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THE VALIDITY OF ODD PRICING

**A thesis presented in partial fulfilment of the requirements for
the degree of Master of Business Studies
at Massey University**

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ABSTRACT

Odd pricing refers to the practice of pricing goods just below the nearest round figure, for example, \$9.99 instead of \$10.00, or \$1,995 instead of \$2,000, to produce higher than expected demand at the price level concerned. Although the practice of odd pricing is prevalent in retailing, there is a lack of empirical evidence to verify the effectiveness of odd pricing as a strategy to increase demand.

This thesis reports the findings of a study designed to test the assumption that odd pricing produces higher than expected demand resulting in a "kinked" demand curve. That is, a demand curve which is inconsistent with the traditional law of demand. Purchase probabilities, used to measure estimated demand for six household products at four price levels, were obtained from a sample of 300 consumers. For each product, showcards featuring two prices, one slightly above an even price point and one slightly below the same price point, were presented to all 300 consumers. These prices served the purpose of creating top and bottom "anchor" points of the demand curve for the product concerned. The sample was further divided into three subsamples of 100 consumers who each viewed either an appropriate even or odd "test" price. This process produced 300 purchase probabilities for each top and bottom "anchor" price and 100 purchase probabilities for each even and odd "test" price, for each of the six products. A demand curve for each product was then produced to examine whether greater than expected demand had occurred at the odd price points.

A noticeable trend of greater than expected demand at odd price points occurred for all products tested. This finding offers strong support for the odd pricing assumption. In particular, greater than expected demand for grocery items occurred in response to odd prices. No difference was detected between the odd pricing effect for 95 and 99 cent endings, indicating that, where practical, 99 cent endings achieve the highest gross profit margin obtainable from pricing below the nearest round figure.

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CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND

Casual observation of advertised retail prices throughout New Zealand highlights a common pattern. That is, the prolific use of odd pricing, or pricing just below the nearest round number, for example, \$9.99 instead of \$10.00, or \$999 instead of \$1,000. Surveillance alone confirms the apparent popularity of prices ending in the digit 9 in particular, and to a lesser extent, the digit 5.

The true origin of odd pricing is uncertain (Dalrymple & Thompson, 1969; Friedman, 1967), but evidence of its use can be traced back over 100 years (Schindler & Wiman, 1989). Since then the use of odd pricing in retailing has become widespread in many countries.

1.2 THE EFFECT OF ODD PRICING ON DEMAND

Various reasons are offered for the widespread use of the odd pricing practice. These reasons are largely based on speculation rather than any objective evidence (Dodds & Monroe, 1985; Kreul, 1982). For example, the belief exists that customers see an odd price as being much cheaper than it actually is in relation to the nearest round figure. In other words, customers see a price of \$2.99 as being closer to two dollars than nearly three dollars. It is believed that this illusion of much cheaper products triggers an enhanced buyer response (Boyd & Massy, 1972). As a result of this response it is assumed that prices set at odd values produce higher than expected demand at the price level concerned. Therefore the assumed demand curve is thought to be inconsistent with the traditional law of demand (Sturdivant, 1970).

There have been few advances made in experimental knowledge about the effect of odd pricing on demand, and there is no known research evidence to indicate that the assumption that odd pricing increases demand is correct (Dodds & Monroe, 1985; Schindler & Wiman,

1989). In fact, the available research tends not to support the belief (Monroe, 1990).

1.3 PREVALENCE OF ODD PRICING

To look more closely at the extent of the odd pricing phenomenon a one week analysis of all home delivered advertising material was carried out in Palmerston North. This analysis included all home-drop advertising material and all advertising displayed in two free weekly newspapers and the *Manawatu Evening Standard* for a seven day period.

When categorising prices into odd or even prices, an odd price was defined as a price which fell:

- within 5 cents of the nearest whole dollar (e.g., 95, 96, 97, 98, 99).
- within 1 cent of the nearest 10 cents (e.g., 19, 29, 39 ...).
- within \$5 of the nearest \$100 or \$1000 amount.
- within \$1 of the nearest round dollar amount (e.g., 19, 29, 39 ...).

Therefore, not every price which ended in an odd digit was in fact an odd price. For example, a price of \$1.45, although ending in an odd digit, was not classified as an odd price. Furthermore, prices which measured less than .5cm and prices which did not pertain to an individual product, were disregarded (e.g., products advertised as two for the price of one; advertisements stating a base price only "From ...").

Each advertisement was analysed on the basis of the right-most digit displayed. In other words, if cents endings were used, the analysis was based on the cents ending, regardless of the whole dollar amounts shown. In the case of whole dollar amounts, again the analysis was based on the last digit, or lowest dollar numeral. In total, 840 advertisements (71%) displayed cents endings, and 348 (29%) ended in whole dollars.

This analysis revealed that odd prices, in particular prices ending in the digit 9, clearly outnumbered all other price endings. In total, 87% of prices were defined as odd prices. Approximately 60% of prices ended in the digit 9, with the digit 5 being the next most common, with approximately 30% of prices ending in this digit. Therefore, approximately

90% of prices ended in either "9" or "5". Three digits (0, 5, 9) accounted for nearly 97% of price endings, with the remaining seven digits accounting for only slightly over 3%. These findings are presented in the following two tables.

Table 1. Frequency of odd versus even prices

Advertisements	n	%
Odd	1031	87
Even	157	13
Total	1188	100

Table 2. End digit preference

Digit Ending	0	1	2	3	4	5	6	7	8	9	Total
n	89	3	3	9	3	340	3	5	12	721	1188
%	7.5	.26	.26	.76	.26	28.6	.26	.4	1.0	60.7	100

It is unlikely that this ratio of price endings would have been arrived at by random pricing formulae alone. Therefore, this analysis indicates that, whatever pricing methods retailers use, there is a definite bias in favour of odd price endings.

1.4 SUMMARY

While the practice of odd pricing is widespread and its effectiveness may therefore seem self evident, there is, in fact, little or no evidence to indicate whether its popularity stems from sound testing of its effectiveness at these price points, or simply from habit or custom. Therefore, in light of the lack of empirical evidence to support the widespread use of the odd pricing technique, this research project was undertaken to investigate the effect, if any, of odd pricing on sales demand.

1.5 RESEARCH OVERVIEW

Research to address the objectives of this study was carried out in two stages. In stage one a marketplace study was undertaken which focused on retailers' rationale for the extensive use of odd pricing. Furthermore, an empirical test was carried out by a mail order retail company to investigate whether demand was greater than expected for odd priced products, in comparison to sales of identical products priced five cents higher at even denominations. In addition, this stage of the research involved analysis of advertised prices, and interviews with a range of consumers about their views and opinions on odd pricing.

In stage two, two studies were undertaken to empirically test the effect of odd pricing on demand for selected products. Both tests involved using purchase probabilities to measure estimated demand. The first test was carried out as part of the 1994 Palmerston North Omnibus survey to investigate the effect of odd pricing on estimated demand for a small range of household products. Second, an odd pricing experiment was undertaken to measure estimated demand for a small range of household products at differing price endings and price levels. Demand was estimated at differing price points for each product, at both odd and even values. A demand curve was then formed for each product to examine whether greater than expected demand had occurred at the odd price points, in line with the traditional downward sloping demand curve.

The study began with a review of relevant literature which addressed issues arising from the use of odd pricing, leading to the formation of the objectives of the study. These issues and the corresponding objectives are detailed in chapter two. Chapters three and four present details of both qualitative and quantitative research undertaken to address the objectives of the study. Chapter five provides a detailed discussion of the issues addressed and the findings of the study, and outlines the conclusions reached.

CHAPTER TWO: LITERATURE REVIEW

2.1 INTRODUCTION

2.1.1 Background

An odd price is also referred to in the literature as a magic price, charm price, psychological price, irrational price, intuitive price or rule-of-thumb price (Boyd & Massy, 1972; Dalrymple & Thompson, 1969; Gabor, 1977; Kreul, 1982; Monroe, 1990; Rogers, 1990; Sturdivant, 1970). There is no general agreement about the exact meaning of odd price endings (Georgoff, 1971). Their general characteristic is that they are just below the nearest round figure, such as \$1.99 instead of \$2.00, or \$1,995 instead of \$2,000. However, there does appear to be agreement that they are not based on strict mathematical calculations or long standing economic theory (Kreul, 1982).

Similarly, there is little agreement as to the true origin of odd pricing (Dalrymple & Thompson, 1969; Friedman, 1967), but evidence of its use can be traced back over 100 years (Schindler & Wiman, 1989).

One theory on the origin of odd pricing is that it arose after the one-price policy became the norm in the USA, shortly after the end of the Civil War. It was only after even or round prices became established that odd pricing, as it is now known, could emerge as a common retailing practice. Before that time, consumers and retailers used to haggle over prices (Georgoff, 1971).

The standardization of currency in America also had an effect. Imported English goods underwent a currency conversion of the English pound sterling into dollars, often giving English goods an odd price ending. As a result of the quality attributed to English goods, odd prices, in time, became associated with superior products. In the late 1800s, retailers would attach an odd price ending to domestic goods because of the high quality image associated with odd priced imported products. This image eventually reversed during the Great Depression, when odd priced products were considered inferior because of their promotional link (*ibid.*).

Since then, odd prices have fluctuated in popularity according to the state of the economy. When the economy is prosperous even pricing seems to grow in popularity. And in each recession since the Great Depression, odd price endings have flourished. This is borne out by going back and studying newspaper advertisements (Whalen, 1980).

A survey of the New York Times reveals that odd prices appeared occasionally in the 1850s and 1860s, although the practice did not become widespread until the turn of the century. The use of odd pricing then rose rapidly until 1910, during which time about 40 percent of advertised products were quoted in odd endings. The next decade saw a 25 percent drop in odd price quotations followed by another sharp rise in the next five years. It has been suggested that this last rise in odd price quotations was attributable, in part, to the Great Depression (Georgoff, 1971, p. 15).

Another commonly cited reason given for the introduction of odd pricing is that it arose as a measure to help combat theft by employees (Harper, 1966; Högl, 1988; Sturdivant, 1970; Twedt, 1965). This is widely believed to have begun earlier this century when R. H. Macy's New York department store introduced 99 cent sales. Odd prices were adopted to force salespeople to issue change and thereby make it less easy for them to pocket the customer's payment without recording a sale (Kreul, 1982; Rudolph, 1954). The idea was considered novel by consumers and consequently had a positive effect on sales. This convention then caught on among retailers around the world (Gilmour, 1985).

Some of the reasons given for the practice of odd pricing have lost much of their relevance (if indeed they were once valid), due to changes in retailing methods and technology. Nevertheless, whatever its true origin, retailers' use of the technique of odd pricing is now extremely common (Schindler & Wiman, 1989).

2.1.2 Prevalence Of Odd Pricing

A noticeable characteristic of odd pricing is the sheer prevalence of this practice in comparison to even pricing, and in particular, the dominance of prices ending in the digit 9.

It would seem reasonable to assume that enough randomness would result from any pricing model to ensure that each of the 10 digits in our number system would occur approximately equally in retail pricing. That is, about 10% of prices would end in each digit from 0 to 9. However, in reality the frequency with which each digit occurs in retailing pricing is far from equally distributed.

In 1948, an analysis of 3,025 retail store advertisements in newspapers in 37 USA cities revealed 64% of prices ended in odd digits (Rudolph, 1954). Another early general observation of retail food prices showed that prices ending in 9 were most popular, with prices ending in 5 being second in popularity (Printers' Ink, 1954; Twedt, 1965). In fact the 9s and 5s often accounted for 80% or more of the retail prices seen (Friedman, 1967).

A more recent extensive analysis of scanner data from a major supermarket chain by Wisniewski and Blattberg in 1983 revealed that over 80% of the store's prices ended in the digit 9 (cited in Schindler & Wiman, 1989). Högl (1988) reported a similar recent trend in Germany where most supermarket advertisements and in-store prices lie just below a Deutsche Mark amount (i.e., 99 Pfennigs, DM 4.99). This trend was also found in a recent observation made in Palmerston North in which around 87% of advertised prices used odd endings, with around 60% of those prices ending in the digit 9.

2.1.3 Price Lining

Closely associated with the practice of odd pricing is price lining, also referred to as price points, or regulation prices (Gabor, 1977). Price lining refers to the general practice some retailers adopt of using only a limited number of prices at which their goods are to be sold.

It is said that price sensitivity varies over a range, and in the case of certain goods, there are price points at which a sudden change in demand occurs (ibid.). Therefore, many prices tend to concentrate within certain areas of a price line, and thus many similar products are sold at prices which cluster at some points and avoid others.

As with odd pricing, it would seem that particular price lines, or points, are felt to be psychologically attractive for a relevant target market. Interestingly, most, though not all,

price points end in an odd price (ibid.).

2.1.4 Customary Pricing

A further association with the odd pricing practice is that of customary pricing. Harper (1966) describes customary prices as certain prices consumers expect to be charged for particular products and services. It could be argued that odd prices themselves have become viewed as customary and, therefore, expected.

Harper believes that where customary prices exist, it is difficult, if not impossible, for a retailer to ignore them. In fact, Harper goes as far as to say it is impossible for a firm to sell products that are priced above the customary price since the demand curve for products of this sort tends to be kinked at the customary price, so that any price other than the customary price is not the best price.

In a sense, the existence of customary, or traditional, prices simplifies the pricing task. In effect, prices are determined by custom, and it is up to the firm to produce or purchase products or services that may be sold profitably at those prices (p. 281).

If the view held by Harper is still adhered to today, it could lead to non-optimal, and inflexible pricing practices, rather than simplified ones as suggested. Furthermore, customary prices could become troublesome during inflationary periods because it then becomes increasingly difficult to keep costs low enough to offer the same product or service profitably at the customary price. It may then become necessary to reduce the quality or quantity offered in order to maintain a customary price during such periods.

There is no known evidence to support the belief in customary pricing. Dalrymple and Thompson (1969) stated that an accumulation of folklore and the precedents of history has made customary pricing so much a part of retailing that it seems unlikely that research or reason will lead to any changes in the near future. This seems to be a view some authors share in relation to all forms of "psychological pricing", including odd pricing.

2.2 THE RATIONALE FOR ODD PRICING

2.2.1 Explanations Of Odd Pricing

Various reasons are offered for the continued use of the odd pricing practice since its early origins. These reasons are largely based on speculation rather than any sound reasoning. For example, after an exhaustive inquiry into the arguments supporting the evolution of odd prices, one author has found that the practice has been attributed to two compelling beliefs. First, that "circles attract the eye" thereby drawing consumers to the digit 9, and secondly, "transient, foreign born, and scatter-brained people are attracted by odd prices" (Hollander, cited in Georgoff, 1971, p. 15). Reasons for these suggestions are not clear, and appear to lack any sound base. In particular the reference to circles, which if true, would imply that round figures would presumably be even more eye catching than those ending in 9.

Odd pricing is often used to imply that a product is a real bargain. The belief is that customers see an odd price as being much cheaper than it actually is in relation to the nearest round figure; hence the rationale associated with the development of this persistent pricing practice.

The explanation that Brenner and Brenner (1982) offer for this rationale is based on the existence of the biological constraint, namely, that people have only a limited amount of memory and a limited capacity for storing directly accessible information. Because consumers are exposed to a continuous flow of information on prices, Brenner and Brenner believe consumers store only the more valuable message, the first digits of a number. For instance, when a price is \$299, the digit 2 is more significant as information than the first 9, which in turn is more significant than the next 9. Thus the consumer will recall that the price is \$200, then maybe that it is \$290, but rarely that it is exactly \$299.

The reason offered for not instead rounding the three digits up to \$300 is based on memory processing time. Rounding upward involves an additional decision compared with storing the integer part of the number (or rounding downward). A further reason involves the visual means by which information on prices is transferred to consumers. The messages are usually brief and followed directly by additional information. Therefore, the information on the price must be stored in a very short interval, and the cheapest way to

do so, in memory and attention terms, is by storing the first digits.

However, it has been suggested that some customers see \$9.99 as the same as \$10.00. Cowden Manufacturing prices jeans at its factory-outlet stores at \$9.86 to deliberately avoid the "\$9.99" price category, because they believe that consumers perceive \$9.99 to be \$10.00. By pricing at \$9.86 Cowden Manufacturing believes that they avoid the "\$10.00 category" and their jeans are instead seen to be in the "less than \$10.00 category" (Hawkins, Best & Coney, 1986). Illusory effects of pricing and the accuracy of price recall will be discussed in the following sections.

Some retailers believe customers like to receive change, thus enhancing any pricing structure which ensures change is given (*ibid.*). However, Kohn (1955) suggests that such a psychological factor related to pricing may work both ways. Odd change could be regarded as much a nuisance as a saving. Furthermore, when consideration is given to the value of the change often given (five cents for example), this argument again loses its credibility, in light of today's purchasing power. Kreul (1982) states:

I suspect that people buy merchandise not because it is offered in odd-figure prices, but because their common sense tells them that it represents something they want, or a superior value, or both - whatever its price (p. 32).

Similarly, another reason given for the assumed success of odd prices is that it forces customers to wait for change and this, in turn, permits them to look around and, perhaps, make an impulse purchase (Harper, 1966). However, since consumers usually wait for a receipt anyway, even if paying with the correct amount, if further impulsive buying is likely to take place, change itself need not be involved. Modern methods of payment including electronic transfers, credit cards and cheques cast further doubt on the credibility of this suggestion.

A further argument cited in favour of odd pricing is that it suggests to consumers that goods are marked at the lowest possible price (*ibid.*). In this way the retailer conveys an image of honesty which would not be achieved by charging a slightly higher round figure. Many retailers believe that the more specific a statement is, the more inclined people are

to believe it (Schwartz, 1973). Thus, a new car priced at a very specific price of \$29,998.79 is more suggestive of an honest effort to charge no more than necessary than a price of \$30,000. However, this argument does not explain how the more commonly seen price of \$29,000 conveys an honest price whereas \$30,000 does not. Surely a price ending which is so commonly seen could not be viewed as more specific than even prices and therefore more honest.

In fact, another often cited argument is that rounded figures imply quality, as opposed to dishonesty (Boyd & Massy, 1972; Georgoff, 1971).

Generally, to suggest a bargain, odd pricing is used; a product is marked \$4.95 or \$4.99 rather than an even \$5.00. On the other hand, to suggest high quality, dollars only - no cents - may be used. Expensive clothing, jewellery, and perfumes are frequently priced at an even dollar amount (Schwartz, 1973, p. 509).

Interestingly, this pricing trend is observable in newspaper advertising of new cars in New Zealand, with many of the "prestigious" models advertised in rounded figures. The relationship between price and quality will be discussed in more detail in following sections.

2.2.2 Why Odd Pricing May Be Counter-Productive

Despite the widespread use of, and apparent belief in the benefits of, odd pricing, there is an emerging school of thought that the convention has been overworked, and has in fact become counter-productive (Gilmour, 1985).

Odd prices may repel some consumers as opposed to appealing to them (Harper, 1966). Some retailers now argue that consumers react more positively to more rational sounding prices such as \$4 instead of \$3.99. It has even been suggested that some consumers experience numeracy problems, leading to a price of, say, \$3.99, appearing to be greater than \$4. They are fooled by the use of a decimal point into thinking that three numerals indicates a higher price than the use of one number which is not followed by decimal places (Gilmour, 1985).

It is also thought that the initial impact of odd prices was due to their uniqueness (Whalen, 1980). However, because odd prices have been used so often and for so long, any effect associated with the practice may have begun to wear out. It is unlikely that consumers would find odd prices in any way novel or unique nowadays. People may also be less responsive to odd pricing now because they have been so conditioned to inflationary effects for so long that they just do not care about saving a few cents any more. The argument is that people instead focus on other variables such as quality, convenience, and durability (ibid.).

Furthermore, where odd prices have been arrived at by making small reductions in price, as from \$20.00 to \$19.95, it should be kept in mind that, if odd prices do not have the desired psychological effect on customers, the small reductions in price required to achieve an odd price can decrease a retailer's profitability, particularly if sales volume is usually large (Georgoff, 1971; Harper, 1966). Bearing in mind the lack of any empirical evidence to support the concept of odd pricing, there is a very real possibility that odd pricing needlessly reduces profitability.

2.2.3 Do Consumers Benefit From Odd Pricing?

There are two explanations of how odd prices are arrived at. One, as previously mentioned, is that odd prices are a reduction in price, and hence a cost to the retailer and a corresponding saving to the consumer. However, a pricing model that is constrained to impose prices that end in certain digits only, is not necessarily providing "cheaper" prices to consumers, despite this implied assumption. Another explanation is that odd prices may have been arrived at by an upward adjustment (Harper, 1966; Sturdivant, 1970). For example, pricing an item to ensure it ends in the digit 9, may exceed the retailer's expected gross margin, above cost price. In other words, an item which would normally retail at 97 cents, based on expected gross margin, but instead is artificially inflated to 99 cents, to appear cheaper, is in fact retailing 2 cents higher than it would normally under a non-psychologically based pricing structure. Dalrymple and Thompson (1969) cite the case of an executive who, in line with this rationale, reasoned that he could probably sell as many of one canned good product at 29 cents as he could at 27 cents, if the item was not out of line competitively.

This line of reasoning leads to a somewhat different logic connected to odd pricing. Beckman and Davidson (cited in Sturdivant, 1970) suggest that more articles can be sold at 17 than at 14 cents, because the former implies a reduction from 20 cents, while 14 cents implies only a reduction from 15 cents. This is another example of odd pricing strategy which contradicts the popular assumption that consumers benefit by saving on cheaper goods.

Another twist to the "standard" odd pricing technique using predominantly prices which end in 9 or 5, was also illustrated by Sturdivant (1970).

A price setter for a discount house once said that he marked items with prices ending in 3 and 7 rather than 5, 8, or 9 (e.g., \$14.93 or \$14.97, rather than \$14.95, \$14.98, or \$14.99), because he felt that customers think *retail* prices end in 5, 8, or 9, and that *discount* prices must end in 3 or 7 to be perceived as truly representing 'discount savings' (p. 528).

