8182	3.04442	2.00	15.00	8.0000	9.0000	12.0000

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
Dual - Absolute	Negative Ranks	11[a]	16.82	185.00
	Positive Ranks	15[b]	11.07	166.00
	Ties	18[c]		
	Total	44		
Relative - Absolute	Negative Ranks	14[d]	16.18	226.50
	Positive Ranks	17[e]	15.85	269.50
	Ties	13[f]		
	Total	44		
Relative - Dual	Negative Ranks	9[g]	16.89	152.00
	Positive Ranks	18[h]	12.56	226.00
	Ties	17[i]		
	Total	44		

a. Dual < Absolute

b. Dual > Absolute

c. Dual = Absolute

d. Relative < Absolute

e. Relative > Absolute

f. Relative = Absolute

g. Relative < Dual

h. Relative > Dual

i. Relative = Dual

Test Statistics[a]

	Dual - Absolute	Relative - Absolute	Relative - Dual
Z	-.243[b]	-.424[c]	-.895[c]
Asymp. Sig. (2-tailed)	.808	.672	.371

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

c. Based on negative ranks.

Multiple Losses

Descriptive Statistics

	N	Percentiles		
		25th	50th (Median)	75th
Absolute	44	8.0000	8.0000	11.7500
Dual	44	8.0000	9.0000	11.7500
Relative	44	8.0000	9.0000	12.0000

Friedman Test

Ranks

	Mean Rank
Absolute	1.92
Dual	1.97
Relative	2.11

Test Statistics[a]

N	44
Chi-Square	1.491
df	2
Asymp. Sig.	.475

a. Friedman Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
Absolute	44	9.4318	2.78198	3.00	15.00	8.0000	8.0000	11.7500
Dual	44	9.5000	2.88944	3.00	15.00	8.0000	9.0000	11.7500
Relative	44	9.6591	2.97230	1.00	15.00	8.0000	9.0000	12.0000

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
Dual - Absolute	Negative Ranks	14[a]	13.79	193.00
	Positive Ranks	14[b]	15.21	213.00
	Ties	16[c]		
	Total	44		
Relative - Absolute	Negative Ranks	9[d]	13.78	124.00
	Positive Ranks	16[e]	12.56	201.00
	Ties	19[f]		
	Total	44		
Relative - Dual	Negative Ranks	9[g]	11.89	107.00
	Positive Ranks	12[h]	10.33	124.00
	Ties	23[i]		
	Total	44		

a. Dual < Absolute

b. Dual > Absolute

c. Dual = Absolute

d. Relative < Absolute

e. Relative > Absolute

f. Relative = Absolute

g. Relative < Dual

h. Relative > Dual

i. Relative = Dual

Test Statistics[a]

	Dual - Absolute	Relative - Absolute	Relative - Dual
Z	-.229[b]	-1.054[b]	-.298[b]
Asymp. Sig. (2-tailed)	.819	.292	.765

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

Appendix 3D – Linear mixed model analysis (Comparison of competitor's current and past prices)

Mixed gains

Model Dimension[a]

		Number of Levels	Covariance Structure	Number of Parameters	Subject Variables	Number of Subjects
Fixed Effects	Intercept	1		1		
	Group	2		1		
	Frame	1		1		
Repeated Effects	Frame	2	Compound Symmetry	2	Subject	72
Total		6		5		

a. Dependent Variable: Ratings.

Information Criteria[a]

-2 Restricted Log Likelihood	719.970
Akaike's Information Criterion (AIC)	723.970
Hurvich and Tsai's Criterion (AICC)	724.057
Bozdogan's Criterion (CAIC)	731.867
Schwarz's Bayesian Criterion (BIC)	729.867

The information criteria are displayed in smaller-is-better form.
a. Dependent Variable: Ratings.

Fixed Effects

Type III Tests of Fixed Effects[a]

Source	Numerator df	Denominator df	F	Sig.
Intercept	1	99.121	92.989	.000
Group	1	70	1.935	.169
Frame	1	71.000	6.139	.016

a. Dependent Variable: Ratings.

Estimates of Fixed Effects[a]

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	6.365385	.750522	117.884	8.481	.000	4.879132	7.851637
[Group=ComCu]	.808858	.581402	70	1.391	.169	-.350712	1.968428
[Group=ComPP]	0[b]	0	.	.	.	.	.
Frame	1.055556	.426017	71.000	2.478	.016	.206103	1.905009

a. Dependent Variable: Ratings.

b. This parameter is set to zero because it is redundant.

Covariance Parameters

Estimates of Covariance Parameters[a]

Parameter		Estimate	Std. Error	Wald Z	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Repeated Measures	CS diagonal offset	6.533646	1.096583	5.958	.000	4.702114	9.078584
	CS covariance	2.775435	1.159196	2.394	.017	.503453	5.047416

a. Dependent Variable: Ratings.

Estimated Marginal Means

Group

Estimates[a]

Group	Mean	Std. Error	df	95% Confidence Interval	
				Lower Bound	Upper Bound
ComCu	8.758[b]	.428	70	7.904	9.611
ComPP	7.949[b]	.394	70	7.164	8.734

a. Dependent Variable: Ratings.

b. Covariates appearing in the model are evaluated at the following values: Frame = 1.50.

Pairwise Comparisons[a]

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	df	Sig.[b]	95% Confidence Interval for Difference[b]	
						Lower Bound	Upper Bound
ComCu	ComPP	.809	.581	70	.169	-.351	1.968
ComPP	ComCu	-.809	.581	70	.169	-1.968	.351

Based on estimated marginal means

a. Dependent Variable: Ratings.

b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

Univariate Tests[a]

Numerator df	Denominator df	F	Sig.
1	70	1.935	.169

The F tests the effect of Group. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.[a]

a. Dependent Variable: Ratings.

Mixed losses

Model Dimension[a]

		Number of Levels	Covariance Structure	Number of Parameters	Subject Variables	Number of Subjects
Fixed Effects	Intercept	1		1		
	Group	2		1		
	Frame	1		1		
Repeated Effects	Frame	2	Compound Symmetry	2	Subject	72
Total		6		5		

a. Dependent Variable: Ratings.

Information Criteria[a]

-2 Restricted Log Likelihood	720.225
Akaike's Information Criterion (AIC)	724.225
Hurvich and Tsai's Criterion (AICC)	724.312
Bozdogan's Criterion (CAIC)	732.122
Schwarz's Bayesian Criterion (BIC)	730.122

The information criteria are displayed in smaller-is-better form.

a. Dependent Variable: Ratings.

Fixed Effects

Type III Tests of Fixed Effects[a]

Source	Numerator df	Denominator df	F	Sig.
Intercept	1	97.386	93.805	.000
Group	1	70.000	1.909	.171
Frame	1	71	1.185	.280

a. Dependent Variable: Ratings.

Estimates of Fixed Effects[a]

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	7.278846	.757157	115.490	9.613	.000	5.779132	8.778560
[Group=ComCu]	-.790210	.571877	70.000	-1.382	.171	-1.930783	.350363
[Group=ComPP]	0[b]	0	.	.	.	.	.
Frame	.472222	.433790	71	1.089	.280	-.392731	1.337175

a. Dependent Variable: Ratings.

b. This parameter is set to zero because it is redundant.

Covariance Parameters

Estimates of Covariance Parameters[a]

Parameter		Estimate	Std. Error	Wald Z	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Repeated Measures	CS diagonal offset	6.774257	1.136966	5.958	.000	4.875275	9.412915
	CS covariance	2.458776	1.139996	2.157	.031	.224426	4.693126

a. Dependent Variable: Ratings.

Estimated Marginal Means

Group

Estimates[a]

Group	Mean	Std. Error	df	95% Confidence Interval	
				Lower Bound	Upper Bound
ComCu	7.197[b]	.421	70.000	6.358	8.036
ComPP	7.987[b]	.387	70.000	7.215	8.759

a. Dependent Variable: Ratings.

b. Covariates appearing in the model are evaluated at the following values: Frame = 1.50.

Pairwise Comparisons[a]

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	df	Sig.[b]	95% Confidence Interval for Difference[b]	
						Lower Bound	Upper Bound
ComCu	ComPP	-.790	.572	70.000	.171	-1.931	.350
ComPP	ComCu	.790	.572	70.000	.171	-.350	1.931

Based on estimated marginal means

a. Dependent Variable: Ratings.

b. Adjustment for multiple comparisons: Bonferroni.

Univariate Tests[a]

Numerator df	Denominator df	F	Sig.
1	70.000	1.909	.171

The F tests the effect of Group. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.[a]

a. Dependent Variable: Ratings.

Multiple gains

Model Dimension[a]

		Number of Levels	Covariance Structure	Number of Parameters	Subject Variables	Number of Subjects
Fixed Effects	Intercept	1		1		
	Group	2		1		
	Frame	1		1		
Repeated Effects	Frame	2	Compound Symmetry	2	Subject	82
Total		6		5		

a. Dependent Variable: Ratings.

Information Criteria[a]

-2 Restricted Log Likelihood	802.524
Akaike's Information Criterion (AIC)	806.524
Hurvich and Tsai's Criterion (AICC)	806.600
Bozdogan's Criterion (CAIC)	814.687
Schwarz's Bayesian Criterion (BIC)	812.687

The information criteria are displayed in smaller-is-better form.

a. Dependent Variable: Ratings.

Fixed Effects

Type III Tests of Fixed Effects[a]

Source	Numerator df	Denominator df	F	Sig.
Intercept	1	108.939	180.163	.000
Group	1	80.000	.016	.900
Frame	1	81.000	4.231	.043

a. Dependent Variable: Ratings.

Covariance Parameters

Estimates of Covariance Parameters[a]

Parameter		Estimate	Std. Error
Repeated Measures	CS diagonal offset	6.277025	.986339
	CS covariance	1.868276	.932692

a. Dependent Variable: Ratings.

Estimated Marginal Means

Group

Estimates[a]

Group	Mean	Std. Error	df	95% Confidence Interval	
				Lower Bound	Upper Bound
ComCu	9.789[b]	.363	80.000	9.067	10.512
ComPP	9.727[b]	.337	80.000	9.056	10.399

a. Dependent Variable: Ratings.

b. Covariates appearing in the model are evaluated at the following values: Frame = 1.50.

Pairwise Comparisons[a]

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	df	Sig.[b]	95% Confidence Interval for Difference[b]	
						Lower Bound	Upper Bound
ComCu	ComPP	.062	.496	80.000	.900	-.924	1.048
ComPP	ComCu	-.062	.496	80.000	.900	-1.048	.924

Based on estimated marginal means

a. Dependent Variable: Ratings.

b. Adjustment for multiple comparisons: Bonferroni.

Univariate Tests[a]

Numerator df	Denominator df	F	Sig.
1	80.000	.016	.900

The F tests the effect of Group. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.[a]

a. Dependent Variable: Ratings.

Multiple losses

Model Dimension[a]

		Number of Levels	Covariance Structure	Number of Parameters	Subject Variables	Number of Subjects
Fixed Effects	Intercept	1		1		
	Group	2		1		
	Frame	1		1		
Repeated Effects	Frame	2	Compound Symmetry	2	Subject	82
Total		6		5		

a. Dependent Variable: Ratings.

Information Criteria[a]

-2 Restricted Log Likelihood	809.222
Akaike's Information Criterion (AIC)	813.222
Hurvich and Tsai's Criterion (AICC)	813.298
Bozdogan's Criterion (CAIC)	821.385
Schwarz's Bayesian Criterion (BIC)	819.385

The information criteria are displayed in smaller-is-better form.

a. Dependent Variable: Ratings.

Fixed Effects

Type III Tests of Fixed Effects[a]

Source	Numerator df	Denominator df	F	Sig.
Intercept	1	111.745	156.042	.000
Group	1	80.000	.635	.428
Frame	1	81	5.370	.023

a. Dependent Variable: Ratings.

Estimates of Fixed Effects[a]

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	8.191796	.682736	133.107	11.998	.000	6.841381	9.542211
[Group=ComCu]	-.413876	.519215	80.000	-.797	.428	-1.447147	.619395
[Group=ComPP]	0[b]	0	.	.	.	.	.
Frame	.902439	.389415	81	2.317	.023	.127625	1.677253

a. Dependent Variable: Ratings.

b. This parameter is set to zero because it is redundant.

Covariance Parameters

Estimates of Covariance Parameters[a]

Parameter		Estimate	Std. Error	Wald Z	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Repeated Measures	CS diagonal offset	6.217404	.976971	6.364	.000	4.569363	8.459848
	CS covariance	2.388188	.997002	2.395	.017	.434100	4.342276

a. Dependent Variable: Ratings.

Estimated Marginal Means

Group

Estimates[a]

Group	Mean	Std. Error	df	95% Confidence Interval	
				Lower Bound	Upper Bound
ComCu	9.132[b]	.380	80.000	8.375	9.888
ComPP	9.545[b]	.353	80.000	8.842	10.249

a. Dependent Variable: Ratings.

b. Covariates appearing in the model are evaluated at the following values: Frame = 1.50.