Although it could be argued that consumers would benefit from these even lower prices, the possibility still exists that prices may be raised to suit a particular odd price ending, rather than to 'truly represent a discount saving' as suggested. The notion that the consumer always benefits from odd pricing may be one of the biggest fallacies of the odd pricing issue.

Nevertheless, it would appear that the assumption usually stands that a retailer is discounting with each odd price transaction, and that consumers are aware of the corresponding saving made on each transaction. Hence, the continued popularity of the odd pricing practice.

2.2.4 Why The Odd Pricing Practice Continues

One reason why the practice of odd pricing is so firmly entrenched in retailing today may be that retailers are convinced that the possible risk of lost sales, resulting from raising odd prices to the marginally higher even prices, is far greater than when compared to the cost of lost revenue per item sale.

A point which must be made in relation to this argument is that, although forgone revenue does not appear impressive in relative terms, the situation changes dramatically when viewed in absolute dollars. For example, a department store which has a very high product volume turnover stands to lose a substantial total dollar amount on even a one cent price drop per item.

This then leads to the question of whether odd pricing continues because retailers believe it increases individual item sales, or whether the issue is a wider one which involves overall store, or even industry, image. Georgoff (1971) views pricing as a reflection of store image. He believes that a discount retailer such as K-Mart has no choice but to use odd pricing. Furthermore, he believes that a retailer who wishes to convey quality must use even pricing. He also suggests that a retail outlet which carries general lines can take advantage of a mixed approach between odd and even pricing. This rationale is related to the previously mentioned discount versus quality argument where odd prices are said to create an illusion of discount prices, whereas even prices convey a quality image.

If there is any merit in Georgoff's argument, its basis still rests on whether or not odd pricing really does affect both the sales of individual products, and possibly a retail store image in general. If so, retailers who use even prices for all products may create a perception of significantly higher prices, whereas competitors who use odd prices may conversely create the perception that their prices appear to be substantially lower overall (Schindler & Kibarian, 1987). If this effect is real, the long term effect may be lower sales for the even priced stores. On the other hand, retailers who wish to create a perception of quality, or non-discount store, could use this illusion to their advantage by employing even pricing. There is, however, insufficient evidence to support either contention as a basis for making pricing decisions.

Friedman (1967) concluded that because the "magic numbers" concept has existed for so many years, it is hard to believe that retailers could be wrong in their understanding of price psychology. But, it is just as likely that many retailers habitually put odd price endings on their products because they lack a formal store policy which outlines how various products should be priced (Whalen, 1980). In this sense odd pricing is simply a default policy rather than one based on sound understanding of either odd pricing effects

on item demand or overall store image.

Until such time as more experimental work is undertaken to investigate the effect of odd pricing on demand it is likely that many retailers will continue to rely on odd pricing either from a blinkered belief in the practice based on tradition, or a fear of harming their overall store image should they move away from odd pricing. The next section will discuss more fully the effect odd pricing is believed to have on demand.

2.3 EFFECTS OF ODD PRICING ON DEMAND

To date the arguments for and against odd pricing have been mainly based on successful contradictions to common practice, largely from situations lacking experimental controls, rather than on a compilation of empirical research findings. As long ago as 1965 Twedt unequivocally stated that experimentation should be undertaken. In 1966 Harper also pointed out the need for research on this topic stating that whether or not odd prices have the assumed psychological effect on consumers has never been adequately studied. Since that time few further advances have been made in experimental knowledge.

A recurring problem with the reporting of odd pricing discussion is that a clear distinction is not always made between fact and assumption. On some occasions, the mere predominance of odd pricing is enough to convince some authors that odd pricing must successfully increase demand. For example, because a survey of the New York Times revealed that odd price advertising was more predominant in the advertising of women's products, it was concluded that women must be more susceptible to odd pricing than men (Georgoff, 1971). There is not a shred of evidence to support this assumption.

A small number of experiments have been undertaken over the last thirty years to investigate what, if any, effect odd pricing has on demand. This experimental work has been divided between looking directly at sales, and looking at other related effects such as price recall, price perception and price illusion. Two other factors which may directly or indirectly impact upon any effect of odd pricing on demand are reference pricing and the relationship between price and quality. The following sections will discuss studies which

have investigated these variables.

2.3.1 The Implied Assumption About Odd Pricing

An assumption exists that consumers find odd prices, or "charm prices", more attractive than other similar, but slightly higher, prices (Gabor, 1977). While economic theory predicts increased demand in response to a lower price, the assumption exists that prices set at odd values produce higher than expected demand at the price level concerned. The explanation given for this effect is that by setting a price at, say, \$2.99 rather than \$3.00, an illusion is created, making the product seem much cheaper, and an enhanced buyer response will be triggered (Boyd & Massy, 1972). Somewhat surprisingly, however, retailers also know that consumers see little difference between \$2.98 and \$2.99 (Shapiro, 1968). Nevertheless, odd prices are thought to produce better first impressions than even prices. And, because first impressions are considered to be important determinants of purchase behaviour, many retailers firmly believe in this practice (Boyd & Massy, 1972).

Of course, many consumers may in fact see through this practice. Furthermore, there is no known research evidence to indicate that the odd pricing assumption is correct (Dodds & Monroe, 1985; Schindler & Wiman, 1989). In fact, the available research tends not to support the concept (Monroe, 1990). This phenomenon, if it exists, may be due to inherent consumer idiosyncrasies or by consumers learning to expect certain prices as normal for certain products. In either case, the assumed demand curve is definitely thought to be inconsistent with the traditional law of demand (Sturdivant, 1970).

2.3.2 Odd Pricing Effects On Product Demand

Increased Demand

Those who believe that odd pricing is effective are assuming that the demand curve for the product in question is jagged. That is, it kinks at odd price points rather than taking the traditional shape of a smooth demand curve which slopes downward to the right (Georgoff, 1971).

Such a curve reflects a situation in which sales are larger when price is expressed as an appropriate odd number than when it is expressed as an even number. Indeed, this notion assumes that customers actually buy less when price is lowered from the appropriate odd price to the next lower even numbered price, as from \$0.99 to \$0.98, or to some less satisfactory odd numbered price, as from \$0.99 to \$0.97 (Harper, 1966). The question then exists of whether those pricing strategies which depart from "the traditional law of demand" are still profitable (Sturdivant, 1970).

The earliest documented study into the effect of odd pricing on demand was conducted in the 1930s by a large USA mail order company. The company suspected that the effectiveness of its odd-cent pricing resulted from "habit and inertia" (Ginzberg, 1936).

To investigate this assumption, even pricing was used for a representative sample of items in several regional issues of one of the company's catalogues. The usual odd cent prices were used in its other catalogues. The company was able to account, with a reasonable degree of certainty, for any variables which may have influenced demand, other than price, by detailing sales activities in the preceding and present period by item classes and regions.

No conclusive results were found on the effect of odd pricing in this experiment. It was found that even pricing greatly increased the sales of some items, cut the sales of other products in half, and left the sales of some items unchanged. An executive of the firm estimated that the sales losses were about equal to the sales gains. A repeat experiment might have yielded sufficient additional data to have enabled more definite conclusions to be drawn. However, the firm's interest in further testing was diminished by a \$50,000 sales loss produced by a one cent increase in the price of one item.

The results of the study strongly suggest that the effects of various price endings can be substantial. However, a more detailed study is necessary to determine the extent to which the conditions of the 1936 study are applicable to the present.

In another USA example a department store chain successfully shifted from odd to even pricing (Dalrymple & Thompson, 1969). The store, which had traditionally used a 95 cent price ending on many items, observed no adverse sales effects after it changed to even

dollar pricing. The department store saw no reason to lose five cents on every sale when it could use even pricing and achieve the same volume. Nevertheless, although apparently satisfied with the new even pricing policy, the store continued to use odd pricing in budget departments and on sale merchandise (*ibid.*). The rationale for the continued use of odd pricing in some situations was not stated.

More recently, Wisniewski and Blattberg (1983; cited in Nagle, 1987) reported finding a positive effect of odd pricing on sales. When popular brands of margarine were discounted and advertised as weekly specials, a substantially greater sales effect occurred as a result of cutting the price to a number ending in 9. Brand One increased in unit sales by 194% when discounted from .83 cents to .63 cents. Unit sales increased by 406% when discounted further to .59 cents. Brand Two also showed a positive sales effect with a 65% increase in unit sales when discounted from .89 cents to .71 cents. When discounted further to .69 cents unit sales increased by 222% from the regular price.

Unfortunately, this study only reports on anecdotal evidence of a sales increase based on odd pricing. Without looking at the results in tandem with other variables such as promotional activity and competitors' activities, it is not possible to say what caused the increases in sales.

Schindler and Warren (1988) also found a positive effect of odd pricing on sales. They designed a study to test whether the amount of attention consumers use to process a price plays a role in determining the size of the odd pricing effect. The study involved subjects choosing food items from a simulated restaurant menu. The experiment provided evidence that pricing an item just below a round number can increase its likelihood of being chosen to a greater extent than would be expected on the basis of the few cents involved. Schindler & Warren believe the reason why this effect was not found in their other studies (discussed in following sections) may lie in the way in which this experiment differed from that of the previous studies. In this study, the subjects were asked to choose among alternatives, some of which were odd priced, some even priced, and some neither. In previous studies respondents were asked to rate products with either even or odd prices rather than choose among them. This factor is considered worthy of note for similar future research studies.

The effect of odd pricing on demand seems to vary across purchase situations from none to quite significant. Why this variation occurs is not known. Georgoff (1971) believes that if odd pricing does indeed have any positive effect on sales, this effect is lost on higher priced goods because the difference in saving is far less than on low-cost items. A difference between 95c and \$1 may appear far greater than the difference between \$479.95 and \$480 although the amount is identical. Consumers simply round the odd price up to the higher price, so, in fact, the odd price is perceived as simply an "advertising gimmick" to attract consumers' attention (Whalen, 1980).

Another possible explanation is that odd pricing is effective only for low involvement products which are purchased quickly, such as grocery items, and not for high involvement products for which consumers take more time to contemplate the decision (Nagle, 1987). This implies that consumers spend less time calculating the exact price but instead make a quick mental calculation which distorts the true price, thus calculating the product to be cheaper than it really is.

On the other hand, by reversing this argument, it could just as easily be postulated that low involvement purchase decisions require less thought about the price per se, therefore, even priced products would be just as readily purchased. Conversely, high involvement decisions which require greater thought and accuracy would be more suited to odd pricing. In other words, the odd pricing argument can be turned to suit any pricing situation and level of purchasing involvement. Either way the argument relies on the existence of an illusory effect in which consumers' perception of the true price is altered.

Illusory Effects And Price Perception

Two opposing views exist with regard to the issue of odd or even pricing and consumers' price perception (Georgoff, 1971). One view maintains that no price illusion is created, the implicit assumption being that customers are rational buyers and are not deceived by the use of odd prices. The other opinion is that consumers tend to perceptually round odd prices downward toward the next lowest even price, instead of making a slight upward adjustment to the nearest even amount (Harper, 1966). This is based on the rationale that consumers regard the first figure, or the far left digit, as more significant than the other digits (Kreul, 1982). Following this line of reasoning, an item priced at \$5.98, for example,

is viewed as costing \$5.00 or only slightly more than \$5.00 rather than \$6.00. Supposedly, there is no similar downward distortion of even prices (Lambert, 1975).

The literature lacks conclusive evidence to show whether or not odd prices are perceived to be lower in dollar and cents terms than even prices. Research into odd-even pricing by Georgoff (1971) suggests that the price illusion issue is a complex phenomenon, affected by many variables in subtle and inconsistent ways. Therefore, the issue of the effectiveness or otherwise of odd pricing is far from resolved. Georgoff states:

On the one hand, widespread adoption and persistent use of odd prices suggests that price illusion is, or was, an effective buying influence. Alternatively, growing adoption of even prices by department and specialty stores suggests that the impact of illusion may be so weak that some retailers may forego the advantages of any price illusion with no substantial consequences in either volume or customer reaction (p. 8-9).

Georgoff (1971) carried out a two-phase study in which subjects were divided into two groups to test for both price illusions among one group of subjects and for sales effects among another. Overall, the results found that, while price illusion may exist for certain products within selected demographic segments, any net effect on sales is relatively weak or is clouded by situational and intervening variables.

To measure for price illusions, subjects used a ten point scale, ranging from 1 to 10, with parallel verbal descriptions from "Poor" to "Excellent", to estimate separately the value of each of eleven products. The products were assigned even prices for some subjects and odd prices for others. According to Georgoff's conception, value is a ratio of a product's perceived quality divided by its perceived price. Assuming perceived quality and price are independent, perceived values would differ for odd and even price endings if price illusions exist.

The results indicated that in the aggregate no evidence of price illusion was apparent. Some differences did appear, however, when the data were subdivided and analysed by products and demographic variables. Whilst acknowledging that demographic variables are

seldom the direct determinant of behaviour, he noted that consumers who were more highly educated, whose household heads have white-collar jobs, who possess higher incomes, and whose households have female heads employed full time, were more susceptible to price illusion. It seemed that these consumers shared the similar characteristic of greater buying power. This being the case, Georgoff concluded that the price variable is relatively less significant for such consumers, and any purchase deliberation would be more involved with other features of the item. A precondition to the existence of illusion is an absence of deliberation. Being less concerned with price may have produced the increased incidence of illusion among these subjects.

A weakness with this study lies in the possible measurement imprecision which could occur when respondents mentally convert perceived prices which are expressed in dollar and cent amounts into ratio values. These calculated ratio values then had to be fitted onto a ten-point scale. A second confounding element was potential interaction between the price and quality components of the ratio. As previously mentioned, research evidence has been reported suggesting that price has a positive influence on perception of product quality in a variety of circumstances. This factor will be returned to later.

Phase two was an actual sales test in six stores of a leading department store group, over a four week period, with two treatments of odd and even pricing for each of eleven selected products. The findings were inconclusive in that any measured effect was relatively weak.

Lambert (1975) also tested the illusory effect that odd prices may be perceived to be lower than the slightly higher rounded price figure. Respondents were required to make quick monetary calculations on four sets of products, in an imaginary television game show. Items were split between odd and even prices, the idea being that if odd and even prices were perceived as nearly identical then the quickly calculated sums would be rounded up, and would therefore also be identical. The results suggested lower price illusions were associated with odd prices under some but not all circumstances.

Price Sensitivity And Price Awareness

Closely associated with the issue of odd pricing is that of price sensitivity. If consumers

are not sensitive to small changes in price, it is fair to assume that odd pricing is unlikely to have a noticeable effect. Furthermore, for sensitivity to exist, consumers must have an awareness of prices (Gabor & Granger, 1969). Price sensitivity relates to the consumer's reaction to a change in a price, whereas awareness relates to the consumer's ability to recall, more or less correctly, the price of a product. Marketing variables such as the absence or intensity of advertising, promotion or display can affect price sensitivity (McGoldrick & Marks, 1987).

The assumption of early economic theory that consumers are aware of item prices has been largely discredited (McGoldrick and Marks, 1987; Stoetzel, 1969). In recent years, there has been growing evidence of consumers' decreasing price awareness (Gijbrecchts, 1993; Monroe, 1973). Studies have shown that shoppers do not always look at prices. A sample of 406 shoppers revealed that over 40% claimed they did not look at the price of their specified product on their last purchase occasion, and only 25% claimed they actually compared prices between purchase occasions (Riley-Smith, 1984, cited in Blamires, 1993). Taken at face value, this would mean that two in five shoppers would not have noticed any price change made, and three in four would not have made the effort to actually compare prices. Although many of the shoppers' self-assessments may have been at variance with their true behaviour, there will certainly be many who did not notice a given price change when next purchasing after the price change (ibid.).

Price Recall

Price awareness can be measured by recall, that is, by the percentage of shoppers who remember the price paid for a product. Without accurate recall, a small change in price is unlikely to be noticed (Gabor & Granger, 1964).

An early finding about consumers' recall of product prices was made by Gabor and Granger (1961). During 1958 they interviewed 428 women. Across seven grocery products, 53% correctly stated prices, 30% gave prices which differed from in-store prices, and 17% were unsure. A difference was detected between products. For example, 79% could correctly recall tea prices, but only 35% could recall breakfast cereal prices. Behavioural reasons may explain these differences, depending on brand variety used in each household. Although this study did not look at odd pricing specifically, it can be

concluded from the findings that the degree of accuracy of price recall was unlikely to have been correct to the extent of a few cents differential involved in odd pricing.

A later study by Gabor in 1984, even after allowing for a relaxation in the definition of "correct" price recall, by allowing a margin of uncertainty, found that fewer consumers were able to correctly recall prices. Issues such as inflation, greater inter-store price rivalry, new brand launches and a greater number of pack sizes may have contributed to this finding (cited in McGoldrick & Marks, 1987).

Another similar study, carried out immediately after shoppers had selected an item from the shelf so that bias due to forgetting was minimized, also found that consumers' ability to accurately recall prices (within 5% of the exact price) was very low (McGoldrick and Marks, 1987). Although awareness levels varied considerably across ten product fields, overall, awareness was greater for lower priced items. Only 29% of price recalls were exactly correct, though 55% were within 5% of the actual price. However, these results are related to low involvement purchasing. Attention to prices may be higher for higher priced goods, durables and services (Zeithaml, 1988). Consumers may also process or recall information differently for products varying in involvement or interest to them.

Schindler (1984) conducted an experiment to test whether consumers' tendencies to notice a price increase in odd prices differed from their tendency to notice a price increase in even prices. Respondents were shown pictures of products which were given either odd or even prices. Two days later, the respondents were shown the same pictures with half of the even prices increased and the other half unchanged, and with half of the odd prices increased and the other half unchanged. The respondents were asked to indicate for each product whether or not the price had changed from the price they had seen two days earlier. A weakness of this study was that the respondents were basing their responses on pictures and products and not making actual purchases.

Results of the study indicated that consumers are less likely to notice an increase in an odd price than in an even price, and are more likely to forget an odd price than the corresponding even price, over a two-day period. This poorer ability to recall odd prices may contribute to the lower tendency to recognize that odd prices have increased.

While it was found that overall recall accuracy was lower for odd priced endings, it was also found that respondents tended to judge that odd ending prices were the ones which had not been raised. This suggests that, when relying on memory, the respondents' responses were guided by an image of odd prices as being more likely to be low prices, and thus less likely to have been recently increased.

However, the fact that consumers have more difficulty remembering odd prices than even prices also implies that the odd prices are not as noticeable. And if they are not as noticeable, it is less likely that they have an additional positive influence on demand. This factor also brings into question the related price point theory which indicates that consumers notice an increase above each odd ending price point.

In a further price recall study by Schindler and Wiman (1989), subjects were presented with a set of prices and were asked to recall those prices two days later. Again, they found that odd ending prices were less likely than even ending prices to be recalled accurately. Additionally, they found that an odd ending price increases the likelihood that it will be underestimated when it is recalled. This finding supports the assumption that odd prices are recalled to be lower than they are in reality. However, two later modified replications of this study (Schindler & Kibarian, 1993), testing more immediate recall (one in a field setting) failed to show any substantial difference between 9-ending prices and non-9-ending prices in level of recalled price.

Although Schindler & Wiman's (1989) finding offers some support for odd pricing, overall, studies on price recall indicate that consumers do not always know or remember product prices, placing obvious doubt on the likelihood that consumers would notice a small price difference.

2.3.3 Odd Pricing Effects In The Marketplace

Price Perception

It has been suggested that consumers' attitudes to odd prices are largely governed by the price structure prevailing in the particular market (Gabor & Granger, 1964). That is, if in

fact consumers do expect "magic-number" prices, it seems quite reasonable to assume the reason is because retailers have taught them to expect such prices. If prices are frequently set with the "good" odd price, and the "bad" higher price then a certain proportion of consumers will be induced to look upon the odd price as the "real" price, and the even price as "incorrect", simply because no known brand happens to be available at that price (Gabor & Granger, 1969). This, in fact, describes odd pricing as a circular process, with stores conditioning the consumer to expect certain prices, and consumers responding over time so that the stores then continue that mode of pricing.

Gabor and Granger (1964) looked at consumers' responses to various prices. The data on which their conclusions are based were obtained by calling out selected prices to subjects who were asked to respond by saying either "Buy", or "No, too expensive", or "No, too cheap". The first product tested showed a definite preference for the price immediately below the next highest round figure. Surprisingly, this price was also preferred to the next lowest price point. A second product showed no support for the odd pricing practice. Interestingly, leading brands of the first product were regularly odd priced, whereas, the second product was not usually priced in this way. These results support the idea that consumer preference for odd pricing may actually be a result of conditioning by retailers.

The effect of price and brand information on perceptions of quality and value, and on willingness to buy, was investigated by Dodds and Monroe (1985). The research also investigated whether perceptions differed when prices were odd or even. The test involved three price levels and two brand treatments. Their overall conclusion was that odd and even prices are not perceived by subjects differently. While their results were not totally conclusive, the evidence seemed to support no difference in perceived quality, perceived value, and willingness to buy between odd and even prices.

Price As A Quality Indicator

Nearly fifty years ago Scitovszky introduced the notion that consumers may use price as an indicator of product quality (Bowbrick, 1980; Monroe & Dodds, 1988; Nyström, 1970). Examples have been cited of instances where an increase in price led to a corresponding increase in sales, in cases where it was difficult for consumers to judge the quality of the products (Gabor & Granger, 1966; Shapiro, 1968). This leads to the suggestion that when

consumers cannot judge quality themselves, they instead rely on other cues - for example, price (McConnell, 1968; Nyström, 1970; Riesz, 1978; Tull, Boring & Gonsior, 1969). This notion is supported by economic theorists who state that rational behaviour with regard to price assumes perfect or near perfect information. In many situations, however, information is far from perfect. Consequently, price becomes a cue to value (Axelrod, 1988).

This price versus quality argument adds a further complication to the psychological pricing argument. That is, higher prices may connote high product quality and lower prices the contrary. To the extent that this is true, sales of a given product might be greater at a higher even price than at a lower odd price, a fact which, if present, has clear implications for profitable odd pricing strategies in some markets (Sturdivant, 1970).