Pairwise Comparisons[a]

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	df	Sig.[b]	95% Confidence Interval for Difference[b]	
						Lower Bound	Upper Bound
ComCu	ComPP	-.414	.519	80.000	.428	-1.447	.619
ComPP	ComCu	.414	.519	80.000	.428	-.619	1.447

Based on estimated marginal means

a. Dependent Variable: Ratings.

b. Adjustment for multiple comparisons: Bonferroni.

Univariate Tests[a]

Numerator df	Denominator df	F	Sig.
1	80.000	.635	.428

The F tests the effect of Group. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.[a]

a. Dependent Variable: Ratings.

APPENDIX 4 (CHAPTER 6)

Questionnaires, Analysis of repeated measures ANOVA, Linear mixed model and Wilcoxon signed-rank test

Appendix 4A - Questionnaires (Expectations of retailer's future prices)

In the scenarios below, you are asked to judge whether Mr. A or Mr. B is happier i.e. would you rather be Mr. A or Mr. B.

On a scale of 1 to 15, kindly rate how happy you think Mr. A or Mr. B.

Scale of 1 to 7 – Mr. A is happier than Mr. B *(with 7 being highest level of happiness)*

At midpoint 8 – Mr. A and Mr. B are equally happy

Scale of 9 to 15 – Mr. B is happier than Mr. A *(with 15 being highest level of happiness)*

Multiple Gains

SCENARIO 1

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the £1300 couch now costs £50 less. He had however been expecting a discount of £70; Mr. B finds that the £300 chair now costs £40 less while the £1000 couch was £10 less. He had however been expecting to spend £70 less on both the couch and the chair.

Who was happier? Mr. A or Mr. B

	Mr. A is happier							Both are equally happy	Mr. B is happier						
Scale of happiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 2

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the £1300 couch now costs 3.84% less. He had however been expecting a discount of 5.38%; Mr. B finds that the £300 chair now costs 13.33% less while the £1000 couch was 1% less. He knew that the combined discount on both the couch and the chair was 3.84%. He had however been expecting a total discount of 5.38% on both the couch and the chair.

Who was happier? Mr. A or Mr. B

	Mr. A is happier							Both are equally happy	Mr. B is happier						
Scale of happiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Multiple Losses

In the scenarios below, you are asked to judge whether Mr. A or Mr. B is unhappier. On a scale of 1 to 15, kindly rate how unhappy you think Mr. A or Mr. B.

Scale of 1 to 7 – Mr. A is unhappier than Mr. B *(with 7 being highest level of unhappiness)*

At midpoint 8 – Mr. A and Mr. B are equally unhappy

Scale of 9 to 15 – Mr. B is unhappier than Mr. A *(with 15 being highest level of unhappiness)*

SCENARIO 1

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the £1250 couch now costs £100 more. Although, he had been expecting some price increase, he had been estimating a price increase of only £70; Mr. B finds that both the £200 chair and the £1050 couch now each cost £50 more. Although, he had been expecting some price increase, he had been estimating a combined price increase of only £70 in both the couch and the chair.

Who was unhappier? Mr. A or Mr. B

	Mr. A is unhappier							Both are equally unhappy	Mr. B is unhappier						
Scale of unhappiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 2

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds that the £1250 couch now costs 8% more. Although, he had been expecting some price increase, he had been estimating a price increase of only 5.6%; Mr. B finds that the £200 chair now costs 25% more and the £1050 couch was now priced 4.76% more. Although, he knew that the combined price increase in both the couch and the chair was 8%, he had been estimating a combined price increase of only 5.6% in both the couch and the chair.

Who was unhappier? Mr. A or Mr. B

	Mr. A is unhappier							Both are equally unhappy	Mr. B is unhappier						
Scale of unhappiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Mixed Gains

In the scenarios below, you are asked to judge whether Mr. A or Mr. B is happier i.e. would you rather be Mr. A or Mr. B.

On a scale of 1 to 15, kindly rate how happy you think Mr. A or Mr. B.

Scale of 1 to 7 – Mr. A is happier than Mr. B *(with 7 being highest level of happiness)*

At midpoint 8 – Mr. A and Mr. B are equally happy

Scale of 9 to 15 – Mr. B is happier than Mr. A *(with 15 being highest level of happiness)*

SCENARIO 1

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds the couch priced at £1250. The previous day when he had been at the store, it had been priced £50 more. Mr. B finds the couch priced at £1050 and the chair priced at £200. The previous day when he had been at the store, the chair had been priced £100 less and the couch priced £50 more.

Who was happier? Mr. A or Mr. B

	Mr. A is happier							Both are equally happy	Mr. B is happier						
Scale of happiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 2

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds the couch priced at £1250, but it had cost 3.84% more the previous day; Mr. B finds the couch priced at £1050, but it had cost 5% less the previous day. However, the chair was priced 33.3% less than its original £300 price.

Who was happier? Mr. A or Mr. B

	Mr. A is happier							Both are equally happy	Mr. B is happier						
Scale of happiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Mixed Losses

In the scenarios below, you are asked to judge whether Mr. A or Mr. B is unhappier. On a scale of 1 to 15, kindly rate how unhappy you think Mr. A or Mr. B.

Scale of 7 to 8 – Mr. A is unhappier than Mr. B *(with 7 being highest level of unhappiness)*

At midpoint 8 – Mr. A and Mr. B are equally unhappy

Scale of 9 to 15 – Mr. B is unhappier than Mr. A *(with 15 being highest level of unhappiness)*

SCENARIO 1

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair.

At the store, Mr. A finds the couch priced at £1300. The price had been increased by £50. He had been expecting some increase in prices at the store. He had however been estimating a £30 increase in the price of the couch. Mr. B finds the chair priced at £300 and the couch priced at £1000. The chair had been increased by £100 and the couch reduced by £50. He had been expecting some increase in prices at the store. He had however been estimating a combined price increase of only £30 in both the couch and the chair.

Who was unhappier? Mr. A or Mr. B

	Mr. A is unhappier							Both are equally unhappy	Mr. B is unhappier						
Scale of unhappiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SCENARIO 2

Mr. A wishes to buy a couch, Mr. B wishes to buy a couch and a chair. At the store, Mr. A finds the couch now priced 4% more than its original £1250 price. He had been estimating a price increase of only 2.4% increase. Mr. B finds the chair priced 50% more than its original price of £200 and the couch priced 4.76% less than its original price of £1050. He had however been estimating a combined price increase of only 2.4% increase in both the chair and the couch.

Who was unhappier? Mr. A or Mr. B

	Mr. A is unhappier							Both are equally unhappy	Mr. B is unhappier						
Scale of unhappiness	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Appendix 4B - Analysis of repeated measures ANOVA (Expectations of retailer's current prices

Multiple Gains

Within-Subjects Factors

Measure: MEASURE_1

Frame	Dependent Variable
1	ControlFR
2	Absolute
3	Relative

Descriptive Statistics

	Mean	Std. Deviation	N
ControlFR	9.4889	2.41795	45
Absolute	8.1333	3.88821	45
Relative	8.4889	3.88249	45

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Frame	Pillai's Trace	.106	2.544[b]	2.000	43.000	.090
	Wilks' Lambda	.894	2.544[b]	2.000	43.000	.090
	Hotelling's Trace	.118	2.544[b]	2.000	43.000	.090
	Roy's Largest Root	.118	2.544[b]	2.000	43.000	.090

a. Design: Intercept

Within Subjects Design: Frame

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Frame	.990	.412	2	.814	.991	1.000	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept

Within Subjects Design: Frame

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Frame	Sphericity Assumed	44.459	2	22.230	2.495	.088
	Greenhouse-Geisser	44.459	1.981	22.441	2.495	.089
	Huynh-Feldt	44.459	2.000	22.230	2.495	.088
	Lower-bound	44.459	1.000	44.459	2.495	.121
Error (Frame)	Sphericity Assumed	784.207	88	8.911		
	Greenhouse-Geisser	784.207	87.169	8.996		
	Huynh-Feldt	784.207	88.000	8.911		
	Lower-bound	784.207	44.000	17.823		

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Frame	Type III Sum of Squares	df	Mean Square	F	Sig.
Frame	Linear	22.500	1	22.500	2.781	.102
	Quadratic	21.959	1	21.959	2.256	.140
Error (Frame)	Linear	356.000	44	8.091		
	Quadratic	428.207	44	9.732		

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	10226.852	1	10226.852	561.437	.000
Error	801.481	44	18.215		

Transformation Coefficients (M Matrix)

Average

Measure: MEASURE_1

Transformed Variable:

AVERAGE

ControlFR	.577
Absolute	.577
Relative	.577

Frame[a]

Measure: MEASURE_1

Dependent Variable	Frame	
	Linear	Quadratic
ControlFR	-.707	.408
Absolute	.000	-.816
Relative	.707	.408

a. The contrasts for the within subjects factors are:

Frame: Polynomial contrast

Estimated Marginal Means

Frame

Transformation Coefficients (M Matrix)

Measure: MEASURE_1

Dependent Variable	Frame		
	1	2	3
ControlFR	1	0	0
Absolute	0	1	0
Relative	0	0	1

Estimates

Measure: MEASURE_1

Frame	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	9.489	.360	8.762	10.215
2	8.133	.580	6.965	9.301
3	8.489	.579	7.322	9.655

Pairwise Comparisons

Measure: MEASURE_1

(I) Frame	(J) Frame	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a] Lower Bound	Upper Bound
1	2	1.356	.635	.115	-.225	2.936
	3	1.000	.600	.307	-.493	2.493
2	1	-1.356	.635	.115	-2.936	.225
	3	-.356	.652	1.000	-1.979	1.268
3	1	-1.000	.600	.307	-2.493	.493
	2	.356	.652	1.000	-1.268	1.979

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.
Pillai's trace	.106	2.544[a]	2.000	43.000	.090
Wilks' lambda	.894	2.544[a]	2.000	43.000	.090
Hotelling's trace	.118	2.544[a]	2.000	43.000	.090
Roy's largest root	.118	2.544[a]	2.000	43.000	.090

Each F tests the multivariate effect of Frame. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

Multiple Losses

Within-Subjects Factors

Measure: MEASURE_1

Frame	Dependent Variable
1	ControlFR
2	Absolute
3	Relative

Descriptive Statistics

	Mean	Std. Deviation	N
ControlFR	8.8889	3.09855	45
Absolute	8.0222	3.20148	45
Relative	9.1333	3.28634	45

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Frame	Pillai's Trace	.087	2.045[b]	2.000	43.000	.142
	Wilks' Lambda	.913	2.045[b]	2.000	43.000	.142
	Hotelling's Trace	.095	2.045[b]	2.000	43.000	.142
	Roy's Largest Root	.095	2.045[b]	2.000	43.000	.142

a. Design: Intercept
Within Subjects Design: Frame

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser	Epsilon[b] Huynh-Feldt	Epsilon[b] Lower-bound
Frame	.955	1.996	2	.369	.957	.999	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept
Within Subjects Design: Frame

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Frame	Sphericity Assumed	30.681	2	15.341	1.824	.167
	Greenhouse-Geisser	30.681	1.913	16.037	1.824	.169
	Huynh-Feldt	30.681	1.998	15.355	1.824	.167
	Lower-bound	30.681	1.000	30.681	1.824	.184
Error(Frame)	Sphericity Assumed	739.985	88	8.409		
	Greenhouse-Geisser	739.985	84.181	8.790		
	Huynh-Feldt	739.985	87.918	8.417		
	Lower-bound	739.985	44.000	16.818		

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Frame	Type III Sum of Squares	df	Mean Square	F	Sig.
Frame	Linear	1.344	1	1.344	.159	.692
	Quadratic	29.337	1	29.337	3.519	.067
Error(Frame)	Linear	373.156	44	8.481		
	Quadratic	366.830	44	8.337		

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	10174.696	1	10174.696	735.556	.000
Error	608.637	44	13.833		

Transformation Coefficients (M Matrix)

Average

Measure: MEASURE_1

Transformed Variable: AVERAGE

ControlFR	.577
Absolute	.577
Relative	.577

Frame[a]

Measure: MEASURE_1

Dependent Variable	Frame	
	Linear	Quadratic
ControlFR	-.707	.408
Absolute	.000	-.816
Relative	.707	.408

a. The contrasts for the within subjects factors are:

Frame: Polynomial contrast

Estimated Marginal Means

Frame

Transformation Coefficients (M Matrix)

Measure: MEASURE_1

Dependent Variable	Frame 1	Frame 2	Frame 3
ControlFR	1	0	0
Absolute	0	1	0
Relative	0	0	1

Estimates

Measure: MEASURE_1

Frame	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	8.889	.462	7.958	9.820
2	8.022	.477	7.060	8.984
3	9.133	.490	8.146	10.121

Pairwise Comparisons

Measure: MEASURE_1

(I) Frame	(J) Frame	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a]	
					Lower Bound	Upper Bound
1	2	.867	.664	.596	-.786	2.520
	3	-.244	.614	1.000	-1.773	1.284
2	1	-.867	.664	.596	-2.520	.786
	3	-1.111	.551	.149	-2.482	.260
3	1	.244	.614	1.000	-1.284	1.773
	2	1.111	.551	.149	-.260	2.482