Based on this suggestion, the question is whether odd prices may repel some consumers who associate the lower price with lower quality. For this reason some retailers who link odd pricing with lower quality goods and even pricing with higher quality items attempt to differentiate themselves from discount stores by pricing their merchandise with even numbers only (Monroe, 1990; Nagle, 1987). Here the first impression is hoped to be of a higher price signalling higher quality. Because of the fact that odd pricing has become so common, those retailers who wish to use even pricing also have the advantage in that it does stand out in consumers' minds (Boyd & Massy, 1972).

A number of studies have reported that the relationship between price and quality is inconsistent across products (Bowbrick, 1980; French, Williams & Chance, 1972; Gerstner, 1985; Lichtenstein, & Burton, 1989; Monroe & Dodds, 1988; Peterson, 1970; Stoetzel, 1969; Venkataraman, 1981). Therefore, it cannot be conclusively stated that lower prices do convey a low image quality, thus impacting on odd prices. However, it is interesting to note that the very image of low prices which proponents of odd pricing wish to convey, may in fact not produce the desired effect.

Reference Pricing

A further issue associated with odd pricing in the wider sense is that of reference pricing. The concept of reference pricing is a form of psychological pricing in which consumers

perceive prices to be fair or appropriate for a product (Biswas, Wilson & Licata, 1993). The effect reference pricing has on consumer perceptions and retail competition is the subject of much interest (Biswas & Blair, 1991; Urbany, Bearden & Weilbaker, 1988).

Internal reference prices are those stored in the consumer's memory. Both historical and current market prices help to influence and reinforce these reference prices (Nagle, 1987). The notion that consumers compare observed prices with some internal standard is supported by a growing body of literature (Gijsbrechts, 1993). External reference prices are those provided to consumers through channels such as advertising, catalogue listings, and consumer price guides (Biswas & Blair, 1991).

Because odd prices have been so predominant in the marketplace for such a long period, consumers may have learned to associate odd prices with certain product categories or retail outlets. Consumers may, therefore, resist if retailers try to alter those prices. For example, when consumers compare an advertised price to a price presumably charged by other retailers in the same trade area they may expect to see a certain price ending. In effect the predominance of odd pricing in the retail industry may have created a self-fulfilling prophecy in that odd prices have developed into expected prices.

Nwokoye's study (1975) alludes to this scenario. He conducted a study of consumer responses to shoe price changes using the concepts of "price tolerance and discount limit". His research found that when brand image is suppressed or weak and consumers instead respond to price as a stimulus, the end digit affects the size of price increase that shoppers will accept. For example, shoppers are likely to accept greater price increases for prices ending with the digit 0 than for prices ending with the digit 5. This suggests that for product classes where prices are relatively unstable, pricing a product at \$19.95 or \$19.99, for example, might lead to greater resistance to a future price increase than if the initial price had been \$20.00. This in turn suggests greater flexibility in pricing can be gained from even pricing than from rigid odd pricing techniques.

2.4 SUMMARY

A possible reason why researchers have had difficulty demonstrating an effect of odd pricing is that there may be several separate effects of odd pricing on the consumer, some positive and some negative (Schindler, 1991). In some situations more than one of these separate effects may be active and these effects may cancel each other out. For example, a tendency to perceive an odd ending price as a low price might be cancelled out by an association of odd ending prices with lower quality items or stores. This would suggest that odd pricing research should be approached by testing specifically for each of these separate effects and then developing hypotheses about when each effect is likely to have an important effect on a sales response (Schindler & Wiman, 1989). However, first it is important to establish that odd pricing does have an effect on demand.

The message to look more closely at the practice of odd pricing has been repeated for many years. Kohn (1955) believed that odd pricing was automatically accepted without doubt but questioned whether acceptance alone makes the practice right, desirable or profitable. If historical reasons for using this type of pricing practice produced desirable results, it may have been because it seemed unique. Now that everyone is doing it, does it actually increase sales?

Similarly, three decades ago Twedt (1965) stated:

Wouldn't it be interesting if a practice that may have started as a safeguard against petty theft persists today as a major imperfection in the price-making process?

Experimentation is clearly called for to determine whether the popularity of odd numbers, and the '9 fixation' in particular, really represent 'magic numbers' that promote sales. Or are they only 'sticky prices' that hinder scientific pricing decisions and optimum profits (p. 55).

There are numerous examples of odd prices being used. Yet there is little research which supports the notion that these prices will generate more sales volume than the round figures they are near. Overall, the results have largely been inconclusive. There is also no

research to distinguish between products which have traditionally been priced at odd price values, and many other general goods and services which have not, such as sports events, theatre tickets, and club memberships, which are traditionally evenly priced.

The pervasiveness of this technique implies that odd prices may affect consumer purchasing behaviour in one or more ways that are beneficial to retailers. Study of these effects could have both immediate and long-range benefits. In the short term, if any positive effects of odd pricing do exist, a clearer description would give retailers guidance concerning the situations when odd pricing is most likely to be effective. Studying these effects may also assist related study into how consumers process price information, and how these processes result in "price points" and other irregularities of the demand curves as believed to exist in retailing situations.

In summary, there is widespread use of and belief in odd pricing, and no shortage of anecdotal evidence to support it. Surprisingly, however, there is little empirical evidence of its effectiveness. As Holloway (1973) stated, "It is interesting that a strategy so widely used and accepted by merchants and academicians has so little proof behind it" (cited in Schindler and Wiman, 1989, p. 107).

The objectives of this study are presented in the next section. A detailed description of the research process undertaken to address these objectives will then follow.

2.5 OBJECTIVES

Overall Objective

The main objective of this study was to determine the effect of odd pricing on demand in the New Zealand retail sector. That is, to determine whether odd pricing increases or decreases demand and, if so, under what circumstances.

Specific Objectives

1. To investigate the generally expressed rationale for "odd pricing" among New Zealand retailers.
2. To establish whether retailers and consumers share the same perceptions of odd pricing.
3. To test whether odd and even prices at or around the same price level produce different purchase behaviour (or purchase probabilities).
4. To test whether odd and even prices at or around differing price levels produce different purchase behaviour (or purchase probabilities).

The research process undertaken to address these objectives, the findings and a corresponding discussion of the findings are outlined in the following chapters. Objectives one and two are addressed in chapter three. Objectives three and four are addressed in chapter four. A discussion leading to the conclusions formulated from this study is contained in chapter five.

CHAPTER THREE: MARKETPLACE RESEARCH

3.1 OVERVIEW

Research, consisting of four separate yet inter-related parts, was undertaken simultaneously to investigate odd pricing in the marketplace. Part one of the marketplace research involved contacting a range of New Zealand retailers. The purpose was to investigate the underlying rationale for retailers' reliance on odd pricing techniques. As previously stated, discussions in academic literature suggest that retailers' reliance on odd pricing is not based on scientifically proven pricing formulae (Kreul, 1982). Nevertheless, it was considered important to question retailers directly about their reliance on this technique, and in the process seek evidence of empirical odd pricing studies already undertaken in the marketplace but not published in academic literature, or to gain access to published material not already considered in the literature previously discussed.

During the course of retailer interviews an opportunity arose to include the findings of a marketplace test of odd pricing's effect on demand. A mail order retail company agreed to conduct a test to compare sales of identical products using a split sample of odd and even prices.

Part three involved an analysis of all home-drop advertising material collected for a period of eight months. The purpose of this analysis was to make a detailed study of retail advertising patterns used by New Zealand retailers, with particular emphasis on odd prices.

In part four of the marketplace research, consumers were questioned about their opinions on odd pricing, and what effect, if any, they believed odd pricing has on their purchase behaviour. A convenience sample of consumers was obtained which provided an insight into consumers' perceptions of odd pricing. Furthermore, this part of the research served as a comparison to the behavioral investigation made of consumers in the experimental section of the study. Discussion of the findings of the four parts of the marketplace research is presented in the following sections.

3.2 RETAILER INTERVIEWS

Introduction

In 1967 Friedman concluded that because odd pricing has existed for so long it is hard to believe that retailers could be wrong in their understanding of price psychology. In light of this statement, and bearing in mind the prevalence of odd pricing in New Zealand, it was fair to assume that study on this topic should include discussion with the retailers themselves. These discussions examined the rationale associated with the use of odd pricing and also sought evidence of the findings of empirical odd pricing experiments which had been undertaken by retailers. In particular, the question was addressed of whether retailers simply use odd pricing for no apparent reason, or whether its use is based on sound reasoning. For reasons of confidentiality, the findings of this study are reported in summary form only.

Sample

The sample of retail outlets was selected to include the sale of a wide range of products at a wide range of price levels, based on an analysis of retail advertising material. Prices ranged from products sold for less than one dollar to products retailing at thousands of dollars. The sample included retail stores that made frequent use of odd pricing, and retail stores that featured mixed pricing strategies consisting of odd prices, even prices and "unusual" prices, meaning prices which did not appear to be set in accordance with a strict pricing structure. The sample was further divided between retail outlets which operated a large number of stores nationwide, retail outlets which operated in one or more large centres, and retail stores owned and operated locally in Palmerston North.

Product lines offered for sale by the selection of retail outlets sampled included:

clothing, footwear, bedding, electronics, fast food, grocery products, building and general purpose hardware, mail order and general merchandise.

A representative of each company was then selected for interview. Each respondent was personally involved in the implementation of pricing policy. This requirement was considered necessary in order to interview only company representatives who made the

decisions on whether or not odd pricing was to be used by their stores, as opposed to staff members who merely implemented these policies without necessarily understanding the rationale for doing so.

The total sample size of retail outlets involved in this part of the study was 25. The response rate was 83% calculated using the following formula:

$$\text{Response Rate} = \frac{\text{Completed Interviews}}{\text{Attempted Interviews - Pricing Decisions Made Overseas}} \times 100$$

Not included in the above response rate are two additional interviews which took place with company representatives from each of two companies. In each case, after the initial interview was completed, the suggestion was made to contact another company representative who could offer further comment on the company's pricing structure. Therefore, in total, 27 successful interviews were completed. For summary details of the retail outlets involved in the study, and the company representatives interviewed, refer to Appendix A.1.

Method

First, telephone contact was made with each retail company to establish the identity of the person responsible for implementing pricing policy. For internationally operated companies it was also necessary to establish whether control of pricing decisions was held by the New Zealand operators. A foot-in-the-door introductory letter was then sent to the company representative which briefly explained the purpose of the study and requested a telephone interview (see Appendix A.2). Two weeks later telephone contact was made with each company to arrange a suitable time to conduct a telephone interview with the selected company representative.

A loosely structured questionnaire was presented to each respondent, allowing flexibility for the range of retail products which each respondent was responsible for pricing. The line of questioning addressed the following structure:

1. Whether the use of odd pricing was deliberate or coincidental to standard pricing formulae used.
2. For what particular reasons was odd pricing used (i.e., proven sales success, literature evidence, customer expectation).
3. Whether round figures were also used and, if so, how often.
4. Whether odd prices were mainly used in conjunction with advertised prices, as opposed to all prices.
5. Whether odd prices were used in association with particular product lines, product value, and so on.
6. Whether a particular odd price ending was preferred and, if so, which one and why.

Main Finding

Overall, viewpoints between retailers differed considerably in why they believed odd pricing to be effective, but nevertheless, they all believed in the necessity for retaining this pricing technique.

What clearly transpired from the discussions was that some retailers firmly believed that consumers see odd prices as being considerably cheaper than corresponding even prices. These retailers accepted this belief without question. This unquestioning belief, or habit, was particularly noticeable with retailers connected with the smaller independently operated stores.

In contrast, some retailers did not believe that consumers are fooled by odd pricing perceptions, but instead viewed odd pricing as a technique that consumers have been conditioned to expect. Therefore, it is believed that consumers would resist a move away from this technique.

In summary, the two main, yet opposing, viewpoints put forward by retailers were:

1. Consumers are not stupid or duped by odd pricing but have instead been conditioned to expect certain prices.
2. A price such as \$5.95 is seen by consumers as closer to \$5, not nearly \$6,

therefore, odd priced products are perceived by consumers to be much cheaper than they actually are.

Summary Of Findings

It was made clear during the discussions, particularly in connection with the larger retail chains, that all prices, including odd prices, were firmly linked to overall store price image. In this sense odd pricing was used more as a way of promoting overall store image in the long term, than of promoting individual product sales in the short term. Or more to the point, a move away from odd pricing may in turn lead to a perception among consumers that a store's overall pricing structure is higher, which in turn may lead to negative long term consequences. For this reason, odd pricing, to some degree, seems to be adhered to through a fear of breaking with retailing tradition, especially if competitors maintain their odd pricing policies.

A small number of retailers did, nevertheless, use even pricing, at least occasionally, and two retailers were beginning to question the predominant use of odd pricing. For many retail outlets, the use of odd pricing was prominent for advertised prices, but some even pricing was used for general retail prices. Moreover, even pricing was sometimes used to make a statement of "cheapness" in association with heavily discounted products. In such circumstances, the even price was believed to represent a statement conveying greater savings.

What was somewhat surprising was the general lack of empirical testing carried out to support the use of odd pricing, especially by the retailers who firmly believed in the immediate benefits of greater product sales as a direct result of odd pricing. It seemed that for many retailers odd pricing is unquestionably accepted, leaving no room for doubt or subsequent testing.

Two specific attempts to empirically test the effect of odd pricing on demand were acknowledged. In each case a traditionally odd priced product was raised to a slightly higher corresponding even price, and sales figures analysed in relation to this change. In both cases sales were said to have dropped as a result of these price changes. Unfortunately, more specific details of the experiments were not available to assess the

degree to which external factors may have influenced these findings. These include other price activity, new product releases and competitors' activities during the experimental period.

One retailer had considered the effect pricing below the "standard odd prices" of 95 or 99 cent endings may have. His philosophy was that odd prices are now so accepted by consumers that to make a statement of better value it is necessary to price below standard odd prices, and instead use "odd pricing" meaning prices which do not have 95 and 99 cent endings, such as 91 cents or 87 cents.

Price points, or levels, were referred to by several retailers as important elements in pricing. These price points all ended in odd prices. It was firmly believed that these points are critical in retail sales and any attempt by retailers to exceed these points, or "barriers" would result in considerable sales losses.

The underlying logic of price points is that consumers will pay up to a certain price point for a particular product, but will not exceed that price point. For example, a price point is said to occur at the \$20 level. Consumers are said to refuse to pay in excess of \$20.00 for products in that price range. Therefore retailers price up to \$19.95 or \$19.99 for products in this range, but will not exceed the barrier by pricing the extra few cents at \$20.00. Retailers who support the price point theory believe that prices can be raised between price points up to the highest point, as long as they do not exceed this price point. For example, a product that will sell at \$17.95 would just as easily sell at \$19.95 (an increase of \$2.00) but could not be raised the extra 5 cents from \$19.95 to \$20.00.

Price points were said to vary as the price level gets higher. For example, the distance between price points is said to be more critical up to \$50. After that, the space between price points can widen and it is just as easy to charge \$89 as \$69 for some products. Over \$100 the gap widens further.

One retailer said that if he opened a store tomorrow, he would price one of two ways. Either he would offer prices exactly as calculated using a standard pricing formula which gives the message to consumers that they will only be charged what is necessary. Or he

would set price points and charge as follows:

\$9.95 \$12.95 \$14.95 \$17.95 \$19.95 \$24.95 \$29.95 \$34.95 \$39.95 .. \$99.95

Over \$99.95 price points would be as follows:

\$149.95 \$179.95 \$199.95 \$249.95 \$279.95 ... \$999,

and over \$999.95 as follows:

\$1,099 \$1,199 \$1,299 \$1,399 ...

Cents would be dropped somewhere around \$299.

He believes that if consumers will pay \$13.95 they will also pay \$14.95 and if they will pay \$27.95 they will also pay \$29.95, and so on. However, he admits there is no strict research to establish these points and does not know why these points should be more effective than others. In conclusion he stated there is no magic formula for odd pricing and no particular reasons for how it works. He believes that retailers with no obvious pricing policy seem unsophisticated but acknowledges that his policy is not strictly sophisticated either.

Refer to Appendix A.3 for a more detailed overview of the retailers' comments.

3.3 MAIL ORDER EXPERIMENT

During the retailer interview stage of the research an opportunity arose to further extend the experimental content of the overall study. Arrangements were made with a mail order company to split a mail order catalogue into two versions. One version featured even dollar prices for each product and in the other version identical products displayed slightly cheaper odd prices with 95 cent price endings. In total 42 products were tested.

Two thousand catalogues were mailed out to customers. Half the sample received the even priced ones and the other half received catalogues displaying odd prices. No detectable

differences occurred in response rates between the two samples. The response rate by mail from each sample was small, yet evenly matched at 9.8% for the even priced sample, and 10.3% for the odd priced sample. Further orders were received by telephone, but are not included in this response rate as the telephone orders were difficult to track and identify to each source.

Overall, the results showed no detectable differences in sales between the odd and even priced products. Dollar values between the two offers were almost identical.

3.4 ADVERTISED PRICES

Introduction

In addition to discussing pricing strategies directly with retailers, all home mail-drop advertising material was collected and analysed, for a period of eight months. This study, an extension of the one week analysis of the prevalence of odd pricing discussed in chapter one, provided an additional insight into odd pricing techniques used by New Zealand retailers.

Findings

An interesting array of pricing strategies was observed during this study. Patterns emerged which some retail companies clearly adopted for advertising purposes, for example, the prolific use of dollar prices ending in 9, used in conjunction with a 95 cent ending. For such companies, it was clear that price point strategies were in place which concentrated on specific dollar price breaks, used in conjunction with odd price endings.

Some even dollar pricing was observed, although the use of odd pricing clearly outnumbered the use of even pricing during the eight month observation. This finding was consistent with the one week analysis of the prevalence of odd pricing previously discussed. The use of even pricing was sporadic and appeared dispersed amongst the predominantly odd priced 99 or 95 cent endings. There were also "unusual" pricing examples displayed in that no obvious pricing convention was being followed. These prices contrasted with the more usual odd price endings. Examples include price endings

such as 90 cents, 50 cents, or 45 cents. For an example of this "mixed" or less rigid price ending structure refer to Appendix B.1.

Even dollar savings were promoted by some retailers to clearly convey a savings message. For example, very boldly stated advertising messages which informed consumers that a product has been reduced by, say, \$100, were commonly seen. It would appear that this technique is used to ensure that consumers clearly understand the savings message. Perhaps it is believed that if consumers were offered a saving of \$99.99, they may round this amount down to \$90 and not think the saving is quite so large. Refer to Appendix B.2 for an example of this pricing technique.

Some of the more common pricing patterns observed were:

- For prices less than \$100, a 9 dollar ending featured in conjunction with a 95 cent ending (for example, \$59.95 or \$79.95).
- For prices over \$100, a 99 dollar ending featured (for example, \$599 or \$799). The use of cents often ceased as prices rose into hundreds of dollars but no clear pattern was obvious as to the exact dollar amount where the use of cents ceased. If cents endings were used at this level, a 95 cent ending was most common (for example, \$399.95).
- For prices over \$1,000, a 98 dollar ending was common, (for example, \$1098 or \$5098). For prices over \$1,000, cents were rarely displayed.

It was common for advertised grocery products to display 99 cent price endings, but 95 cent endings, or other digits divisible by five, were more commonly used for advertised durables. The Four Square grocery chain was an exception to this rule, instead using a wide array of advertised prices rather than their competitors' more frequent use of the digit 9 for advertised prices.

One feature of advertised prices which is so common it is almost standard practice is the differentiation between the size of font used to display the dollar digit(s) and the corresponding cents digits. Almost without exception the font size for the dollar amount

is proportionately larger than the cent amount. This differentiation in size ranges from the cents being half the print size of the dollar amount, down to one fifth. The belief appears to be that consumers take far more notice of, or are more greatly influenced by, the dollar figure of a price than the cents amount. This advertising strategy supposedly serves to help reinforce the illusion of cheaper prices. Refer to Appendix B.3 for an example of an extreme difference where the cents amount displayed is very small.

3.5 CONSUMERS' VIEWS ON ODD PRICING

Introduction

Interviews were conducted with a convenience sample of 50 consumers which focused on their thoughts and opinions regarding odd pricing. Questions were informally structured, but designed to address consumers' awareness of retailers' use of odd pricing, and their own reactions to odd pricing. Specifically, the study addressed the issue of whether consumers view odd prices as absolute prices and, if not, whether they mentally calculate odd prices up or down. Furthermore, consumers were asked whether they believe odd prices are cheaper, or fairer prices, than slightly higher even prices.

Findings

The main finding of the consumer discussions was that consumers hold a negative view of odd pricing. In fact, the consumers interviewed expressed no support at all in favour of the practice. This finding was somewhat surprising considering that odd pricing is presented as an expression of lower prices and greater savings for the consumer's benefit.

In general, consumers' opinions indicated that odd pricing was seen as attempted trickery by the retailers to fool consumers into believing that they were getting a good price deal. Many consumers considered the practice laughable as they simply mentally adjusted prices up to the nearest round dollar amount. Some consumers were indignant that their intelligence was brought into question in regards to their ability to see through this perceived deceit. Others were scornful because they did not see the small saving usually involved as being worthwhile, but instead viewed it as very insignificant. Interestingly, one part-time sales assistant in a Palmerston North retail outlet stated that customers often

"tossed a coin back and told him to keep the change". This attitude indicated that the small coin offered as change was not worthy of acceptance.

An interesting aspect of pricing which emerged during this stage of the research was consumers' apparent reluctance to use odd pricing techniques themselves when selling personal items. Observation of classified newspaper advertisements uncovered no evidence of the use of odd pricing by consumers to sell secondhand goods. Consumers questioned in this sample had neither used odd pricing personally to sell second-hand goods, nor expected to pay odd values for second-hand goods. There is an obvious difference in perception in advertised retail prices and the sale of second-hand personal goods.

However, because what people say and what they do are not necessarily related, the second stage of the research, namely the experimental research, concentrated on investigating actual behaviour as opposed to expressed attitudes and beliefs. Despite consumers' apparent indifference to the savings indicated by odd pricing, it was necessary to investigate how accurately consumers' beliefs matched their expected purchase behaviour. The experimental studies undertaken to investigate this issue are described in the next chapter.