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.
Pillai's trace	.087	2.045[a]	2.000	43.000	.142
Wilks' lambda	.913	2.045[a]	2.000	43.000	.142
Hotelling's trace	.095	2.045[a]	2.000	43.000	.142
Roy's largest root	.095	2.045[a]	2.000	43.000	.142

Each F tests the multivariate effect of Frame. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

Mixed Gains

Within-Subjects Factors

Measure: MEASURE_1

Frame	Dependent Variable
1	ControlFR
2	Absolute
3	Relative

Descriptive Statistics

	Mean	Std. Deviation	N
ControlFR	8.0208	3.48547	48
Absolute	7.3958	2.88606	48
Relative	8.2708	2.20000	48

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Frame	Pillai's Trace	.073	1.812[b]	2.000	46.000	.175
	Wilks' Lambda	.927	1.812[b]	2.000	46.000	.175
	Hotelling's Trace	.079	1.812[b]	2.000	46.000	.175
	Roy's Largest Root	.079	1.812[b]	2.000	46.000	.175

a. Design: Intercept

Within Subjects Design: Frame

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Frame	.827	8.741	2	.013	.852	.881	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept

Within Subjects Design: Frame

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Frame	Sphericity Assumed	19.500	2	9.750	1.106	.335
	Greenhouse-Geisser	19.500	1.705	11.437	1.106	.328
	Huynh-Feldt	19.500	1.763	11.063	1.106	.330
	Lower-bound	19.500	1.000	19.500	1.106	.298
Error(Frame)	Sphericity Assumed	828.500	94	8.814		
	Greenhouse-Geisser	828.500	80.133	10.339		
	Huynh-Feldt	828.500	82.843	10.001		
	Lower-bound	828.500	47.000	17.628		

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Frame	Type III Sum of Squares	df	Mean Square	F	Sig.
Frame	Linear	1.500	1	1.500	.137	.713
	Quadratic	18.000	1	18.000	2.686	.108
Error(Frame)	Linear	513.500	47	10.926		
	Quadratic	315.000	47	6.702		

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	8977.563	1	8977.563	1167.409	.000
Error	361.438	47	7.690		

Transformation Coefficients (M Matrix)

Average

Measure: MEASURE_1

Transformed Variable: AVERAGE

ControlFR	.577
Absolute	.577
Relative	.577

Frame[a]

Measure: MEASURE_1

Dependent Variable	Frame	
	Linear	Quadratic
ControlFR	-.707	.408
Absolute	.000	-.816
Relative	.707	.408

a. The contrasts for the within subjects factors are:
Frame: Polynomial contrast

Estimated Marginal Means

Frame

Transformation Coefficients (M Matrix)

Measure: MEASURE_1

Dependent Variable	Frame		
	1	2	3
ControlFR	1	0	0
Absolute	0	1	0
Relative	0	0	1

Estimates

Measure: MEASURE_1

Frame	Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
1	8.021	.503	7.009	9.033
2	7.396	.417	6.558	8.234
3	8.271	.318	7.632	8.910

Pairwise Comparisons

Measure: MEASURE_1

(I) Frame	(J) Frame	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a] Lower Bound	95% Confidence Interval for Difference[a] Upper Bound
1	2	.625	.657	1.000	-1.006	2.256
	3	-.250	.675	1.000	-1.925	1.425
2	1	-.625	.657	1.000	-2.256	1.006
	3	-.875	.464	.196	-2.026	.276
3	1	.250	.675	1.000	-1.425	1.925
	2	.875	.464	.196	-.276	2.026

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.
Pillai's trace	.073	1.812[a]	2.000	46.000	.175
Wilks' lambda	.927	1.812[a]	2.000	46.000	.175
Hotelling's trace	.079	1.812[a]	2.000	46.000	.175
Roy's largest root	.079	1.812[a]	2.000	46.000	.175

Each F tests the multivariate effect of Frame. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

Mixed Losses

Within-Subjects Factors

Measure: MEASURE_1

Frame	Dependent Variable
1	ControlFR
2	Absolute
3	Relative

Descriptive Statistics

	Mean	Std. Deviation	N
ControlFR	7.7083	3.38305	48
Absolute	7.9583	2.81303	48
Relative	8.1875	2.67897	48

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Frame	Pillai's Trace	.018	.413[b]	2.000	46.000	.664
	Wilks' Lambda	.982	.413[b]	2.000	46.000	.664
	Hotelling's Trace	.018	.413[b]	2.000	46.000	.664
	Roy's Largest Root	.018	.413[b]	2.000	46.000	.664

a. Design: Intercept
Within Subjects Design: Frame

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Frame	.863	6.789	2	.034	.879	.911	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept
Within Subjects Design: Frame

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Frame	Sphericity Assumed	5.514	2	2.757	.382	.684
	Greenhouse-Geisser	5.514	1.759	3.135	.382	.657
	Huynh-Feldt	5.514	1.822	3.027	.382	.664
	Lower-bound	5.514	1.000	5.514	.382	.540
Error(Frame)	Sphericity Assumed	679.153	94	7.225		
	Greenhouse-Geisser	679.153	82.658	8.216		
	Huynh-Feldt	679.153	85.621	7.932		
	Lower-bound	679.153	47.000	14.450		

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Frame	Type III Sum of Squares	df	Mean Square	F	Sig.
Frame	Linear	5.510	1	5.510	.742	.393
	Quadratic	.003	1	.003	.000	.982
Error(Frame)	Linear	348.990	47	7.425		
	Quadratic	330.163	47	7.025		

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	9104.340	1	9104.340	753.361	.000
Error	567.993	47	12.085		

Transformation Coefficients (M Matrix)

Average

Measure: MEASURE_1

Transformed Variable:

AVERAGE

ControlFR	.577
Absolute	.577
Relative	.577

Frame[a]

Measure: MEASURE_1

Dependent Variable	Frame	
	Linear	Quadratic
ControlFR	-.707	.408
Absolute	.000	-.816
Relative	.707	.408

a. The contrasts for the within subjects factors are:

Frame: Polynomial contrast

Estimated Marginal Means

Frame

Transformation Coefficients (M Matrix)

Measure: MEASURE_1

Dependent Variable	Frame		
	1	2	3
ControlFR	1	0	0
Absolute	0	1	0
Relative	0	0	1

Estimates

Measure: MEASURE_1

Frame	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	7.708	.488	6.726	8.691
2	7.958	.406	7.142	8.775
3	8.188	.387	7.410	8.965

Pairwise Comparisons

Measure: MEASURE_1

(I) Frame	(J) Frame	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a] Lower Bound	Upper Bound
1	2	-.250	.627	1.000	-1.807	1.307
	3	-.479	.556	1.000	-1.860	.902
2	1	.250	.627	1.000	-1.307	1.807
	3	-.229	.448	1.000	-1.341	.883
3	1	.479	.556	1.000	-.902	1.860
	2	.229	.448	1.000	-.883	1.341

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.
Pillai's trace	.018	.413[a]	2.000	46.000	.664
Wilks' lambda	.982	.413[a]	2.000	46.000	.664
Hotelling's trace	.018	.413[a]	2.000	46.000	.664
Roy's largest root	.018	.413[a]	2.000	46.000	.664

Each F tests the multivariate effect of Frame. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

Appendix 4C - Linear mixed model analysis (Expectations of retailer's current prices)

Multiple gains

Model Dimension[a]

		Number of Levels	Covariance Structure	Number of Parameters	Subject Variables	Number of Subjects
Fixed Effects	Intercept	1		1		
	Group	2		1		
	Frame	1		1		
Repeated Effects	Frame	2	Compound Symmetry	2	Subject	90
Total		6		5		

a. Dependent Variable: Ratings.

Information Criteria[a]

-2 Restricted Log Likelihood	926.172
Akaike's Information Criterion (AIC)	930.172
Hurvich and Tsai's Criterion (AICC)	930.241
Bozdogan's Criterion (CAIC)	938.524
Schwarz's Bayesian Criterion (BIC)	936.524

The information criteria are displayed in smaller-is-better form.

a. Dependent Variable: Ratings.

Fixed Effects

Type III Tests of Fixed Effects[a]

Source	Numerator df	Denominator df	F	Sig.
Intercept	1	124.334	160.018	.000
Group	1	88	5.541	.021
Frame	1	89	.582	.447

a. Dependent Variable: Ratings.

Estimates of Fixed Effects[a]

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	9.155556	.727368	151.739	12.587	.000	7.718479	10.592632
[Group=Exp]	-1.311111	.556968	88	-2.354	.021	-2.417968	-.204254
[Group=Nexp]	0[b]	0	.	.	.	.	.
Frame	.311111	.407680	89	.763	.447	-.498941	1.121163

a. Dependent Variable: Ratings.

b. This parameter is set to zero because it is redundant.

Covariance Parameters

Estimates of Covariance Parameters[a]

Parameter		Estimate	Std. Error	Wald Z	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Repeated Measures	CS diagonal offset	7.479151	1.121172	6.671	.000	5.575089	10.033508
	CS covariance	3.240222	1.192256	2.718	.007	.903444	5.577001

a. Dependent Variable: Ratings.

Estimated Marginal Means

Group

Estimates[a]

Group	Mean	Std. Error	df	95% Confidence Interval	
				Lower Bound	Upper Bound
Exp	8.311[b]	.394	88	7.528	9.094
Nexp	9.622[b]	.394	88	8.840	10.405

a. Dependent Variable: Ratings.

b. Covariates appearing in the model are evaluated at the following values: Frame = 1.50.

Pairwise Comparisons[a]

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	df	Sig.[c]	95% Confidence Interval for Difference[c]	
						Lower Bound	Upper Bound
Exp	Nexp	-1.311*	.557	88	.021	-2.418	-.204
Nexp	Exp	1.311*	.557	88	.021	.204	2.418

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

a. Dependent Variable: Ratings.

c. Adjustment for multiple comparisons: Bonferroni.

Univariate Tests[a]

Numerator df	Denominator df	F	Sig.
1	88	5.541	.021

The F tests the effect of Group. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.[a]

a. Dependent Variable: Ratings.

Multiple losses

Model Dimension[a]

		Number of Levels	Covariance Structure	Number of Parameters	Subject Variables	Number of Subjects
Fixed Effects	Intercept	1		1		
	Group	2		1		
	Frame	1		1		
Repeated Effects	Frame	2	Compound Symmetry	2	Subject	90
Total		6		5		

a. Dependent Variable: Ratings.

Information Criteria[a]

-2 Restricted Log Likelihood	902.385
Akaike's Information Criterion (AIC)	906.385
Hurvich and Tsai's Criterion (AICC)	906.454
Bozdogan's Criterion (CAIC)	914.738
Schwarz's Bayesian Criterion (BIC)	912.738

The information criteria are displayed in smaller-is-better form.

a. Dependent Variable: Ratings.

Fixed Effects

Type III Tests of Fixed Effects[a]

Source	Numerator df	Denominator df	F	Sig.
Intercept	1	127.627	140.139	.000
Group	1	88.000	2.773	.099
Frame	1	89.000	9.282	.003

a. Dependent Variable: Ratings.

Estimates of Fixed Effects[a]

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	7.766667	.673660	156.042	11.529	.000	6.435998	9.097336
[Group=Exp]	-.888889	.533796	88.000	-1.665	.099	-1.949696	.171919
[Group=Nexp]	0[b]	0	.	.	.	.	.
Frame	1.133333	.371991	89.000	3.047	.003	.394196	1.872471

a. Dependent Variable: Ratings.

b. This parameter is set to zero because it is redundant.

Covariance Parameters

Estimates of Covariance Parameters[a]

Parameter		Estimate	Std. Error	Wald Z	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Repeated Measures	CS diagonal offset	6.226966	.933462	6.671	.000	4.641689	8.353664
	CS covariance	3.297628	1.073304	3.072	.002	1.193990	5.401266

a. Dependent Variable: Ratings.

Estimated Marginal Means

Group

Estimates[a]

Group	Mean	Std. Error	df	95% Confidence Interval	
				Lower Bound	Upper Bound
Exp	8.578[b]	.377	88.000	7.828	9.328
Nexp	9.467[b]	.377	88.000	8.717	10.217

a. Dependent Variable: Ratings.

b. Covariates appearing in the model are evaluated at the following values: Frame = 1.50.

Pairwise Comparisons[a]

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	df	Sig.[b]	95% Confidence Interval for Difference[b]	
						Lower Bound	Upper Bound
Exp	Nexp	-.889	.534	88.000	.099	-1.950	.172
Nexp	Exp	.889	.534	88.000	.099	-.172	1.950

Based on estimated marginal means

a. Dependent Variable: Ratings.

b. Adjustment for multiple comparisons: Bonferroni.

Univariate Tests[a]

Numerator df	Denominator df	F	Sig.
1	88.000	2.773	.099

The F tests the effect of Group. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.[a]

a. Dependent Variable: Ratings.