CHAPTER FOUR: EXPERIMENTAL RESEARCH

4.1 OVERVIEW

The experimental research for this study was divided into two stages. The purpose of each stage was to investigate whether demand for odd prices was greater than expected, in line with economic theory of the downward sloping demand curve. Therefore, this research directly questioned the assumption that prices set at odd values produce higher than expected demand at the price level concerned.

The first stage involved testing a small range of products for differences in estimated demand at both odd and even prices. This research stage, whilst providing a useful independent insight into odd pricing, also acted as a pilot study for the main experimental study to follow.

The second stage of the experimental research involved estimating purchase demand for a range of products at differing odd and even prices (for example, \$5.00, \$4.99, \$4.95) and price levels (for example, \$20.00, \$50.00, \$100.00). A demand curve was then produced for each product to investigate whether an odd pricing effect occurred at odd price points, demonstrated by a noticeable shift in demand at these points, as described in the following section.

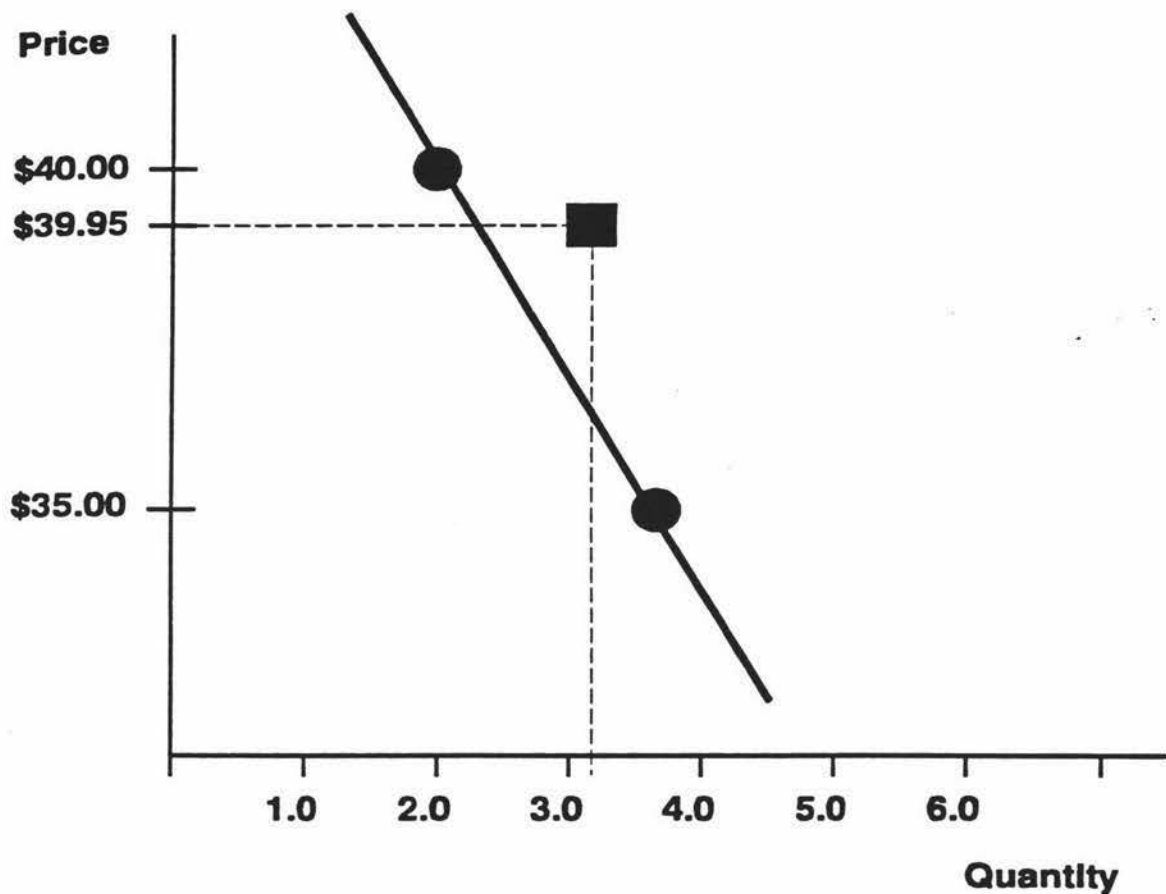
4.2 EXPECTED DEMAND AT ODD PRICE POINTS

A demand curve may be viewed as a schedule of price elasticities of demand. Price elasticity of demand is a *ceteris paribus* measure of the responsiveness to price changes of the quantity demanded and sold. According to the traditional "law of demand", and for most goods, price elasticity of demand is negative, because as the price is lowered, the quantity demanded will usually increase, and the contrary is true for price increases (Sturdivant, 1970).

The assumed demand for odd price points is definitely thought to be inconsistent with the

traditional law of demand. By obtaining purchase probabilities for a product at differing price points, a demand curve can be estimated to establish whether greater than expected demand occurred for odd prices. This effect is illustrated in Figure 1. At the odd price of \$39.95 a kink in the demand curve occurs where this point lies to the right of the traditional demand curve, suggesting greater than expected demand at this point.

Figure 1. "Kinked" Demand Curve



Testing the implied assumption (that odd prices lead to greater than expected demand at those price points) with actual sales data was not possible. There are many extraneous factors, including competitive prices and consumer motives for patronizing the store, that may affect sales during in-store experiments with odd and even prices (Lambert, 1975). Due to an inability to control for such factors, a surrogate for purchasing behaviour - purchase intentions measured by purchase probabilities - was used to estimate demand.

The process used was similar to the "Gabor-Granger technique" of pricing research, which

involves showing respondents a product then checking purchase intention at a number of prices. This technique provides the familiar downward sloping demand curve, thus enabling a measure of price sensitivity at each point tested (Gabor and Granger, 1964). Unlike the Gabor-Granger technique, however, instead of asking respondents to respond with a verbal purchase intention, they were instead asked to state their purchase probability based on the Juster scale. The Juster Scale, which is described in the next section, has been shown to be a better predictor of consumer purchases than verbal buying intentions (Day, Gan, Gendall & Esslemont, 1991).

4.3 RESEARCH INSTRUMENTS

Juster Scale

The Juster Scale is a purchase probability scale used to predict the actual purchase rate in a population from a sample of consumers from that population (Juster, 1966). Since its development by Juster it has been used in a number of experimental studies to predict consumer purchase rates of a range of items including durables, services, and fast moving consumer goods (Hamilton-Gibbs, Esslemont and McGuinness, 1992). The Juster scale, illustrated in Figure 2, enables respondents to base their probability of purchase on a scale of eleven points between 0, (representing no chance or almost no chance), to 10, (representing certainty or almost certainty of purchase at the price shown).

Figure 2. The Juster Purchase Probability Scale

+ 10	Certain, Practically Certain (99 in 100)
+ 9	Almost Sure (9 in 10)
+ 8	Very Probable (8 in 10)
+ 7	Probable (7 in 10)
+ 6	Good Possibility (6 in 10)
+ 5	Fairly Good Possibility (5 in 10)
+ 4	Fair Possibility (4 in 10)
+ 3	Some Possibility (3 in 10)
+ 2	Slight Possibility (2 in 10)
+ 1	Very Slight Possibility (1 in 10)
+ 0	No Chance, Almost No Chance (1 in 100)

Showcards

In both stages of the experimental research, respondents were asked to state their purchase probabilities after viewing A5 size showcards which featured a product and corresponding price. For each showcard, consumers were asked to base purchase probabilities on the brand, size and price, exactly as it appeared on the showcard presented. This was to ensure that the answers given were not based on purchase probabilities given in relation to showcards previously viewed which featured the same product.

The prices displayed on the showcards appeared with a size differentiation between the dollar digit(s) and the cents digits, as regularly occurs with advertised retail prices (previously discussed in section 3.4). The cents digits were approximately one third the size of the dollar digit(s), and were raised so that the dollar and cents digits were visually in line at the highest point as shown in Figure 3.

Figure 3. Digit Size Differentiation



\$19.99

No known research has addressed the effect that the proportionally smaller cents size differentiation may have on demand, or how this advertising strategy may contribute to the overall effect, if any, of odd pricing on demand. Like odd pricing studies undertaken by Lambert (1975) and Schindler and Wiman (1989), which used larger numerals for the dollar portion of the price than for the cents portion, this research design also adhered to the common practice of size differentiation. It was assumed that it is important to first look for any evidence of an effect of odd pricing on demand. If this effect was found, further research could be undertaken to examine issues that may assist or promote the effect, such as differentiating the size of digits displayed.

4.4 OMNIBUS SURVEY

Sample

The data for this stage of the research were obtained from the 1994 Palmerston North Omnibus survey. This annual survey, based on clusters of four interviews (two with males, two with females, 15 years of age or older), covers households within the Palmerston North city boundary. Randomly selected starting addresses were chosen in such a way that the number of addresses in each of the 16 Census Area Units in Palmerston North was proportional to the number of occupied dwellings in that area unit. Substitutions were made for households where an interview was refused or for households where no contact could be made with the respondent after three attempts. This survey, on which the data are based, involved 250 completed interviews and had a response rate of 44%.

Procedure

Showcards featuring six products displaying either an odd or an even price were presented to all respondents, who were then asked to give their probability of buying each product. Two versions of the Omnibus questionnaire were used, with half the respondents viewing each version. This process produced two separate subsamples of data. The following table illustrates the products used, the prices tested, the subsample and the corresponding mean purchase probability given for each test price.

Table 3. Purchase Probabilities For Odd And Even Prices

Product	Subsample	Price Point Tested	Mean Purchase Probabilities
White Sugar	1	\$1.59	5.03
	2	\$1.60	4.85
Frozen Peas	1	\$2.00	4.44
	2	\$1.95	5.04
Frozen Chicken	1	\$5.99	3.86
	2	\$5.99	3.98
Video Tape	1	\$5.95	2.82
	2	\$6.00	2.18
Chocolates	1	\$8.00	3.29
	2	\$8.00	3.65
Kettle	1	\$35.00	2.41
	2	\$34.95	3.02

For one product the prices displayed were even in both subsamples (Chocolates, \$8.00), and for one product the prices displayed were odd in both subsamples (Frozen Chicken, \$5.99). This element was introduced to the experimental design in order to compare differences that can occur in purchase probabilities between subsamples simply due to sampling variation.¹

The remaining four products were presented with even prices in one subsample and odd prices in the other. In total each respondent viewed three even priced products and three odd priced products.

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1. The data were weighted so that age-sex distributions of both samples were the same. However, this process had minimal effect on the estimated purchase probabilities so the results reported are based on unweighted data.

Findings

Estimated demand, measured by purchase probabilities, for each of the four products tested at both odd and even price points (Peas, Sugar, Video Tape, Kettle), increased in response to the lower, or odd price. This is consistent with economic theory of the downward sloping demand curve. The mean purchase probabilities for each odd price value were greater than for the corresponding even prices by the following amounts:

Sugar	0.18
Peas	0.60
Kettle	0.61
Video Tape	0.64

The following differences in mean purchase probabilities also occurred between the two identically priced products:

Frozen Chicken	0.12
Chocolates	0.36

The mean purchase probabilities of the Peas, Kettle and Video Tape, which were higher for odd prices than for corresponding even prices, are greater than the differences which occurred between mean purchase probabilities of both identically priced products.

The fourth product tested at odd and even prices was Sugar. The test price for Sugar only involved a one cent difference between the odd and even price values, compared to a five cent difference between the test prices of the other three products tested at both odd and even prices. Therefore, in line with the traditional downward sloping demand curve, greater mean purchase probability differences were expected to occur between odd and even test prices for the Peas, Kettle and Video Tape.

However, while this did occur, the difference of 0.18 was less than that between the mean purchase probabilities for Chocolates, which were identically priced for each sample. This suggests that, although a higher purchase probability occurred for the odd Sugar price, than

for the slightly higher even price, the higher purchase probability for the odd price may have occurred by chance.

Thus, while results for the Peas, Kettle and Video Tape all provide fairly clear evidence of stronger demand at odd prices, the result for Sugar is less conclusive.

Conclusion

It is not possible to conclude from this study whether the higher estimated demand at odd prices for the Peas, Kettle and Video Tape is greater than expected based on the traditional law of demand. However, for these three products, the trend towards higher purchase probabilities at odd prices does offer some support for the assumption that odd prices lead to greater than expected demand.

4.5 ODD PRICING EXPERIMENT

4.5.1 Method

Introduction

The purpose of this experiment was to test the assumption that demand for products is noticeably greater at odd price points, than at slightly dearer even price points. According to the traditional law of demand, quantity demanded will usually increase when a price is lowered. Therefore, an odd price of, say, \$9.99 is expected to produce greater demand than a slightly higher even price of \$10.00. To reiterate, the odd pricing assumption is that odd prices result in greater than expected demand at these points, resulting in a "kink" in the traditional downward sloping demand curve, as depicted in Figure 1, section 4.2.

The experiment involved testing a range of products at varying price levels, and at various price points, using purchase probabilities to estimate demand at each price point. Demand curves were then created for each product based on the mean purchase probabilities calculated from the total sample of consumers.

A demand curve was created for each product based on five price points; two "anchor

prices" and three "test prices". The highest price point tested and the lowest price point tested for each product are referred to in this study as "anchor prices". These prices represent the top and bottom points of the demand curve for each product. Each price point tested, which lies between the two anchor points, is referred to as a "test" price point. More details on the creation of the demand curves will follow in the procedure section.

The demand curves for each product were then analysed to ascertain whether the odd "test" prices resulted in noticeably greater demand at these points, producing a kink in the demand curve.

Sample

The total sample size for this study consisted of 300 respondents who were either mostly, or jointly responsible for household shopping. The sample was further divided into three subsamples of 100; these will be described in more detail in the procedure section. The sample was a convenience sample selected during a mall intercept in Palmerston North, carried out in late September, 1994. The response rate was 49%, calculated using the following formula:

$$\text{Response Rate} = \frac{\text{Completed Interviews}}{\text{Attempted Interviews - Not Household Shopper}} \times 100$$

A breakdown of the response rate is provided in Appendix C.

Product Selection

Two criteria were used to select the products tested. One was the product's appeal to consumers and the other was its usual retail price. Products which were considered to have reasonably broad appeal were selected for this study to reduce the likelihood of getting consistent zero purchase probabilities.

Particular products were also selected because their usual retail prices coincided with four "critical" price levels which were identified during the retailer discussions. To reiterate,

retailers identified a range of price levels that they believe are sensitive to small price changes, which if exceeded, would result in lost sales. Therefore, the assumption is that odd prices, which mark the "barriers" or highest possible price point that should be charged at each price level, produce greater sales than the slightly higher even price points. If this assumption is correct, price tests based on these "odd price barriers" would result in noticeably greater demand for odd price points at the price levels nominated by retailers.

Based on the retailer discussions price points at four differing price levels were tested:

- Under \$10.00
- \$20.00
- \$50.00
- \$100.00

Pilot Study

An initial pilot study was undertaken to test the degree of consumer interest in the products selected, and to ascertain the number of showcards that could be consecutively presented to consumers without fatigue introducing bias to the results. It is known that studies in which respondents are presented with a question which asks, effectively, for likelihood of purchase at a given price can create major biases resulting from repetition of the questions (Blamires, 1993). Such bias could occur if respondents became too familiar with the interviewing procedure, leading to anticipation of the questions asked. It was also important to ascertain the approximate time needed for respondents to view the showcards. This was to ensure that the products presented later in the interview were not treated differently by respondents deliberately seeking to hasten the interview procedure due to excessive demands on their time.

Eight products were tested during the pilot study. These were:

Cheese	Frozen Chicken
Chocolates	Towel
Hair Dryer	Kettle
Electric Blanket	Blender

The pilot study indicated that six products was the optimum number to test. This involved the presentation of 18 show cards, three per product to each respondent (explained in more detail in the procedure section). The presentation of a higher number of showcards led to signs of restlessness and boredom from the consumers approached during the pilot study. Respondents required 30 seconds on average to view each showcard. This process quickened by the third rotation. The pilot study indicated that approximately seven minutes was required for each respondent to view, and give purchase probabilities for all the showcards. In addition to the six products tested, one further product (Frozen Peas) was presented to respondents initially as a test item to familiarise them with the Juster scale.

Two products, the Towel and the Electric Blanket produced very low purchase probabilities and were eliminated from the final experimental test leaving the remaining six products to make up the test products suitable for the main experimental stage. The Towel, priced at the \$20.00 price level, although based on actual retail prices, was considered too expensive by respondents in the pilot study. Many cheaper towels are widely available and the brand tested had only limited appeal. The Electric Blanket also attracted very low interest, which may have been due to seasonal effects. The study was undertaken in early spring, a time when low demand for electric blankets was not surprising. The Hair Dryer replaced the Towel at the \$20.00 level and the Blender replaced the Electric Blanket at the \$100.00 level. Therefore, the final selection of six products for testing was:

Cheese	Frozen Chicken
Chocolates	Hair Dryer
Kettle	Blender

The time frame for the likelihood of purchase for Cheese and Frozen Chicken was within the next four weeks. For the remaining four products respondents were asked for the probability of purchase next time that particular product was bought. Further details of interview instructions are provided in Appendix D.

The presentation order of showcards was also tested during the pilot study and will be discussed in the next section.

Procedure

Each respondent was shown a series of showcards featuring a range of products, at varying prices, and asked to give their purchase probability for each showcard, using the Juster scale. In total, 18 showcards were viewed by each respondent, six products at three different price points. (A sample showcard for each product is provided in Appendix E.)

Each respondent was shown three different versions of each showcard. One showcard included a price slightly above an even price point (for example, \$10.10), and one a price slightly below the same price point (for example, \$9.90). These two prices were presented to all 300 respondents; and served the purpose of creating top and bottom anchor points of the demand curve for the product concerned. The third showcard included either the appropriate even test price (for example, \$10.00) or one of two odd test prices (for example, \$9.99 or \$9.95). Each of these three "test" prices was presented to a subsample of 100 respondents. Respondents received only **one** price (odd or even) between the two anchor points, so as not to create fatigue, as discussed in the previous section.

For two products at the \$20 or dearer level, instead of testing the .99 cent odd price ending, which is less commonly used for higher prices, the slightly higher .05 cent price ending was tested (for example, \$20.05). Although a .05 cent ending is not really defined as "odd", testing this point provided an evenly spaced point on the demand curve to more accurately test a 5 cent variation around an even price (for example, \$20.00). Therefore any effect leading to a shift in the demand curve at the .95c level (for example, \$19.95) would be more noticeable.

The products and corresponding price points tested are presented in Table 4.

Table 4. Products and Prices Tested

Product	Bottom Anchor Price	"Test" Prices			Top Anchor Price
Cheese	\$4.90	\$4.95	\$4.99	\$5.00	\$5.10
Frozen Chicken	\$5.90	\$5.95	\$5.99	\$6.00	\$6.10
Chocolates	\$9.90	\$9.95	\$9.99	\$10.00	\$10.10
Hair Dryer	\$19.90	\$19.95	\$20.00	\$20.05	\$20.10
Kettle	\$49.90	\$49.95	\$50.00	\$50.05	\$50.10
Blender	\$90	\$95	\$99	\$100	\$110

During the pilot study, tests were made to establish the optimal order in which to present the showcards. Two methods of showcard presentation were tested. One variation involved presenting the showcards from the highest "anchor" price to the lowest "anchor" price. That was, for example, presenting prices for Cheese in the following order: \$5.10 followed by \$4.90, followed by a "test" price, say \$4.99. Respondents did not react well to this price order presentation and appeared confused by it. As a result of the pilot test anchor prices were finally presented in reverse, or ascending price order from lowest to highest, which met less resistance from consumers. For example, prices for Cheese were presented in the following order: \$4.90 followed by \$5.10 followed by a "test" price, say \$4.99.

The reason for presenting the two "anchor" prices first, followed by a "test" price, rather than presenting all prices based on ascending price value was to ensure that the purchase probabilities obtained for the anchor points for each demand curve were not influenced by the value of test price presented between them.

The distance between points on the demand curves, expressed in dollar values, for each of the five price points tested to obtain demand curves varied. For example, the distance in value of price points for Cheese between the bottom anchor point \$4.90 and the test price,

\$4.95 is closer (five cents) than between \$4.90 and \$4.99 (nine cents). This factor may have influenced the Juster probabilities given depending on the showcard order. Therefore, it was important when presenting showcards to ensure that the data obtained for creating the top and bottom anchor points for each product were consistent, and not affected by variations in the distance of price points on the demand curve.

A further pilot test was undertaken to establish whether to present the showcards in order of product consistency, or price consistency. Specifically, two variations on the showcard presentation were tested. One involved presenting the showcards in product groupings, whereby respondents viewed three showcards of the same product in consecutive order at three differing price levels (for example, Cheese, \$4.90, \$5.10, \$4.99), followed by the next three showcards featuring the next product (for example, Chocolates \$9.90, \$10.10, \$10.00), for all six products.

The second variation to this method involved presenting the showcards based on price grouping, whereby respondents viewed all six products consecutively at the lowest anchor price (for example, Chicken \$5.90 followed by Cheese \$4.90, and so on). All products were then rotated again in the same product order but featuring the highest anchor price (for example, Chicken \$6.10 followed by Cheese \$5.10, and so on). Finally, all six products were rotated a third time in consecutive order featuring a test price (for example, Chicken \$5.95 followed by Cheese \$4.99 and so on). This method of rotation proved most successful during the pilot study and was adopted as the method used in the main experiment.

The previously mentioned method of showcard presentation based on product groupings led to respondents quickly anticipating the price order of each product to be viewed. This in turn led to Juster probabilities given based on the insight that the second price to be presented would be higher than the first, followed by a third price, higher than the first price viewed but lower than the second. Although to some extent this problem was still present when presenting in the order of price consistency, the effect on respondents was less obvious as they had already viewed six products before the rotation factor became apparent. Although respondents were aware that they had seen the products previously they could not recall what their last purchase probability given for each product was, therefore

each Juster probability obtained was given independently of the previous price viewed.

Further details of the procedure used to rotate the showcards in such a way to reduce any effect the presentation order may have had on the purchase probabilities given are described in the next section.

Rotation of Test Prices

The test prices were assigned to respondents in such a way that equal numbers of respondents were presented with each test price. Each respondent viewed a mixed range of even and odd test prices. To avoid order bias, all test prices were rotated throughout the three showcard presentation versions.