Mixed gains

Model Dimension[a]

		Number of Levels	Covariance Structure	Number of Parameters	Subject Variables	Number of Subjects
Fixed Effects	Intercept	1		1		
	Group	2		1		
	Frame	1		1		
Repeated Effects	Frame	2	Compound Symmetry	2	Subject	96
Total		6		5		

a. Dependent Variable: Ratings.

Information Criteria[a]

-2 Restricted Log Likelihood	982.092
Akaike's Information Criterion (AIC)	986.092
Hurvich and Tsai's Criterion (AICC)	986.156
Bozdogan's Criterion (CAIC)	994.575
Schwarz's Bayesian Criterion (BIC)	992.575

The information criteria are displayed in smaller-is-better form.

a. Dependent Variable: Ratings.

Fixed Effects

Type III Tests of Fixed Effects[a]

Source	Numerator df	Denominator df	F	Sig.
Intercept	1	124.480	104.762	.000
Group	1	94	1.481	.227
Frame	1	95.000	4.244	.042

a. Dependent Variable: Ratings.

Estimates of Fixed Effects[a]

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	7.156250	.714181	149.801	10.020	.000	5.745081	8.567419
[Group=Exp]	-.604167	.496432	94	-1.217	.227	-1.589844	.381511
[Group=Nexp]	0[b]	0	.	.	.	.	.
Frame	.854167	.414639	95.000	2.060	.042	.031005	1.677329

a. Dependent Variable: Ratings.

b. This parameter is set to zero because it is redundant.

Covariance Parameters

Estimates of Covariance Parameters[a]

Parameter		Estimate	Std. Error	Wald Z	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Repeated Measures	CS diagonal offset	8.252412	1.197386	6.892	.000	6.209771	10.966959
	CS covariance	1.788466	1.050124	1.703	.089	-.269739	3.846670

a. Dependent Variable: Ratings.

Estimated Marginal Means

Group

Estimates[a]

Group	Mean	Std. Error	df	95% Confidence Interval	
				Lower Bound	Upper Bound
Exp	7.833[b]	.351	94	7.136	8.530
Nexp	8.438[b]	.351	94	7.741	9.134

a. Dependent Variable: Ratings.

b. Covariates appearing in the model are evaluated at the following values:
Frame = 1.50.

Pairwise Comparisons[a]

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	df	Sig.[b]	95% Confidence Interval for Difference[b]	
						Lower Bound	Upper Bound
Exp	Nexp	-.604	.496	94	.227	-1.590	.382
Nexp	Exp	.604	.496	94	.227	-.382	1.590

Based on estimated marginal means

a. Dependent Variable: Ratings.

b. Adjustment for multiple comparisons: Bonferroni.

Univariate Tests[a]

Numerator df	Denominator df	F	Sig.
1	94	1.481	.227

The F tests the effect of Group. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.[a]

a. Dependent Variable: Ratings.

Mixed losses

Model Dimension[a]

		Number of Levels	Covariance Structure	Number of Parameters	Subject Variables	Number of Subjects
Fixed Effects	Intercept	1		1		
	Group	2		1		
	Frame	1		1		
Repeated Effects	Frame	2	Compound Symmetry	2	Subject	96
Total		6		5		

a. Dependent Variable: Ratings.

Information Criteria[a]

-2 Restricted Log Likelihood	957.646
Akaike's Information Criterion (AIC)	961.646
Hurvich and Tsai's Criterion (AICC)	961.711
Bozdogan's Criterion (CAIC)	970.130
Schwarz's Bayesian Criterion (BIC)	968.130

The information criteria are displayed in smaller-is-better form.

a. Dependent Variable: Ratings.

Fixed Effects

Type III Tests of Fixed Effects[a]

Source	Numerator df	Denominator df	F	Sig.
Intercept	1	145.051	153.966	.000
Group	1	94	.234	.630
Frame	1	95.000	4.841	.030

a. Dependent Variable: Ratings.

Estimates of Fixed Effects[a]

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	7.223958	.632010	176.364	11.430	.000	5.976682	8.471234
[Group=Exp]	-.260417	.538896	94	-.483	.630	-1.330406	.809573
[Group=Nexp]	0[b]	0	.	.	.	.	.
Frame	.739583	.336143	95.000	2.200	.030	.072255	1.406912

a. Dependent Variable: Ratings.

b. This parameter is set to zero because it is redundant.

Covariance Parameters

Estimates of Covariance Parameters[a]

Parameter		Estimate	Std. Error	Wald Z	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Repeated Measures	CS diagonal offset	5.423629	.786943	6.892	.000	4.081170	7.207677
	CS covariance	4.257988	1.090136	3.906	.000	2.121360	6.394616

a. Dependent Variable: Ratings.

Estimated Marginal Means

Group

Estimates[a]

Group	Mean	Std. Error	df	95% Confidence Interval	
				Lower Bound	Upper Bound
Exp	8.073[b]	.381	94.000	7.316	8.830
Nexp	8.333[b]	.381	94	7.577	9.090

a. Dependent Variable: Ratings.

b. Covariates appearing in the model are evaluated at the following values:

Frame = 1.50.

Pairwise Comparisons[a]

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	df	Sig.[b]	95% Confidence Interval for Difference[b]	
						Lower Bound	Upper Bound
Exp	Nexp	-.260	.539	94	.630	-1.330	.810
Nexp	Exp	.260	.539	94	.630	-.810	1.330

Based on estimated marginal means

a. Dependent Variable: Ratings.

b. Adjustment for multiple comparisons: Bonferroni.

Univariate Tests[a]

Numerator df	Denominator df	F	Sig.
1	94	.234	.630

The F tests the effect of Group. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.[a]

a. Dependent Variable: Ratings.

Appendix 4D - Analysis of Wilcoxon signed-rank test

Multiple Gains

Descriptive Statistics

	N	Percentiles		
		25th	50th (Median)	75th
ControlFR	45	8.0000	9.0000	11.0000
Absolute	45	5.0000	8.0000	11.0000
Relative	45	5.5000	9.0000	11.0000

Friedman Test

Ranks

	Mean Rank
ControlFR	2.12
Absolute	1.89
Relative	1.99

Test Statistics[a]

N	45
Chi-Square	1.721
df	2
Asymp. Sig.	.423

a. Friedman Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
ControlFR	45	9.4889	2.41795	3.00	14.00	8.0000	9.0000	11.0000
Absolute	45	8.1333	3.88821	1.00	15.00	5.0000	8.0000	11.0000
Relative	45	8.4889	3.88249	1.00	15.00	5.5000	9.0000	11.0000

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
Absolute - ControlFR	Negative Ranks	20[a]	18.75	375.00
	Positive Ranks	12[b]	12.75	153.00
	Ties	13[c]		
	Total	45		
Relative - ControlFR	Negative Ranks	18[d]	20.28	365.00
	Positive Ranks	15[e]	13.07	196.00
	Ties	12[f]		
	Total	45		
Relative - Absolute	Negative Ranks	12[g]	12.83	154.00
	Positive Ranks	14[h]	14.07	197.00
	Ties	19[i]		
	Total	45		

a. Absolute < ControlFR

b. Absolute > ControlFR

c. Absolute = ControlFR

d. Relative < ControlFR

e. Relative > ControlFR

f. Relative = ControlFR

g. Relative < Absolute

h. Relative > Absolute

i. Relative = Absolute

Test Statistics[a]

	Absolute - ControlFR	Relative - ControlFR	Relative - Absolute
Z	-2.081[b]	-1.514[b]	-.548[c]
Asymp. Sig. (2-tailed)	.037	.130	.583

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

c. Based on negative ranks.