The presentation of showcards to respondents was structured to ensure that all 300 respondents viewed the top and bottom anchor prices for each product, and a total of six test prices, one for each product, some even and some odd. Each test price was viewed by a subsample of 100 respondents. Table 5 demonstrates how the showcards were rotated to overcome the effects of order bias. That is, the effects that may have occurred if respondents had seen only even test prices or only 99 cent ending test prices, and so on.

Table 5. Rotation Process Of Test Prices

Product	1	2	3	4	5	6
Low Anchor Price *	*	*	*	*	*	*
Sample 1	T1	T3	T2	T1	T3	T2
Sample 2	T2	T1	T3	T2	T1	T3
Sample 3	T3	T2	T1	T3	T2	T1
High Anchor Price *	*	*	*	*	*	*

Note: * High and low anchor prices presented to all consumers

T1 = Test Price 1

T2 = Test Price 2

T3 = Test Price 3

As described in the previous section, the show cards were presented in such a way that all respondents viewed the low anchor price first followed by the high anchor price, followed by one test price. The codes T1, T2 and T3 in the body of Table 5 refer to the test price point that was presented, and Table 6 presents the test price points for each product examined. For example, for Product 1 (Chicken), Test Price 1 (\$6.00) was presented in Sample 1, Test Price 2 (\$5.99) was presented in Sample 2, and Test Price 3 (\$5.95) was presented in Sample 3. For Product 2 (Cheese), Test Price 1 (\$5.00) was presented in Sample 2, Test Price 2 (\$4.99) was presented in Sample 3, and Test Price 3 (\$4.95) was presented in Sample 1, and so on. The presentation order varied for each of the six products.

Table 6. Test Price Points

Product	Test Price 1 (T1)	Test Price 2 (T2)	Test Price 3 (T3)
1 - Chicken	\$6.00	\$5.99	\$5.95
2 - Cheese	\$5.00	\$4.99	\$4.95
3 - Chocolates	\$10.00	\$9.99	\$9.95
4 - Hair Dryer	\$20.05	\$20.00	\$19.95
5 - Kettle	\$50.05	\$50.00	\$49.95
6 - Blender	\$100	\$99	\$95

This process produced 300 purchase probabilities for each top and bottom "anchor" price and 100 purchase probabilities for each even and odd "test" price, for each of the six products. Because the prices used for the Hair Dryer and the Kettle varied to include the .05 cent ending this method of rotation did feature more even prices in Sample 3. For further clarification of the price order rotation procedure refer to the sample coding sheets presented in Appendix F. Findings from the analysis of data obtained from this experimental method are presented in the next section.

4.5.2 Results

Introduction

Demand curves were constructed for each of the six products.² The expected outcome in each case was that the estimated demand curve would be concave to the origin, curving as the name suggests, rather than a straight line between the two anchor points. If no pricing effect was detected, the odd price points would lie on the estimated demand curve. If, on the other hand, odd price points produced the assumed effect, namely greater than expected demand at these points, the odd price points would lie well to the right of the estimated demand curve, resulting in a "kinked" demand curve. The estimated demand curves are shown in Figures 4 to 9.

Each estimated curve depicts two anchor points based on aggregated purchase probabilities from the total sample. Between the anchor points lie an even price point and either two odd price points, or one odd price point and one .05 cent ending price point. These three points are based on aggregated data from each of three subsamples. (Each subsample relates to the corresponding coding sheets presented in Appendix F.)

For each product tested, the demand curve was formed by joining the probabilities for the top and bottom anchor points through the even prices tested. For two products, the Hair Dryer and the Kettle (Figures 7 and 8) where the .05 cent ending price appeared to lie on the demand curve, the line to illustrate the demand curve was formed through these points as well. Similarly, for one product, the Blender (Figure 9), the demand curve was formed through the \$95 odd price point as this point also appeared to lie on the demand curve.

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2. These demand curves represent the "best estimate" points of the true demand curve for each product. Any variation in shape or slope between these estimated demand curves and the true demand curves they represent is not critical to this study. The only assumption required is that the same relationship exists between the true demand curves and odd price points, and the estimated demand curves and estimated odd price points.

Data Analysis

Several techniques to analyse the data were investigated. First, consideration was given to possible age-sex differences among the three samples. The data were weighted so that the age-sex distributions of the three samples were the same. However, this process had only minimal effect on the estimated purchase probabilities. Therefore, the results reported are based on unweighted data.

The next stage of the analysis involved forming individual demand curves for each subsample, for each product. Similar purchase probability estimates were expected for the anchor point prices of the three demand curves for each product, since these prices were tested on all three samples of respondents. This finding would give weight to the assumption that any differences in purchase probabilities for the odd "test" prices were not due to sampling differences.

The analysis revealed that the anchor point purchase probabilities for each of the products for the three subsamples were not identical. Rather there was evidence of systematic bias in the anchor point purchase probabilities of the different subsamples. For subsample one, five of the six products tested produced consistently lower overall purchase probabilities, resulting in a shift to the left of the subsample demand curve. A similar, yet contrasting systematic bias occurred for subsample two. Four of the six products tested produced higher overall purchase probabilities, resulting in a noticeable shift to the right of the subsample demand curve. Subsample three produced purchase probabilities which were an approximate average of the three subsamples. The individual subsample demand curves for each product are presented in Figures G-1 to G-6 in Appendix G.

To eliminate this systematic bias it was first necessary to estimate its magnitude. This involved making a direct estimation of the systematic bias at the top and bottom anchor points of each subsample. The size of bias for any price point between the two anchor points could then be estimated by interpolating between the two anchor points.

First, a best estimate was made of the top and bottom anchor price purchase probabilities. This process involved calculating the average purchase probability of the top and bottom anchor points for the three subsamples. These "average" points then represented best

estimates of the true top and bottom anchor points of the demand curve for each product.³

The purchase probabilities for each price point between the anchor points ("test" prices) of each subsample demand curve were then recalculated in line with the shift left or right (positive or negative) of the subsample anchor points. These calculations involved adding the amount of the shift to the original test price purchase probability. This process linearly transformed the estimated purchase probability for each test price point. To calculate the shift, the distance of the shift of the anchor points for each subsample was multiplied by the slope of the demand curve.

The underlying rationale of the linear transformation of data was that the size of the shift for each "test" price point (either an odd price ending, an even price ending, or a .05 cent ending) was proportional to the slope of the line between that point and the anchor points and the distance of the shift. An example of how this transformation was undertaken is described in Appendix H.

The demand curves presented in Figures 4 to 9 are based on this linear transformation procedure.

3. Whilst systematic error can be eliminated, any random variation which occurred will remain. The best estimate points are assumed to lie within an acceptable allowance for random error.

Figure 4. Demand Curve - Cheese

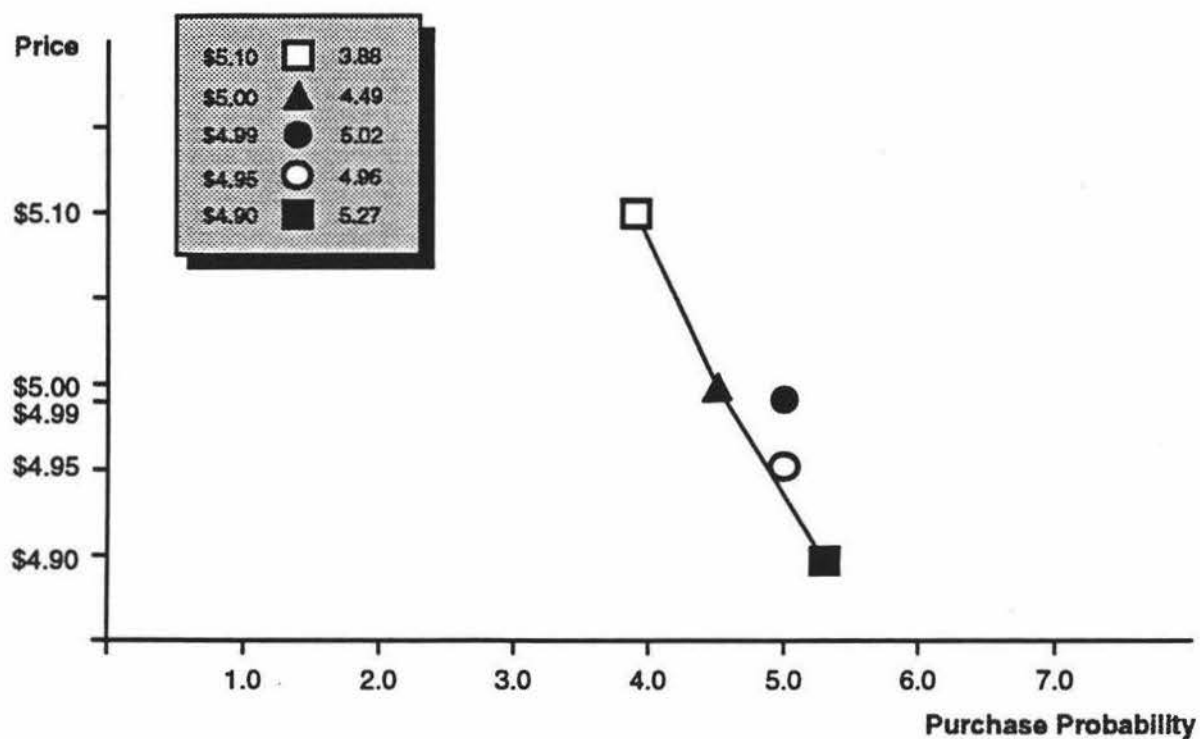


Figure 5. Demand Curve - Frozen Chicken

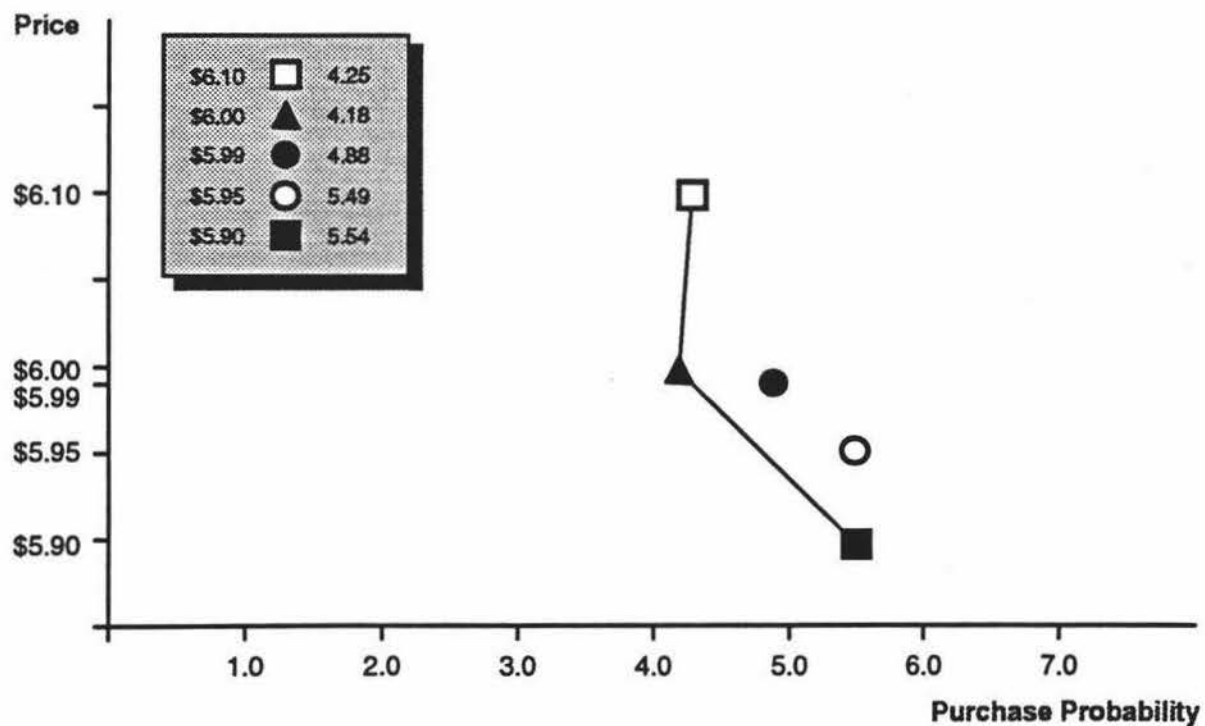


Figure 6. Demand Curve - Chocolates

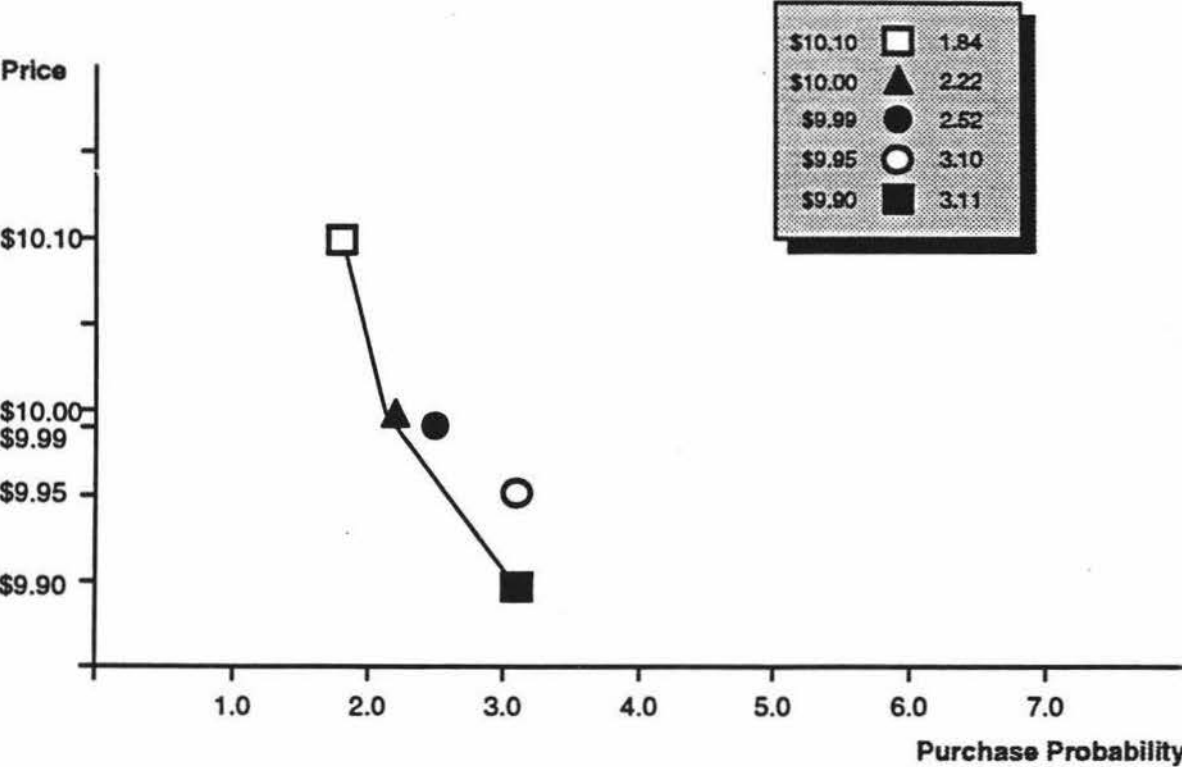


Figure 7. Demand Curve - Hair Dryer

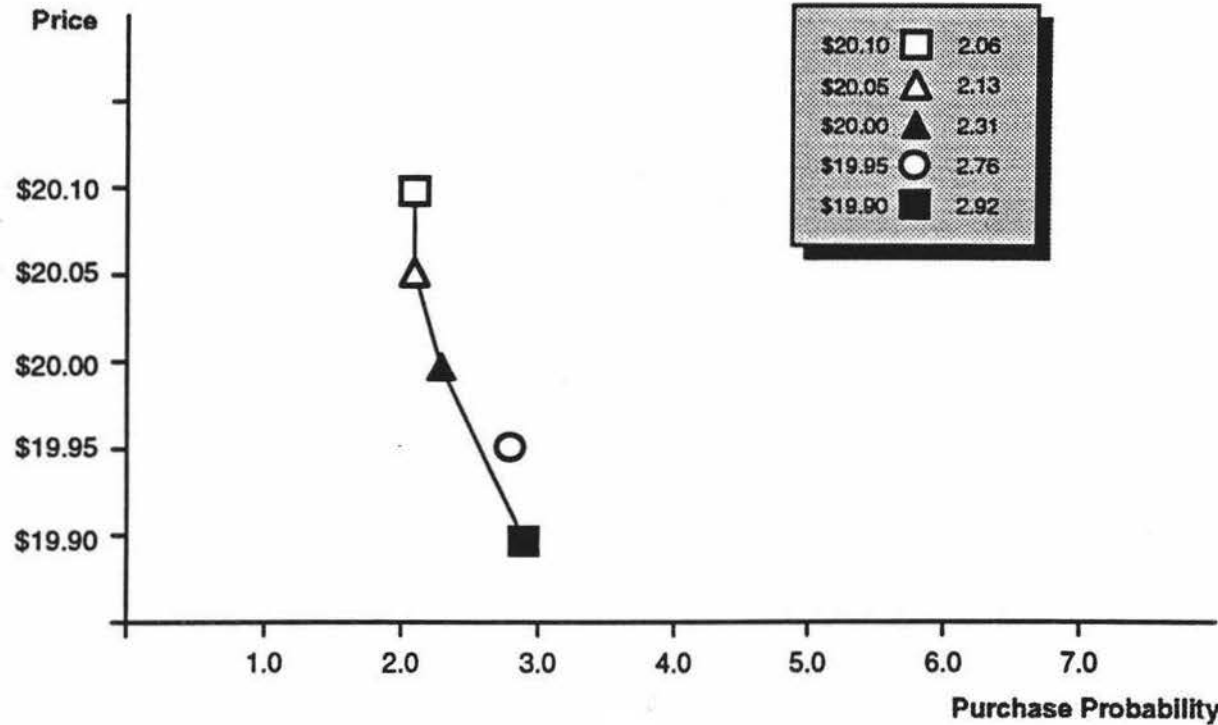


Figure 8. Demand Curve - Kettle

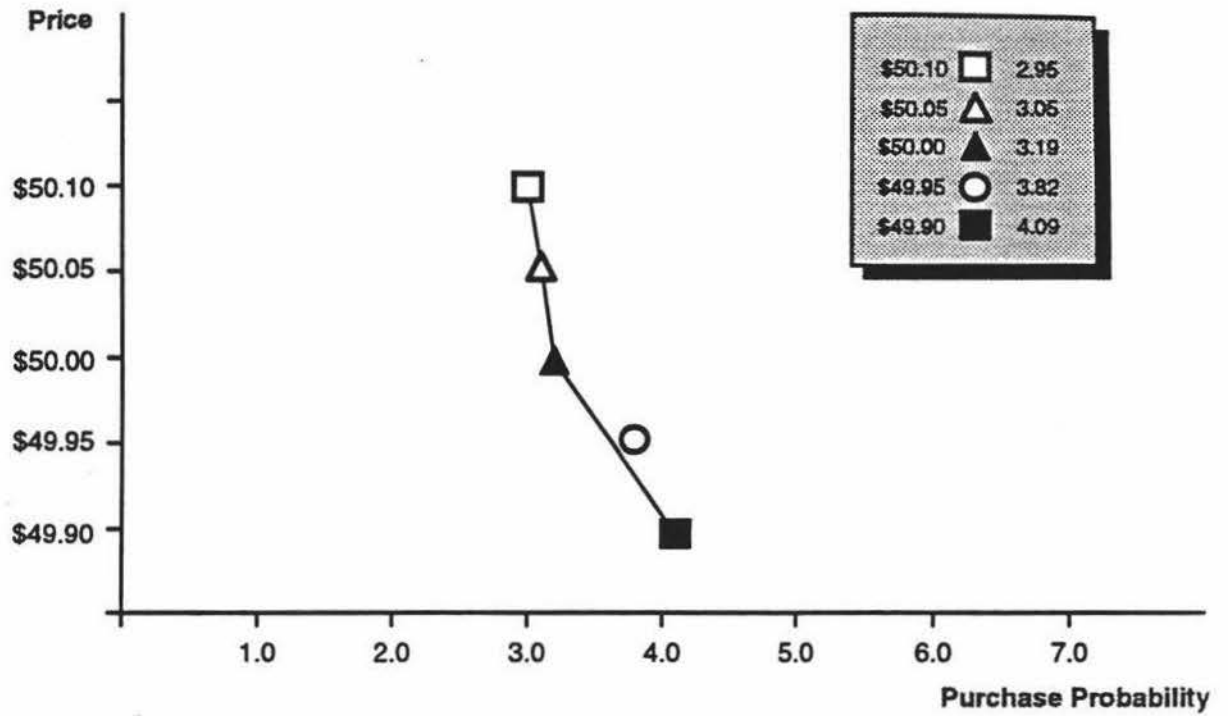
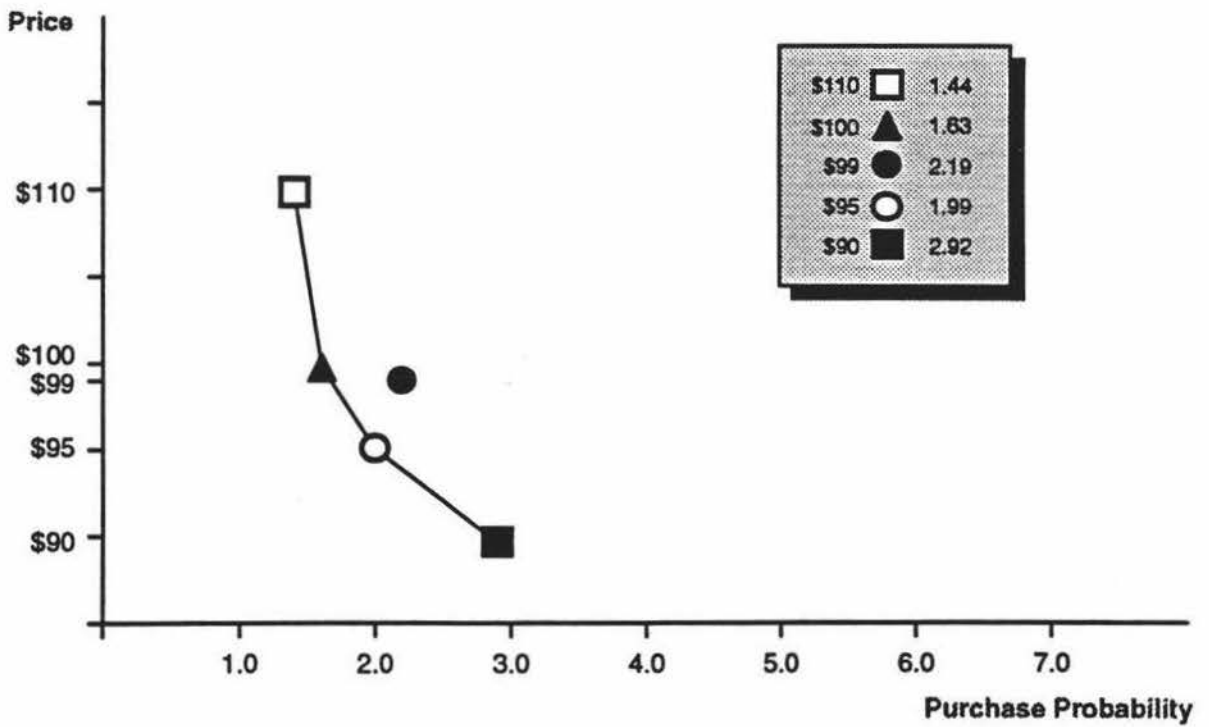


Figure 9. Demand Curve - Blender



Findings

The method used to test the assumption that odd prices produce greater than expected demand leading to a "kink" in the demand curve at these price points proved successful for this purpose. For all six products tested, plotting the transformed purchase probabilities obtained for the top and bottom anchor points and the corresponding even price point, produced a downward sloping demand curve. This gives some reassurance about the validity of the method used as a means of testing the effect of odd pricing on demand.