Multiple Losses

Descriptive Statistics

	N	Percentiles 25th	50th (Median)	75th
ControlFR	45	7.0000	8.0000	12.0000
Absolute	45	6.0000	8.0000	9.0000
Relative	45	8.0000	10.0000	11.0000

Friedman Test

Ranks

	Mean Rank
ControlFR	1.99
Absolute	1.80
Relative	2.21

Test Statistics[a]

N	45
Chi-Square	5.119
df	2
Asymp. Sig.	.077

a. Friedman Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles 25th	50th (Median)	75th
ControlFR	45	8.8889	3.09855	1.00	15.00	7.0000	8.0000	12.0000
Absolute	45	8.0222	3.20148	1.00	15.00	6.0000	8.0000	9.0000
Relative	45	9.1333	3.28634	1.00	15.00	8.0000	10.0000	11.0000

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
Absolute - ControlFR	Negative Ranks	18[a]	19.14	344.50
	Positive Ranks	15[b]	14.43	216.50
	Ties	12[c]		
	Total	45		
Relative - ControlFR	Negative Ranks	18[d]	20.89	376.00
	Positive Ranks	22[e]	20.18	444.00
	Ties	5[f]		
	Total	45		
Relative - Absolute	Negative Ranks	3[g]	16.00	48.00
	Positive Ranks	18[h]	10.17	183.00
	Ties	24[i]		
	Total	45		

a. Absolute < ControlFR

b. Absolute > ControlFR

c. Absolute = ControlFR

d. Relative < ControlFR

e. Relative > ControlFR

f. Relative = ControlFR

g. Relative < Absolute

h. Relative > Absolute

i. Relative = Absolute

Test Statistics[a]

	Absolute - ControlFR	Relative - ControlFR	Relative - Absolute
Z	-1.148[b]	-.460[c]	-2.355[c]
Asymp. Sig. (2-tailed)	.251	.646	.019

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

c. Based on negative ranks.

Mixed Gains

Descriptive Statistics

	N	Percentiles		
		25th	50th (Median)	75th
ControlFR	48	5.0000	8.0000	11.0000
Absolute	48	6.0000	8.0000	8.0000
Relative	48	7.2500	8.0000	10.0000

Friedman Test

Ranks

	Mean Rank
ControlFR	2.02
Absolute	1.81
Relative	2.17

Test Statistics[a]

N	48
Chi-Square	3.817
df	2
Asymp. Sig.	.148

a. Friedman Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
ControlFR	48	8.0208	3.48547	2.00	15.00	5.0000	8.0000	11.0000
Absolute	48	7.3958	2.88606	1.00	15.00	6.0000	8.0000	8.0000
Relative	48	8.2708	2.20000	3.00	14.00	7.2500	8.0000	10.0000

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
Absolute - ControlFR	Negative Ranks	21[a]	21.05	442.00
	Positive Ranks	17[b]	17.59	299.00
	Ties	10[c]		
	Total	48		
Relative - ControlFR	Negative Ranks	20[d]	21.98	439.50
	Positive Ranks	22[e]	21.07	463.50
	Ties	6[f]		
	Total	48		
Relative - Absolute	Negative Ranks	8[g]	16.88	135.00
	Positive Ranks	22[h]	15.00	330.00
	Ties	18[i]		
	Total	48		

a. Absolute < ControlFR

b. Absolute > ControlFR

c. Absolute = ControlFR

d. Relative < ControlFR

e. Relative > ControlFR

f. Relative = ControlFR

g. Relative < Absolute

h. Relative > Absolute

i. Relative = Absolute

Test Statistics[a]

	Absolute - ControlFR	Relative - ControlFR	Relative - Absolute
Z	-1.039[b]	-.151[c]	-2.023[c]
Asymp. Sig. (2-tailed)	.299	.880	.043

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

c. Based on negative ranks.

Mixed Losses

Descriptive Statistics

	N	Percentiles 25th	50th (Median)	75th
ControlFR	48	5.0000	8.0000	10.0000
Absolute	48	6.0000	8.0000	10.0000
Relative	48	8.0000	8.0000	10.0000

Friedman Test

Ranks

	Mean Rank
ControlFR	1.82
Absolute	1.98
Relative	2.20

Test Statistics[a]

N	48
Chi-Square	4.449
df	2
Asymp. Sig.	.108

a. Friedman Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles 25th	50th (Median)	75th
ControlFR	48	7.7083	3.38305	1.00	14.00	5.0000	8.0000	10.0000
Absolute	48	7.9583	2.81303	2.00	14.00	6.0000	8.0000	10.0000
Relative	48	8.1875	2.67897	2.00	15.00	8.0000	8.0000	10.0000

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
Absolute - ControlFR	Negative Ranks	13[a]	20.92	272.00
	Positive Ranks	21[b]	15.38	323.00
	Ties	14[c]		
	Total	48		
Relative - ControlFR	Negative Ranks	15[d]	20.77	311.50
	Positive Ranks	24[e]	19.52	468.50
	Ties	9[f]		
	Total	48		
Relative - Absolute	Negative Ranks	10[g]	17.85	178.50
	Positive Ranks	20[h]	14.33	286.50
	Ties	18[i]		
	Total	48		

a. Absolute < ControlFR

b. Absolute > ControlFR

c. Absolute = ControlFR

d. Relative < ControlFR

e. Relative > ControlFR

f. Relative = ControlFR

g. Relative < Absolute

h. Relative > Absolute

i. Relative = Absolute

Test Statistics[a]

	Absolute - ControlFR	Relative - ControlFR	Relative - Absolute
Z	-.437[b]	-1.100[b]	-1.122[b]
Asymp. Sig. (2-tailed)	.662	.271	.262

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

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