In total, ten odd price points were tested for an odd pricing effect in which estimated demand was noticeably greater at odd values. These test odd price points consisted of five 95 cent endings, three 99 cent endings, and two whole dollar odd prices; \$95 and \$99.

The demand curves reveal that sensitivity to pricing occurred with nine of the ten odd prices tested. This is demonstrated by the odd price points concerned lying to the right of the estimated demand curve in each case. Although these differences between expected purchase probabilities and actual purchase probabilities were not statistically significant⁴, the noticeable trend that occurred of greater than expected demand at these price points offers strong support for the odd pricing assumption. The likelihood of nine out of ten odd price points falling to the right of an estimated demand curve occurring by chance alone

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4. To test for a significant difference between the expected purchase probabilities and the actual purchase probabilities a demand curve equation was determined between the two anchor points for each product. For example, for the product Cheese a demand curve equation was established between the \$4.90 and \$5.10 anchor prices. The expected purchase probability was then calculated for both odd test price points (\$4.95, \$4.99), based on this demand curve. A 't' test of difference between two proportions was then carried out to establish whether the difference between the expected purchase probability and the actual purchase probability for both odd test prices was significantly different.

is less than 1%⁵ or significant at the .01 level.

For the five products tested with odd price cents endings (Figures 4 to 8), all eight odd price points tested produced greater than expected demand, demonstrated by these points lying to the right of the estimated demand curve for each product. The likelihood of this finding occurring by chance alone is less than 0.5%⁶ or significant at the .005 level.

Sensitivity to odd pricing was greater for the three products tested at the \$10 and under level; Cheese, Frozen Chicken and Chocolates (Figures 4 to 6). Five of the six odd price points tested at this level showed noticeably greater estimated demand. The sixth odd price tested (Cheese, \$4.95) produced only a weak odd pricing effect on estimated demand in comparison to the effect produced at the \$4.99 price point.

Overall, the effect of each of the odd prices tested on demand for Cheese, Frozen Chicken and Chocolates was similar for the 95 cent and 99 cent endings. That is, neither odd price ending produced consistently greater estimated demand than the other.

The two electrical appliance products, Hair Dryer (Figure 7) tested at the \$20 level and Kettle (Figure 8) tested at the \$50 level, produced surprisingly similar demand curves. The estimated demand curve for each product shows a downward sloping curve when the anchor points are joined through the even dollar and .05 cent price points. The 95 cent odd price ending that was tested for each product (Hair Dryer, \$19.95; Kettle, \$49.95) lies to the right of each product's estimated demand curve. That is, greater sensitivity to pricing was apparent at the 95 cent level than at either the even dollar or .05 cent level for both

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5. This result was calculated by considering the random possibility of an odd price point, lying between two points on the estimated product demand curve, falling to the left, or to the right of that estimated demand curve. By chance alone an odd price point would be expected to fall to the left of the estimated demand curve 50% of the time, and to the right 50% of the time. Thus, the likelihood of an odd price point falling to the right of the estimated demand curve for each product nine out of ten times by chance alone is $10/2^{10}$ or $10/1024 = <.01$ or $<1\%$.
 6. The likelihood of an odd price point falling to the right of the estimated demand curve for each product eight out of eight times is $1/2^8$ or $1/256 = <.004$ or $<0.5\%$.

products. The possibility that these findings occurred by chance cannot be discounted. However, the fact that this trend occurred for both the products tested with a five cent variation around an even price point does offer greater support for the odd pricing assumption. The increase in estimated demand at odd price points for products at these two price levels was, however, less noticeable than for the majority of odd prices tested at the \$10 and under level.

For the remaining product, the Blender (Figure 9), a shift to the right of the estimated product demand curve occurred at the \$99 odd price point, with no odd pricing effect detected at the \$95 odd price point. A possible explanation for this finding is the wider gap between price points tested at this level. That is, the distance between price points was greater for this product tested at whole dollar prices, than for the other five products tested at cent ending points. Therefore, odd pricing sensitivity may be greater for prices nearer to the \$100 even price point.

Summary

Overall, the analysis revealed strong support for the assumption that greater than expected demand occurs at odd price points. The odd price endings tested produced consistently greater than expected demand at these points. Nine of the ten odd price points tested fell to the right of the estimated demand curve for the product concerned, producing a kink in the demand curves at these points. Individually, these differences between expected purchase probabilities and actual purchase probabilities were not significant, but an obvious odd pricing trend occurred for all six products tested. This finding was particularly noticeable with the cents ending odd prices, with all eight prices tested falling to the right of the estimated product demand curves. The probability of this finding occurring entirely due to chance is less than 0.5%. Hence, it is very unlikely that these findings were due solely to sampling variations while no actual differences prevailed.

The greatest sensitivity to odd pricing occurred for the grocery items, including Chocolates, at the lower price levels. Nearly all the 95 cent and 99 cent price endings tested at the \$10 and under level produced greater than expected demand at these points. No obvious difference was detected in the degree of sensitivity of odd pricing between the 95 cent and

99 cent endings.

The \$99 odd price point tested at the \$100 price level also produced greater than expected demand. However, the \$95 odd price tested at this level did not appear to be sensitive to the effect of odd pricing on demand (Figure 9, Blender). This finding may have been due to the greater differential between prices tested at the whole dollar level in comparison to those tested at the cents level.

The next chapter presents a discussion of the findings of this odd pricing experiment and of how these findings interrelate with the findings of the various research stages of this overall study. This discussion incorporates previous findings and issues relating to odd pricing presented in the review of academic literature in chapter two.

CHAPTER FIVE: DISCUSSION

5.1 INTRODUCTION

The purpose of this study was to investigate the effect, if any, of odd pricing on product demand. This involved undertaking two experiments to investigate the effect of odd pricing on estimated demand for a range of products, at differing price levels and price points. Additionally, qualitative research with consumers and retailers was undertaken, and evidence sought of empirical testing of the odd price assumption by retailers.

The findings of this study support the assumption that higher than expected demand occurs for goods priced at odd values, than at slightly higher even price values. This chapter discusses the implications of the findings (outlined in Chapter Four) and draws some conclusions. Finally, some limitations of this study and suggestions for future research in the area of odd pricing are outlined.

5.2 REVIEW OF EXPERIMENTAL STUDIES

The findings of this study are consistent with an earlier experimental study undertaken by Schindler & Warren (1988). Using a simulated restaurant menu to investigate the effect of odd pricing on sales, Schindler and Warren provided evidence that pricing an item just below a round number increased its likelihood of being chosen, beyond the extent expected on the basis of the few cents involved.

Generally, however, previous attempts to validate the assumption that odd prices lead to greater than expected demand have largely been mixed or inconclusive (Ginzberg, 1936; Georgoff, 1971). For instance, one USA department store changed from odd pricing to even pricing without incurring adverse sales effects (Dalrymple & Thompson, 1969). Also, a recent mail order experiment undertaken by a New Zealand retailer, in conjunction with this study, found no detectable differences in demand for identical products priced at odd and even values.

Although other in-store experiments did report that greater demand resulted from odd pricing, the findings were anecdotal. An experiment reported in the literature stated that a large increase in sales for two products occurred as a result of reducing prices to an odd value (Wisniewski & Blattberg, 1983; cited in Nagle, 1987). Similarly, several in-store studies by New Zealand retailers questioned for this study reported that when products that usually retailed at odd prices were raised to the nearest round dollar figure, sales fell as a consequence of this pricing move. However, for each of these findings no attempts were made to control for other in-store influences such as promotions and competitor activities which may also have impacted on sales.

5.3 ISSUES ARISING FROM ODD PRICING STUDIES

Choosing Among Alternatives

Reasons for the previous lack of evidence to support the assumption that odd pricing has a positive effect on demand are not clear. One possible explanation is that the previous empirical investigations that did not conclusively support odd pricing were conducted in real-shopping situations, as opposed to experimental settings.

In a natural shopping environment consumers are subjected to many in-store influences other than price. For example, they are able to choose among a range of brands, at differing price levels. By contrast, this study required consumers to state their purchase probabilities for individual products. If they were unfamiliar with the usual retail price, or the brand, product attributes and so on, price may then have become a cue to their stated purchase intentions. Different findings may have occurred if respondents had been permitted to choose between alternative brands. Then purchasing factors other than price would have been present, possibly reducing any positive odd pricing effect on purchase intention. This problem has been recognized by de Chernatony and Knox (1992), who state there is growing evidence that by asking consumers about prices in isolation, without any reference point, they are less able to make realistic judgements on brand prices.

This argument does contradict the findings of Schindler and Warren's study in which respondents did choose among alternatives and a positive odd pricing effect occurred

(Schindler & Warren, 1988). However, it could be argued that purchase decisions for restaurant meals differ from purchase decisions made for a range of in-store items. Furthermore, the subjects who took part in their study were university students who, arguably, were more sensitive to price than most other diners. Therefore, further studies are needed to investigate more fully how demand for odd priced goods varies when consumers are able to choose among a range of similar products, closely resembling a true shopping situation, at a range of odd and even prices. This would eliminate price as the main focus of consumers' attention.

Price Illusion Versus Consumer Conditioning

What cannot be determined from this study is whether the positive effect of odd pricing on demand occurred due to an illusion of cheaper prices. Alternatively, this positive effect could be due to marketplace conditioning of consumers to expect odd price endings. In other words, the sheer predominance of odd pricing in the marketplace may influence consumers' price expectations, which in turn makes a positive odd pricing effect on demand a self-generating outcome.

One assumption made about odd pricing is that consumers perceive odd prices to be much cheaper than they actually are (Boyd & Massy, 1972). For example, a price of \$9.99 is perceived as closer to \$9 than to \$10. Retail advertising techniques attempt to reinforce this message by displaying a much smaller type size for the cents digits than for dollar digits, thereby emphasising the dollar amount of the price. This factor may in fact contribute to the illusion, if it exists, that odd prices are cheaper than they actually are. However, it can be assumed that retailers are not confident that odd pricing alone can achieve desired sales levels, because of their adherence to the persistent use of size differentiation between dollar and cent digits.

If an illusion does exist that odd prices are much cheaper than other nearby prices, then any attempt by retailers to move away from odd pricing would have a negative effect on both sales of individual products and on long term store image (Georgoff, 1971). If, on the other hand, the effectiveness of odd pricing is determined by reference price effects, then retailers may be unnecessarily restricting themselves to less than optimal pricing strategies. This applies in circumstances where product prices have been reduced considerably to

sustain odd pricing levels. Although odd prices may generate greater than expected demand, profits obtained at these levels may actually fall below those obtainable at a higher price level. In other words, increased demand at odd price levels may not result in profit maximisation. Therefore, more research is required to establish clearer guidelines on the most appropriate situations in which to use odd pricing. Such situations may lead to a move away from "across the board" application of odd pricing, to applying odd pricing when its use is most profitable.

If retailers were to move away from strict adherence to odd pricing strategies in the marketplace then consumers would pay more for these goods that rise above current odd pricing levels. On the other hand, if consumers no longer expected odd prices, those goods that are currently increased in price to reach odd price levels should fall. This is because the optimal price for some goods would be below the price usually charged in accordance with an odd pricing policy.

Interestingly, the consumers interviewed in the qualitative stage of this study claimed their purchase decisions were not affected by odd pricing and objected to the assumption underlying the practice. This attitude is consistent with the fact that householders do not make predominant use of odd pricing when advertising their own secondhand goods. Presumably, if price illusion effects truly increase the likelihood that a product would be purchased, then householders would adopt this selling technique to imply better bargains when selling personal items.

Nevertheless, consumers' attitudes toward odd pricing were not consistent with the findings of the quantitative stages of the study. That is, the negative attitudes expressed about odd pricing did not correspond to the purchase intentions given for the experimental study. Although consumers may say that odd prices have no effect on their purchase decisions, the purchase intentions stated for this study imply that they do. This finding is consistent with the suggestion that any effect of odd pricing on demand is created by reference price effects. Although the consumers sampled for the qualitative stage of this study clearly viewed odd prices as exact prices, or rounded them up to the nearest round dollar price, consumers' actual purchase behaviour may be influenced by price endings retailers have conditioned them to expect.

Some researchers argue that odd pricing is a complex phenomenon and that many factors influence the potential of odd pricing to increase demand. Hence, some odd pricing studies have looked at factors that may promote the effect of odd pricing on purchasing behaviour, such as illusory effects, price perception, price sensitivity, price awareness and price recall (Dodds & Monroe, 1985; Gabor, 1984; Georgoff, 1971; Lambert, 1975; Schindler & Kibarian, 1993; Schindler & Wiman, 1989). The focus of these studies has been on *how* odd pricing may increase demand rather than *if* it increases demand. Although such studies do not directly address the question of whether odd pricing increases demand, the findings promote an understanding of instances when odd pricing may be effective, for example, in association with particular markets, products or price levels. Therefore, if further studies continue to support odd pricing strategies, research is required to investigate the separate effects which may contribute to, and, further enhance, the overall effect of odd pricing on demand.

Sensitivity To Odd Price Endings

The findings of this study support the use of odd pricing for low involvement grocery products in particular. This suggestion is consistent with earlier views expressed by Georgoff (1971) and Nagle (1987). Greater sensitivity to odd pricing occurred for the products Cheese, Frozen Chicken and Chocolates (Figures 4-6) than for the two electrical appliances tested at odd price cents endings (Figures 7 & 8). For pricing sensitivity to exist consumers must have an awareness of price (Granger & Gabor, 1969). Not surprisingly, greater price awareness of the Cheese, Frozen Chicken and Chocolates was apparent during the interviewing stage of the experiment. This was probably because fast moving consumer goods, including Chocolates, are likely to be purchased on a more regular basis than the other products tested; Hair Dryer, Kettle or Blender (Figures 7-9).

Another reason that sensitivity to odd pricing was greater for the products at the ten dollar and below level than for two of the electrical products priced at higher levels possibly relates to the perceived value of the saving gained (Georgoff, 1971). A saving of five cents is far greater when viewed as a percentage of the total cost of a product priced at, say, \$4.95, as opposed to \$5.00, than the percentage of an identical saving obtained from a product priced at \$49.95, as opposed to \$50.00. This may explain why the positive odd pricing effect that occurred for all products was not as noticeable for the Hair Dryer at the

\$20.00 level (Figure 7) and Kettle at the \$50.00 level (Figure 8). Demand was more sensitive to odd pricing for the Blender at the \$100 level than for the Hair Dryer and the Kettle. However, whole dollar odd price endings were used at the \$100 level rather than cents endings, which may account for the different degree of sensitivity that occurred.

Sensitivity to odd pricing in this study was not noticeably greater for prices ending in the digit 9 than the digit 5. The implication of this finding is that, if 5 cent endings and 9 cent endings generate similar demand, retailers may as well use nine cent price endings and benefit from the extra four cents revenue gained for each item sale. This finding supports the predominant use of prices ending in the digit 9 in retail advertising.

The use of 9 cent endings is obviously impractical for solely cash transactions involving one item, because of the necessity of rounding to the nearest five cent ending. Such transactions necessitate either lowering the price four cents, in which case charging the lower price initially would appear more sensible, or rounding up to the next highest five cent ending, which may generate ill-will from consumers who resent being charged more than the stated price. However, non-cash methods of payment such as cheques, credit cards and electronic funds transfer, do promote the use of 9 cent price endings, particularly in association with stores from which consumers usually purchase multiple items. Such a pricing strategy has obvious favourable profit implications. Therefore, this study supports the continued predominant use of the digit 9 in grocery stores. This conclusion has already been reached by one retailer, reported earlier in this study. This store moved from 9 cent endings to 5 cent endings when one and two cent coins were withdrawn from use in New Zealand. Later that store returned to 9 cent price endings to achieve a higher gross profit margin for each item. No adverse effect on sales occurred as a result of reverting back to 9 cent endings.

This finding is particularly relevant at the \$100 price level. Findings for the Blender (Figure 9) are consistent with the view expressed by retailers on the \$100 price barrier. Retailers interviewed during the qualitative research stage of this study believed that \$100 is an important price point and that attempts to exceed the \$99 barrier result in lost sales. The Blender tested at both \$99 and \$95 produced no odd pricing effect at the \$95 level. Perhaps the logic of pricing at \$95 in preference to \$99 can be questioned, as this study

found that \$99 created greater than expected estimated demand, indicating more favourable profit implications for the retailer.

5.4 CONCLUSIONS

The following conclusions have been drawn from this study:

- Odd prices promoted greater than expected demand for selected products offering strong support for retailers' odd pricing strategies.
- Sensitivity to odd pricing is particularly apparent when used in association with low involvement grocery items.
- There is no detectable difference between the odd pricing effect for 95 and 99 cent endings. The profit implication of this finding is that 99 cent endings are optimal for achieving the highest gross profit margin obtainable from pricing below the nearest round figure.

5.5 LIMITATIONS

Several limitations need to be acknowledged in relation to the findings of this study. First, the results are based on purchase probabilities which are a surrogate for actual purchase behaviour. Different results may have occurred had the study been based on actual sales occurring in a natural shopping environment, assuming control was maintained over all influencing factors such as competitive effects, new product launches, and so on.

The second limitation relates to the small range of products tested. It is not discernable from this study whether the results could be generalized to other products.

The third limitation relating to this study is that the findings are based on a total sample size of 300, further divided into three subsamples of 100. A larger sample size may have

detected significant differences in demand for individual products at odd prices.

Ways of addressing these limitations in further studies are discussed in the next section.

5.6 DIRECTION FOR FUTURE RESEARCH

Further research needs to be undertaken to investigate the effect of odd pricing on demand for a wider range of products. Very little is known about the effect of odd pricing on many product categories. The results of this study indicate that the odd pricing effect is greater for cheaper fast moving consumer goods. More studies, using a wider range of products, are needed to support or refute this finding. Perhaps such research could also be broadened to include services.

Another research alternative to the method used in this study is to investigate the odd pricing effect using a wider spread of anchor and test prices. The demand curves estimated in this study were limited to a very narrow price range either side of an even price point (for example, \$50.10, \$50.05, \$50.00, \$49.95, \$49.90). An alternative method would be to use a wider range of prices, for example, \$60, \$55, \$50, \$49, \$45, \$40. This would enable an investigation of sensitivity to odd pricing for a wider section of the demand curve for each product. The true demand curve for each product is unlikely to be consistent in shape over a wide range of price points. This is because factors other than price, such as brand and quality, may also influence demand. For example, contrary to economic law, demand for some products has increased in response to a higher price, (Rodgers, 1990). Therefore, the degree of sensitivity to odd pricing may also vary for some products at certain price points.

The provision of a reference price is another consideration for similar future experiments to ensure the duration of interviews is kept as brief as possible to avoid respondent fatigue. During interviewing, it was detected that some respondents, when asked to state their purchase probabilities, lacked an internal reference price on which to base their answer. This was particularly noticeable with the Kettle at the \$50 level and the Blender at the \$100 level. This reliance on a reference price appeared to distract those respondents from

the specific questions asked because they seemed to be thinking about price in a wider sense than simply the actual price featured on each showcard. If odd pricing has the effect of implying cheaper prices, the lack of a reference price would not have affected the overall outcome of the experiment. This is because the odd prices presented to the respondents should still have indicated a lower price in comparison to the other prices viewed and, therefore, induced greater likelihood of purchase.

Nevertheless, an alternative method of experimentation would be to test a range of brands within each product category, featuring varying odd and even prices, instead of a single brand in isolation. Using this method consumers could be asked to indicate purchase preference between a selection of brands at varying prices and price levels. For example, two or more brands could be matched with odd and even price endings at each price level. This situation would more closely resemble a true buying situation. If odd pricing has the desired effect of promoting greater demand, this would be demonstrated by consumers' selection among the odd and even priced products.

A final important consideration for future research in this area is the sample size used. Research based on larger sample sizes would give more precision in tests of the differences between expected values and actual values for individual products.

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APPENDICES

APPENDIX A: RETAILER INTERVIEWS

APPENDIX A.1: COMPANY AND RESPONDENT DETAILS

Completed Interviews - Companies Nationwide

Camera House	General Manager
Deka NZ Ltd	Marketing Manager
Dick Smith Electronics (NZ) Ltd	Merchandising Manager
Dress for Less	Merchandising Manager
Farmers Trading Co Ltd	General Manager of Merchandising
	<i>Previous Manager of Merchandising</i>
Georgie Pie	General Manager
Hallenstein Bros Ltd	National Retail Manager
Hannahs R & Co Ltd	Marketing Manager
K Mart	Director of Sales and Marketing
KFC (NZ) Ltd	Marketing Manager
LV Martin & Son	Joint Chief Executive
McDonalds Family Restaurants	Director of Marketing
Mitre 10	Marketing Manager
Noel Leeming Appliance Centres	Marketing Manager
The Warehouse	Managing Director
	Assistant Manager
Woolworths	Marketing Manager

Completed Interviews - Local Companies (Palmerston North)

A E Preston & Co Ltd	Manager
Broadtop Footwear Ltd	Owner
Country Comfort Beds	Owner
EZIBUY Ltd	Managing Director
Leader & Watt Ltd	General Manager
Melody's New World Supermarket	Grocery Manager
Pak N Save (PN Branch)	Assistant Manager
Roses Pharmacy Ltd	Owner
T Market Fresh	Manager, Fruit & Vegetables

Unsuccessful Interview Attempts

Countdown Foodmarkets NZ Ltd
 Foodtown Supermarkets Ltd
 Glassons Ltd
 Pizza Hut
 3 Guys

APPENDIX A.2: FOOT-IN-THE-DOOR-LETTER

7 July, 1994

Mr Bill *****
Managing Director

P O Box *****
WELLINGTON

Dear Mr *****

I am a fifth year marketing student at Massey University studying towards a Masters degree in Business Studies. My thesis will be based on research into the effect of odd pricing on demand; that is, whether odd pricing increases or decreases demand and, if so, under what circumstances.

As you will be aware, the convention of odd pricing, that is, a price which falls just below a round number (\$3.99 instead of \$4.00; \$1,995 instead of \$2,000) is widespread in the New Zealand retail sector. Part of my research will involve establishing the generally expressed rationale for odd pricing among New Zealand retailers. In order to do this I need to question a range of retailers about their pricing methods, with particular reference to odd pricing. For example, I would like to establish whether the widespread use of odd pricing stems from a belief in the psychological effect which odd prices may have on consumers, or from a demonstrated increase in demand resulting from tests conducted at varying price levels.

Having noticed that your company makes relatively frequent use of this practice, I am writing to seek your cooperation in my study. I will contact you in the week commencing 18 July in the hope that we can arrange a suitable time to discuss pricing methods used by your company. I anticipate that our telephone discussion would take up approximately five minutes of your time.

Yours sincerely

Ms Judith Holdershaw

APPENDIX A.3: SUMMARY OF RETAILER INTERVIEWS

Reasons Offered By Retailers For Using Odd Pricing:

- Consumers set the price, not retailers, and consumers expect odd prices.
- Customers are thought to be psychologically conditioned to expect odd prices.
- Customers view odd pricing as a better deal, or better value than higher even prices.
- Customers react better to odd prices than to even prices.
- Customers prefer odd prices.
- Customers mentally round odd prices down to the next lowest even dollar amount, for example, mentally rounding \$5.95 down to \$5.00. (Some retailers claimed to use the same thought process with their own personal shopping.)
- Retailers can just as easily charge a higher price so it is pointless to charge a lower price. For example, there is no need to charge 50c for a product when 95c is just as attainable; there is no need to charge \$179 for a product when \$199 is just as attainable.
- Odd prices increase sales (usually based on gut instinct).
- Odd pricing is simply retailing habit.
- Odd pricing is a retailing tradition.
- The odd pricing practice is reinforced from past use, therefore, continues to be practiced.
- Competitors use odd pricing and other retailers do not want to be viewed by customers as dearer than competing stores.

Reasons Offered By Retailers For Using Even Pricing:

- Even prices look less cluttered.
- Even pricing simplifies the pricing structure.
- Even prices are used to indicate "specials" when the usual retail price is lowered so much that discount pricing, or odd pricing, is not necessary to highlight the bargain. For example, a product which normally retailed in the \$20 range was sold

at the special price of \$10. Because of the large saving already offered, no need was seen to lower the price further, to \$9.95. Had the offer been \$20 the product would instead have retailed at \$19.95.

- Odd prices are reserved for advertised pricing only. Even prices or a mix of odd and even prices are used in-store.
- Even prices are used for television advertising because they can be spoken faster. For example, "\$10" can be spoken faster than "\$9.99". Therefore, by voicing even priced products only, more time is saved on voice announcements and an extra product can be announced during a 30 second advertisement.

Preferred Odd Price Ending:

- 95c because 99c is viewed by customers as too close to the nearest round price.
- 95c because it is ridiculous to price at 99c as a 99c ending has to be rounded down to 95c at the point of sale anyway.
- 95c because it is bad practice to advertise at a different price from that finally charged, due to price rounding.
- 95c because customers prefer this price ending to 99c.
- 95c to state a specific message of cheaper prices.
- Either 95c or 99c, depending on the value of the product. Hard goods such as toasters, jugs, toys and video tapes are more likely to end in 95c, than 99c. Apparel, on the other hand, is sold at the highest possible odd price ending of 99c. (These products are viewed as representing different markets and different buyers and require different margins.)
- 99c in order to charge the maximum price without breaking into the higher dollar price.
- 99c because the store's accountants reasoned that there was no need to lose an extra 4 cents per transaction over multiple transactions (95c endings were previously used and no adverse reactions from customers occurred when prices were raised again to 99c endings).
- A recent decision by one retailer was made to end prices with the digits 4 or 8 to make a point of the extra discount than that offered by 5 or 9 cent endings.
- One retailer usually prices using either 95 or 99 cent endings, but when really wanting to imply a bargain, an 89c ending is preferred because he considers 95c and 99c are still too close to the nearest rounded price.

- For some price levels cents endings are dropped completely after a certain point, but this point is quite arbitrary.

Retailers' Comments On Price Points:

- Consumers are not stupid when it comes to saving a few cents, but the main psychological effect of pricing is instead based on price points. In other words, the effect occurs in response to barriers to actual dollar amounts, not because of a small saving.
- Prices are rounded up or down to maintain certain price endings and price points. For example, prices such as 90c and \$1.05 would both be rounded to below \$1, to either 95c or 99c, as \$1.00 is considered a price barrier because consumers will not pay more than 99c for some products.
- Some retailers believe that prices which exceed certain price points or do not end in odd price endings are not seen as realistic by consumers.

Variations on this theme include:

- Odd prices are seen to signify good value.
- A price such as \$4.03 is seen as ridiculous because of the three cent ending.

Standard price points suggested:

- Under \$10
 - \$19 (barrier starts at \$20)
 - \$49 (barrier starts at \$50)
 - \$99 (barrier starts at \$100)
 - \$10 intervals ending in 9, say, \$19, \$29...
-
- One company's example of using a price points strategy is:

up to \$10	- 50c breaks
\$10-\$20	- \$1 breaks (however, \$11 & \$15 are rare)
\$20-\$30	- \$2 breaks (e.g., \$22, \$24, \$27, \$29)
\$30-\$99	- \$5 breaks (e.g., \$34, \$39, \$44, \$49 ..)
over \$100	- \$10 breaks ending in 9 (e.g., \$109, \$119 ... \$199)
-
- * All prices usually end in 95c up to somewhere in the hundreds depending on the type of product.
 - * Within breaks there are still preferred prices. For example, \$79 is preferable to \$89.

Price Point Experimentation In The Marketplace:

- One retailer has developed price point strategies based on empirical testing of sales at these points. In other words, certain price points were proven to create greater sales demand than other similar ones.
- Another retailer also claims that sales increase significantly if prices are dropped to certain points. These "critical price points" are said to relate to barriers. For example, customers will pay \$19.95 but view \$20, \$21, \$22 etc., as far more expensive than \$19.95.
- One retailer has experimented and found that price points made no difference to individual sales but believes it harms the store image over a period of time to use the slightly higher even price points.

Odd Pricing Experimentation In The Marketplace:

- One retailer reported a 20% drop in sales when an electrical appliance was raised in price from \$599 to \$600, based on the previous three months sales. Additionally, he found that dropping prices which were previously priced over the price point of, say, \$1000, to \$999 from, say, \$1038, led to a big increase in sales which was not just attributable to the overall price drop. The exact increase in sales varied depending on price points and products.
- Sales were 25% higher when 24 small bottles of fizzy drink were sold for \$9.99, rather than \$10.00.
- Several less specific examples were given of odd pricing producing a large increase in sales. However, these examples refer to instances involving such large price cuts, relative to the original price, that the resultant large sales increase may instead have occurred because of the price cut, as opposed to the odd price point it was reduced to.

Price Versus Quality Effects:

- A clothing store priced a business shirt at \$19.99. The price was dropped to \$9.99 and a big sales fall resulted. The price was raised again to \$19.99 and previous sales levels were restored.
- One retailer prices cheaper shoe lines with odd price endings but more expensive shoes with even prices. He says people who buy more expensive shoes care less about the price ending. He believes there is a difference between top end (quality)

prices and lower end (discount) prices.

- Similarly, another retailer stated that prices are set according to quality. Odd prices are used for cheaper products but people who buy the more expensive items in a range care very little about the price ending, or price saving.

Additional Beliefs, Comments Or Findings:

- One retailer was interested in the effect that "odd prices" such as \$387 instead of the usual "magical" \$399, which are cheaper than traditional odd prices, may have on demand.
- A reason offered for the continued practice of odd pricing is that "Buyers" set the prices. Retail Buyers, the people who buy the merchandise to be sold by their store, have gone through the retail chain, learned retail ways, and transfer them to their buying practice. This is why the tradition is hard to break.
- One retailer would rather not have to use odd pricing because even pricing is far more convenient, but describes the effect of odd pricing as an aberration of the human mind and so long as the human mind continues to work this way retailers will have to adhere with it.
- One retailer's pricing strategy is basically to price within a margin and in line with competition and then manipulate prices around the 9 mark. The policy is to make as much profit as possible but be seen to be competitive.

Overall Summary:

- Consumers expect odd prices to be used.
- Retailers are used to using odd price endings.
- Retailers are convinced that odd pricing works.
- Concern exists among retailers about overall store price image, especially in the long term. Therefore, retailers are not prepared to be seen as different, or more expensive than their competitors, so continue to use odd price endings.
- There is very favourable support for price points, used in association with odd price endings.

APPENDIX B: ADVERTISED PRICE EXAMPLES

APPENDIX B.1: MIXED PRICING STRATEGY

GOLDAIR 2 Slice Toaster was \$38.59 NOW \$29⁹⁹

BLACK & DECKER Self Clean Surge of Steam Iron was \$89.99 NOW \$45

1/2 PRICE

PHILIPS Juice Extractor was \$145 NOW \$98

GOLDAIR Food Processor and Blender was \$199.99 NOW \$168

HITACHI 1100 watt Vacuum Cleaner Metal pipes, variable suction, cord rewind, was \$449 NOW \$349

PHILIPS 1100 watt Vacuum Cleaner with metal pipes • 4 stage dust filter • retractable cord • 360° swivel hose, was \$399 NOW \$299

TEFAL 1 kg Deep Fryer was \$149.99 NOW \$109

PHILIPS 20 Litre 600 watt Microwave Oven 5 Power levels was \$349 NOW \$295

Sunbeam 10 cup Coffee Maker was \$67.59 NOW \$47⁵⁹

PHILIPS Espresso Coffee Machine was \$168.59 NOW \$145

BLACK & DECKER Sprint Cordless Quick Boil kettle was \$59.74 NOW \$49⁷⁴

BLACK & DECKER Non-stick Frypan was \$149.99 NOW \$98

SAVE OVER \$20

SAVE OVER \$23

SAVE OVER \$50

SAVE \$40

SAVE OVER \$50

20 piece Caracas Dinner Sets
3 patterns. Made in France. Break resistant. Dishwasher safe. Microwave safe. Limited quantities. Only 500 sets available. were \$99.99

NOW \$37



CD Midi System

5 Disc Multiplay Compact Disc Player

• 32 Track Programmable Memory • Repeat track, repeat disc function • Search / Index / Pause functions • AM/FM Tuner • Phono input • Dual Tape Deck with high speed dubbing • High wattage Speakers • Bass boost

was \$649
NOW \$349



SAVE \$300

BRISCOES

YOU'LL NEVER BUY



SAVE \$100

BRISCOES

OFFER ENDS SUNDAY 24 APRIL 1994 OR WHILE STOCKS LAST



New seasons Flannelette Sheets
4 printed designs and 4 plain colours

Single was \$29.99
NOW \$23.99 PR

Queen was \$39.99
NOW \$29.99 PR

King was \$44.99
NOW \$35.99 PR

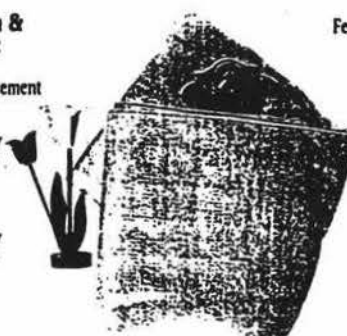
Matching Pillowcases were \$5.99
NOW \$4.75 PR

Rolla Warm & Safe Electric Blankets

12 month replacement guarantee

Single
NOW ONLY \$39.99

Double
NOW ONLY \$78



HEATWAY 3kw Gas Heaters
Features 3 safety devices. Powerful 3 kw with 2 heat settings. 4 wide castors for stability. Made in Italy

NOW \$278



Prestige 6 litre Stainless Steel Pressure Cooker

Made in UK • 18/10 stainless steel • Saves energy, cooks meals up to 3 times as fast • One touch fast steam release • Rise'n'time indicator • Free colour recipe book • Retains vitamins and nutrients for healthier eating • 10 year guarantee. was \$249.99

NOW \$149.99

SPARK PLUG WRENCH SETS

4 piece set with double head and conical handle. Available in 13/16" & 5/8".

\$14⁹⁵

DEALS ON OILS...

REPCO 20W40 Engine oil and quality spin-on oil filter.

\$19⁹⁵

DUCKHAMS 15W50 HYPERGRADE

Oil and quality spin-on oil filter.

\$29⁹⁵

BOSCH SPARK PLUGS

4 PACK PRICED FROM **\$19⁹⁵**
6 PACK PRICED FROM **\$29⁹⁵**

VALVOLINE 20W50 Motor Oil

Oil and quality spin-on oil filter.

\$24⁹⁵

DUCKHAMS Q 20W50

Motor Oil and quality spin-on oil filter.

\$24⁹⁵

WD40

277gms. Spray gun, always getting spray.

\$4⁹⁵

BOSCH IGNITION

20% OFF ALL POPULAR PART NUMBERS OF CONTACT POINTS.

THE BEST FOR YOUR CAR BY FAR

CASTROL GTX

Motor Oil 4 litre 20W50 and quality spin-on oil filter.

\$24⁹⁵

REPCO 30/40

Engine oil and quality spin-on oil filter.

\$15⁹⁵

VALVOLINE FORMULA 5000 15W40

Motor Oil and quality spin-on oil filter.

\$29⁹⁵

FOR OIL

\$12⁹⁵

ENGINE SHOOTER

\$12⁹⁵

SPIT FIRE

\$10⁹⁵

CASTROL GTX 2

\$29⁹⁵

Valvoline Motor Oil

\$29⁹⁵

THE BEST BUYS, THE BEST RANGE, THE BEST SERVICE. THE BEST BUYS, THE BEST RANGE, THE BEST SERVICE.

APPENDIX C: SURVEY RESPONSE RATES

Table 1. Response Rate For Household Shopper Sample

	n	%
Completed Interviews	300	45
Contact Refusal	58	9
Refusal	239	36
Not Household Shopper	59	9
Other	11	1
Total	667	100

The net sample size of the survey, after deducting the "Not Household Shopper" category was 608, and the valid response rate was 49%.

APPENDIX D: INTERVIEWER INSTRUCTIONS

APPENDIX D.1: GENERAL INSTRUCTIONS

- * Interview only main household shoppers or joint household shoppers.
- * Record true response rate.
- * Use the Peas Showcard as a practice showcard to familiarise respondents with the Juster scale.
- * If respondents query the wording "This Particular Product" for any of the six questions, "This Particular" means the brand, size, price etc. shown on the card. At the conclusion of each interview ask respondents what they thought was meant by "This Particular" to ensure their answers were only based on the card presented.
- * Hand respondents the showcards in numbered order, one at a time, and allow a sufficient pause for them to look at cards before questioning.

APPENDIX D.2: INTERVIEWING GUIDELINES

Good morning/afternoon. I'm from Massey University and I'm conducting some research into consumers' interest in particular products.

I would like to interview people who are either the main shopper in their household or jointly responsible for household shopping. Are you mainly responsible or jointly responsible for shopping in your household?

I'd like to ask you questions about some products, which will take up approximately five minutes of your time.

First, I'd like to ask you some questions about grocery buying. I'll show you pictures of some products then ask you what the chances are of you buying each product. **HAND RESPONDENT TEST SHOWCARD (PEAS)**. To answer each question I'd like you to use this scale. **HAND RESPONDENT JUSTER SCALE SHOWCARD**.

The answers you may give are provided on the scale printed on this card. The answers are arranged on the scale a bit like a thermometer. If you are certain or practically certain that you will buy this product sometime during the next four weeks, you would choose the answer "10". If you think that there is no chance or almost no chance of buying this product during the next four weeks, your answer would be "zero". If you are uncertain about the chances, you would choose another answer as close to "zero" or "10" as you think it should be.

***** The time frame for purchase probabilities of the chicken and cheese is within the next four weeks.**

i.e. Please tell me how likely it is that you personally would buy this **particular** product, at this price, sometime during the next four weeks?

***** The time frame for purchase probabilities of the chocolates, hair dryer, kettle and blender is the next time bought.**

i.e. Next time you buy a ****, please tell me how likely it is that you personally would buy this **particular** product, at this price?

***** Year of Birth**

Please tell me in which year you were born.

APPENDIX E: SAMPLE SHOWCARDS

Cheese - \$4.95

Mainland Mild or Colby Cheese 800g

4.95

*Frozen Chicken - \$5.95*

Ingham Frozen Chicken Size 10

5.95





***Cadbury 500g
Continental
Chocolates***

9.⁹⁵

Hair Dryer - \$19.95

**REMINGTON
THE GROOMING COMPANY**



19.⁹⁵

**REMINGTON
MINI HAIRDRYER
AD321M**

Kettle - \$49.95

98



49.⁹⁵

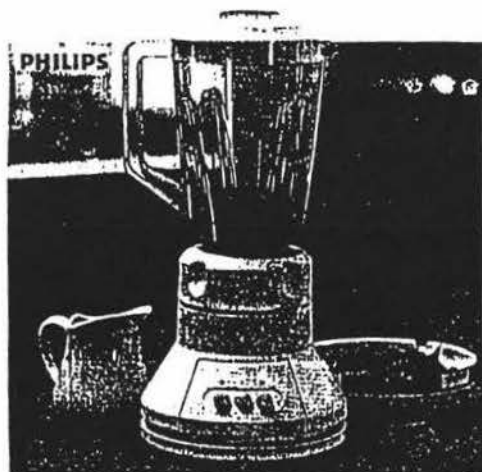
**KAMBROOK
CORDLESS
KETTLE**

Powerful fast boiling element
with boil dry protection.

Fully automatic.

Model KU300

Blender - \$99.95



PHILIPS BLENDER

1.25 litre non-scratch jug.

Blends, purees and mixes.

Cord storage. 400 watts.

Model HR2817.

\$95

APPENDIX F: CODING SHEETS

ID No. _____ (1-3)

Version 1 (4)

1. CHICKEN

\$5.90 _____ (5-6)

\$6.10 _____ (7-8)

\$6.00 _____ (9-10)

4. HAIR DRYER

\$19.90 _____ (23-24)

\$20.10 _____ (25-26)

\$20.05 _____ (27-28)

2. CHEESE

\$4.90 _____ (11-12)

\$5.10 _____ (13-14)

\$4.95 _____ (15-16)

5. KETTLE

\$49.90 _____ (29-30)

\$50.10 _____ (31-32)

\$49.95 _____ (33-34)

3. CHOCOLATES

\$9.90 _____ (17-18)

\$10.10 _____ (19-20)

\$9.99 _____ (21-22)

6. BLENDER

\$90 _____ (35-36)

\$110 _____ (37-38)

\$99 _____ (39-40)

Gender (41)

Circle 1 = Male

2 = Female

Year of Birth 19 _____
(42-43)

ID No. _____ (1-3)

Version 2 (4)

1. CHICKEN

\$5.90 _____ (5-6)

\$6.10 _____ (7-8)

\$5.99 _____ (9-10)

2. CHEESE

\$4.90 _____ (11-12)

\$5.10 _____ (13-14)

\$5.00 _____ (15-16)

3. CHOCOLATES

\$9.90 _____ (17-18)

\$10.10 _____ (19-20)

\$9.95 _____ (21-22)

4. HAIR DRYER

\$19.90 _____ (23-24)

\$20.10 _____ (25-26)

\$20.00 _____ (27-28)

5. KETTLE

\$49.90 _____ (29-30)

\$50.10 _____ (31-32)

\$50.05 _____ (33-34)

6. BLENDER

\$90 _____ (35-36)

\$110 _____ (37-38)

\$95 _____ (39-40)

Gender (41)

Circle 1 = Male

2 = Female

Year of Birth 19
(42-43)

ID No. _____ (1-3)

Version 3 (4)

1. CHICKEN

\$5.90 _____ (5-6)

\$6.10 _____ (7-8)

\$5.95 _____ (9-10)

2. CHEESE

\$4.90 _____ (11-12)

\$5.10 _____ (13-14)

\$4.99 _____ (15-16)

3. CHOCOLATES

\$9.90 _____ (17-18)

\$10.10 _____ (19-20)

\$10.00 _____ (21-22)

4. HAIR DRYER

\$19.90 _____ (23-24)

\$20.10 _____ (25-26)

\$19.95 _____ (27-28)

5. KETTLE

\$49.90 _____ (29-30)

\$50.10 _____ (31-32)

\$50.00 _____ (33-34)

6. BLENDER

\$90 _____ (35-36)

\$110 _____ (37-38)

\$100 _____ (39-40)

Gender (41)

Circle 1 = Male

2 = Female

Year of Birth 19____
(42-43)

APPENDIX G: SUBSAMPLE DEMAND CURVES

Figure G-1. Cheese

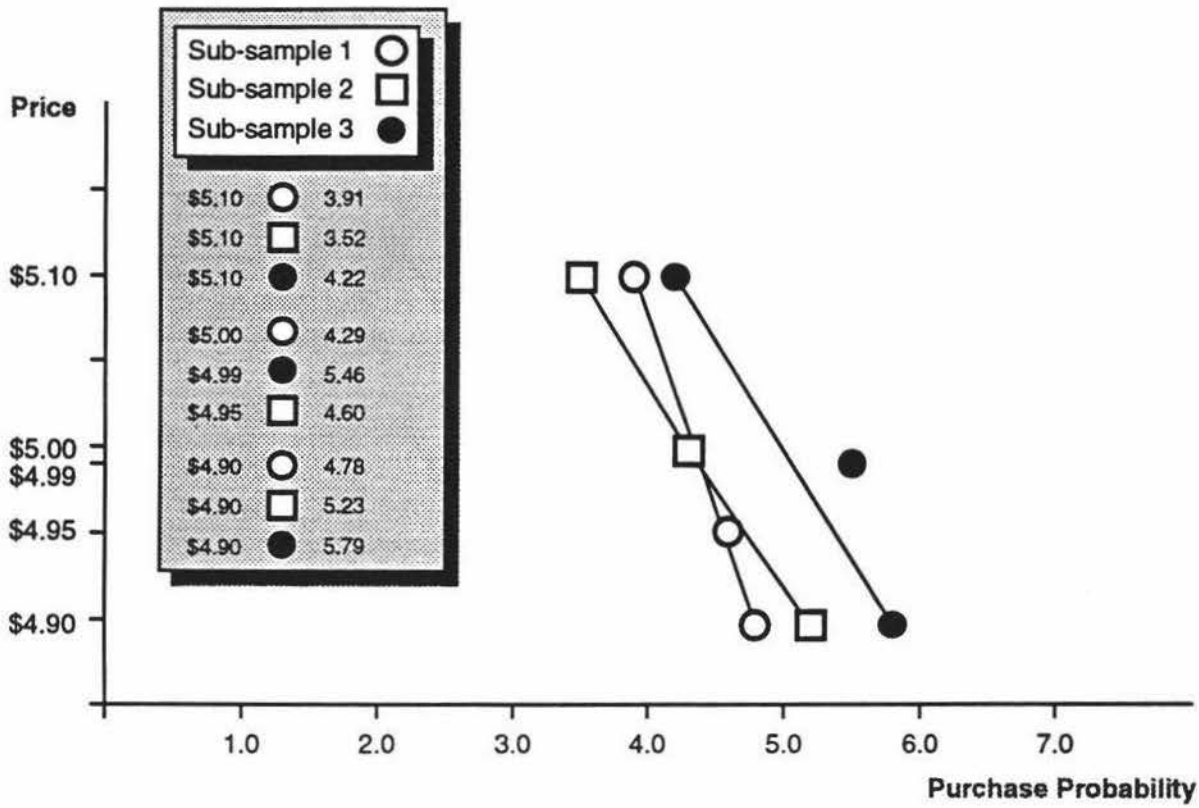


Figure G-2. Frozen Chicken

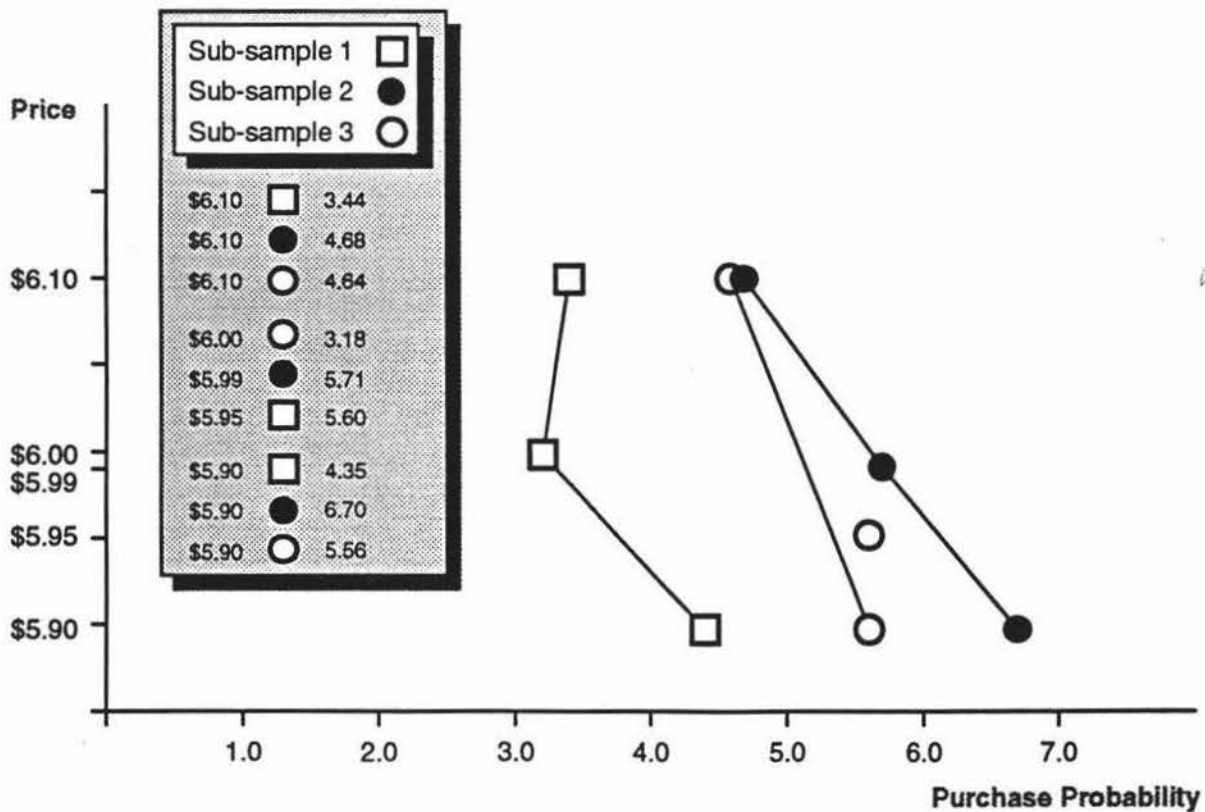


Figure G-3. Chocolates

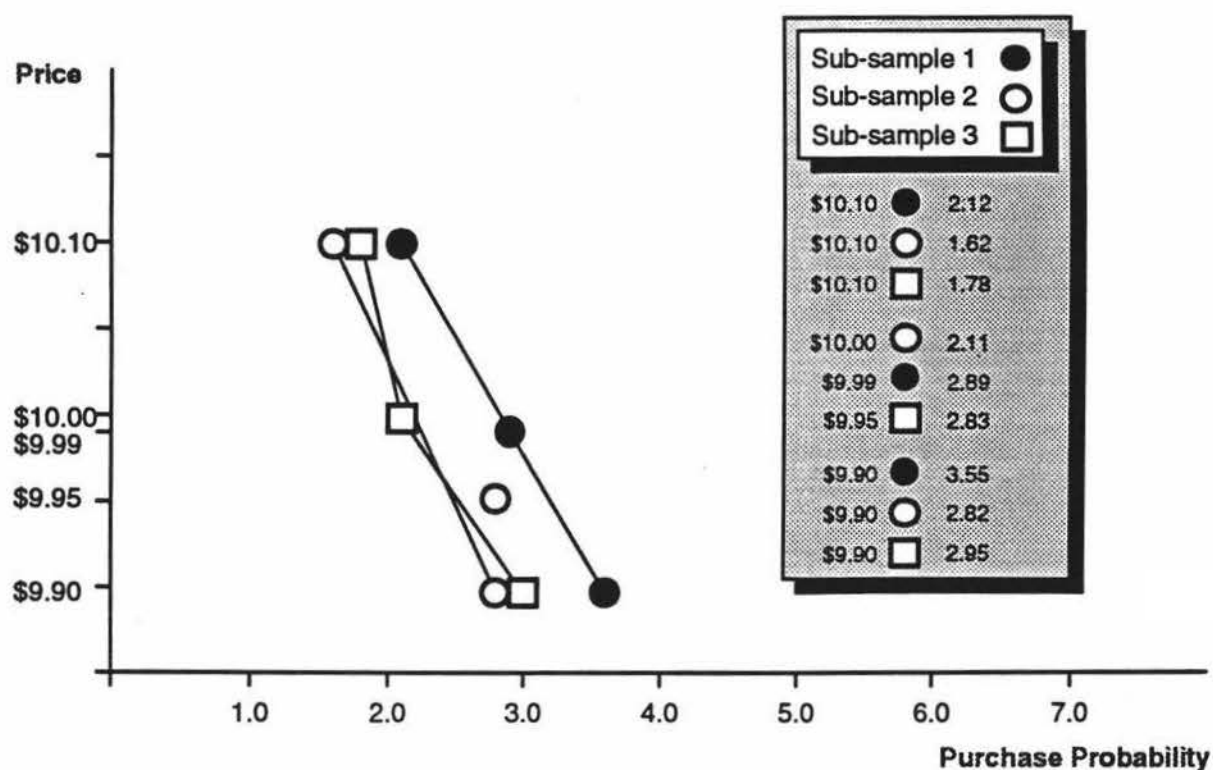


Figure G-4. Hair Dryer

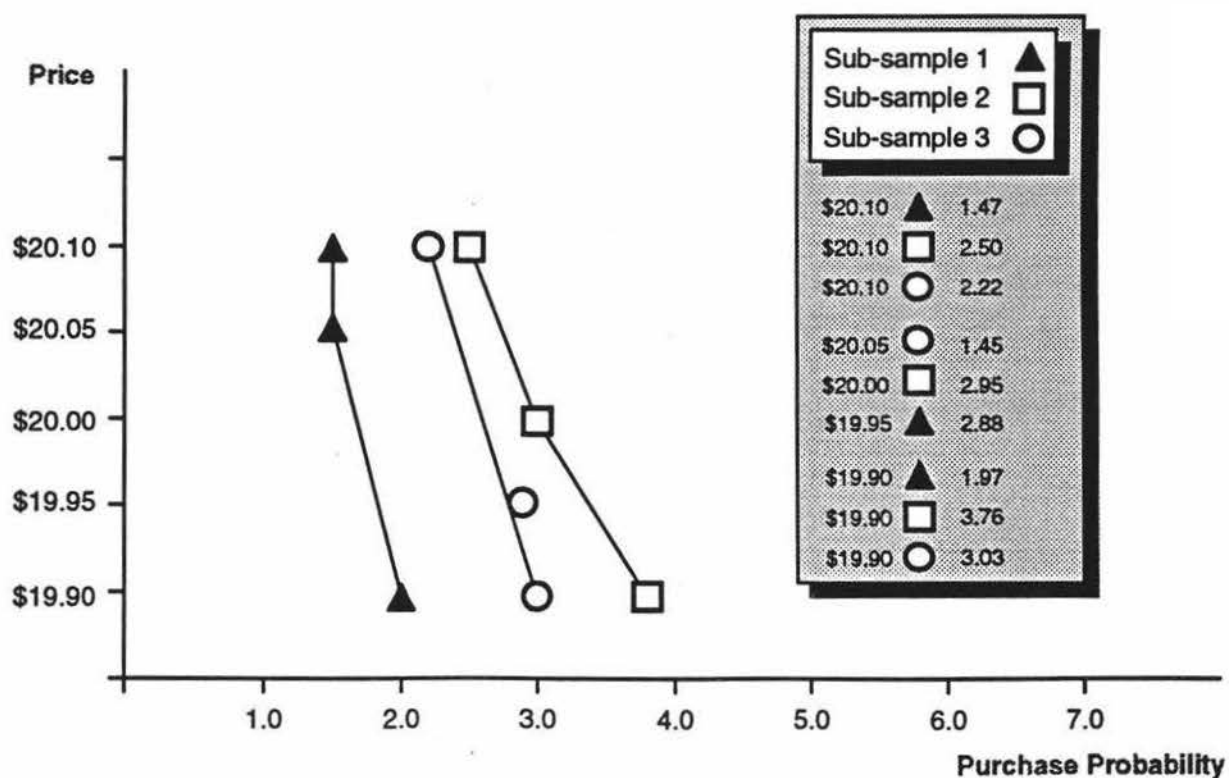


Figure G-5. Kettle

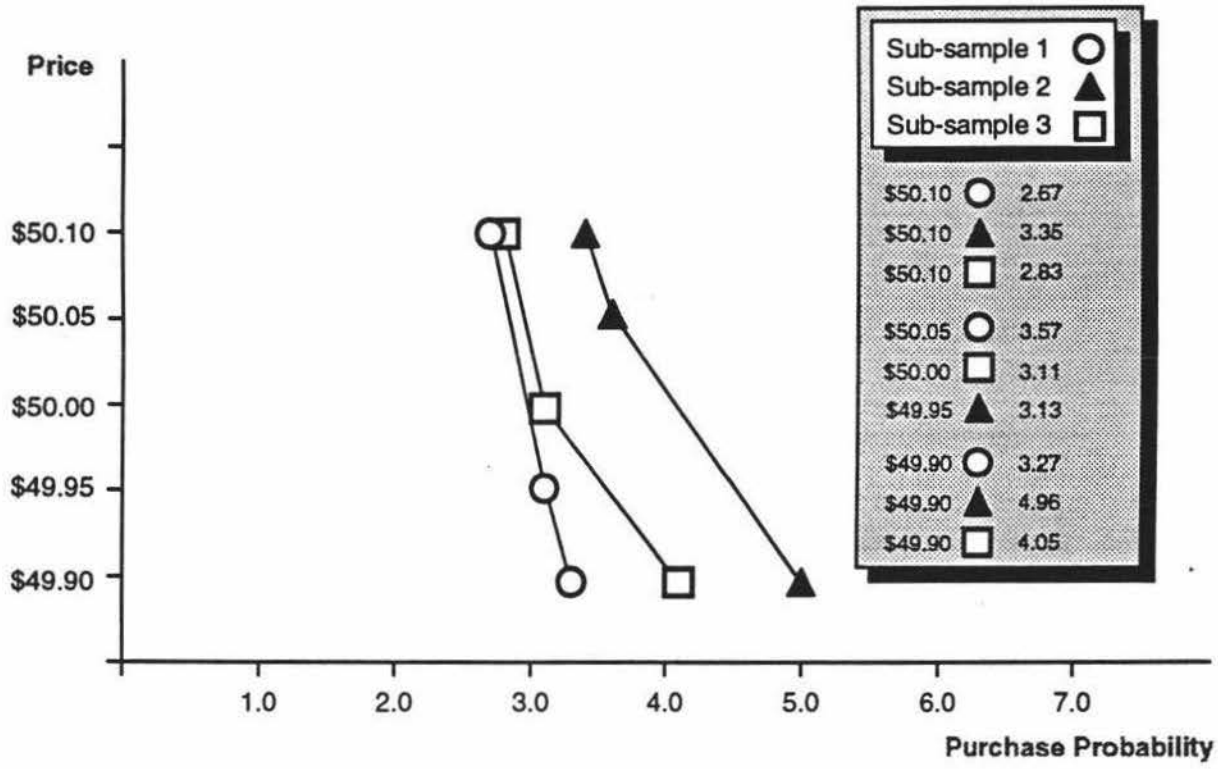
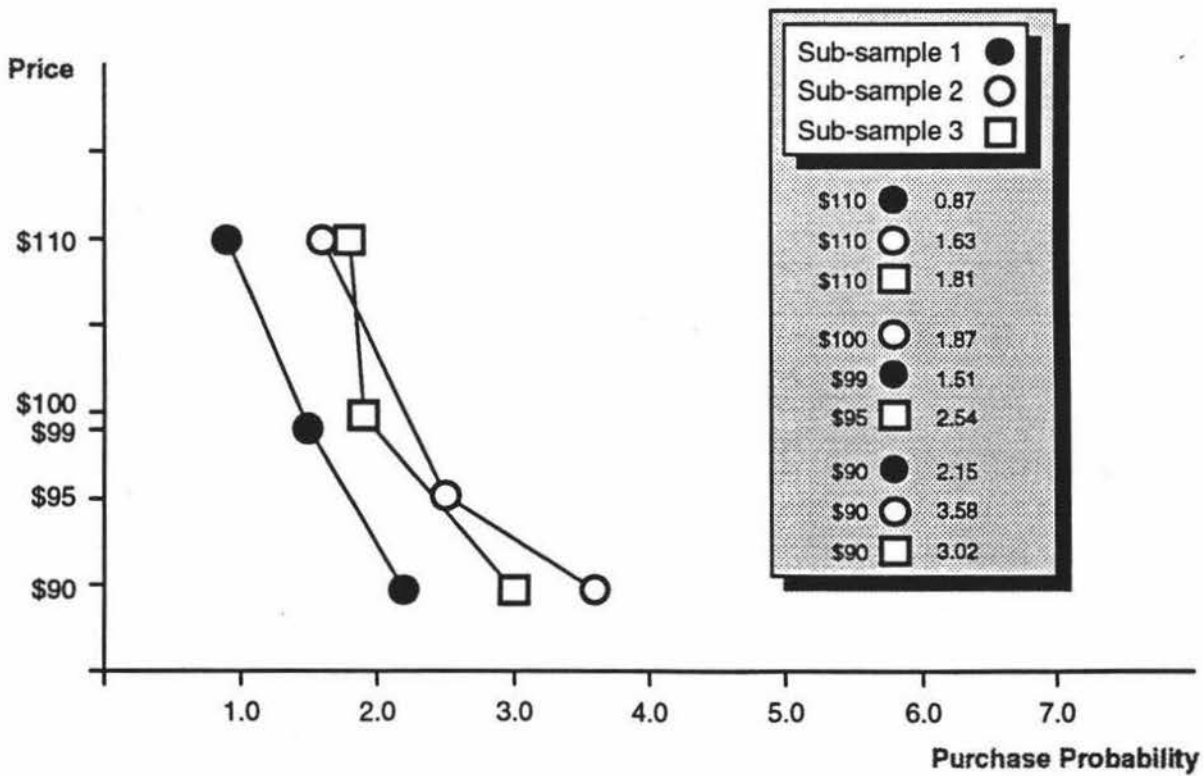


Figure G-6. Blender



APPENDIX H: LINEAR TRANSFORMATION OF PURCHASE PROBABILITY DATA

An example of the linear transformation performed on data for the product Frozen Chicken follows:

- The original purchase probability of each subsample prior to linear transformation:

Price	Purchase Probability	Subsample
\$5.90	4.35	1
\$5.90	6.70	2
\$5.90	5.56	3
\$6.00	3.18	1
\$5.99	5.71	2
\$5.95	5.60	3
\$6.10	3.44	1
\$6.10	4.68	2
\$6.10	4.64	3

- First, the mean purchase probability for the top and bottom anchor points was calculated.

Top Anchor Price (\$6.10) Mean Probability = 4.25

Bottom Anchor Price (\$5.90) Mean Probability = 5.54

- The linear transformation was then made using the following equation:

$$p_t = p_o + s$$

$$\gg p_t = p_o + x + (y-x) * a/(a+b)$$

p_t = Transformed "test" price purchase probability

p_o = Original "test" price purchase probability

s = Shift, either positive or negative, of each "test" price point

x = The mean purchase probability of the three top anchor price subsamples *minus* the individual subsample purchase probability.

y = The mean purchase probability of the three bottom anchor price subsamples *minus* the individual subsample purchase probability.

a = The differential between the top anchor price and the test price.

b = The differential between the bottom anchor price and the test price.

Figures derived from the transformation calculations are presented in Table H-1.

Table H-1. Transformation of "test" price purchase probabilities

"Test" Price Point	x	y	a	b	Original Purchase Probability	Transformed Purchase Probability
\$6.00	.81	1.19	.10	.10	3.18	4.18
\$5.99	-.43	-1.16	.11	.09	5.71	4.88
\$5.95	-.39	-.02	.15	.05	5.60	5.49

\$6.00 test price calculated as follows:

$$p_o = 3.18$$

$$x = 4.25 - 3.44 = .81$$

$$y = 5.54 - 4.35 = 1.19$$

$$a = \text{differential between } \$6.10 \text{ and } \$6.00 = .10$$

$$b = \text{differential between } \$5.90 \text{ and } \$6.00 = .10$$

$$p_t = p_o + x + (y-x) * a/(a+b)$$

$$p_t = 3.18 + .81 + (1.19 - .81) * .10 / (.10 + .10)$$

$$p_t = 3.18 + .81 + .38 * .5$$

$$p_t = 4.18$$

\$5.99 test price calculated as follows:

$$p_o = 5.71$$

$$x = 4.25 - 4.68 = -0.43$$

$$y = 5.54 - 6.70 = -1.16$$

$$a = \text{differential between } \$6.10 \text{ and } \$5.99 = .11$$

$$b = \text{differential between } \$5.90 \text{ and } \$5.99 = .09$$

$$p_t = p_o + x + (y-x) * a/(a+b)$$

$$p_t = 5.71 + -0.43 + (-1.16 - -0.43) * .11 / (.11 + .09)$$

$$p_t = 5.71 + -0.43 + -0.73 * .55$$

$$p_t = 4.88$$

\$5.95 test price calculated as follows:

$$p_o = 5.60$$

$$x = 4.25 - 4.64 = -0.39$$

$$y = 5.54 - 5.56 = -0.02$$

$$a = \text{differential between } \$6.10 \text{ and } \$5.95 = .15$$

$$b = \text{differential between } \$5.90 \text{ and } \$5.95 = .05$$

$$p_t = p_o + x + (y-x) * a/(a+b)$$

$$p_t = 5.60 + -0.39 + (-0.02 - -0.39) * .15 / (.15 + .05)$$

$$p_t = 5.60 + -0.39 + .37 * .75$$

$$p_t = 5.49$$