

The Widespread Use of Odd Pricing in the Retail Sector

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All home-drop advertising material, and all advertising displayed in two free weekly newspapers, and the local daily (Manawatu Evening Standard) was analysed over a seven day period to identify the prevalence of odd pricing. 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. An analysis of 840 advertisements 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 a further 30% of prices ending in the digit 5. Thus, 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%. Whatever pricing methods retailers use, there is a definite bias in favour of odd price endings.

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Introduction

Casual observation of advertised retail prices throughout New Zealand highlights the prolific use of odd pricing, the practice of pricing just below the nearest round number (for example, \$9.99 instead of \$10.00, or \$99.95 instead of \$100). The popularity of prices ending in the digit 9 and, to a lesser extent, the digit 5, reflects the belief that odd pricing will produce higher than expected demand at the price level concerned. In other words, the assumed demand curve is thought to be "kinked" upwards at odd price points.

Odd prices, also referred to in the literature as magic prices, charm prices, psychological prices, irrational prices, intuitive prices or rule-of-thumb prices (Dalrymple & Thompson 1969; Sturdivant 1970; Boyd & Massy 1972; Gabor 1977; Monroe 1990; Rogers 1990), are not based on strict mathematical calculations or long standing economic theory (Kreul 1982). Although the true origin of odd pricing is uncertain (Friedman 1967; Dalrymple & Thompson 1969), the use of odd pricing 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.

The Rationale for Odd Pricing

Various explanations are offered for the widespread use of odd pricing. One explanation is that customers see an odd price as being much cheaper than it actually is in relation to the nearest round figure. That is, customers see a price of \$4.99 as being closer to four dollars than nearly five dollars. It is believed that this illusion of much cheaper products triggers an enhanced buyer response (Boyd & Massy 1972).

An explanation for this rationale is that people have only a limited capacity for storing information. Brenner & Brenner (1982) believe that because consumers are exposed to a continuous flow of information on prices, they store only the more valuable message, the first digits of a number. Thus when a price is \$4.99, a consumer will recall that the price is \$4.00, then maybe that it is \$4.90, but rarely that it is exactly \$4.99. The reason offered for not

instead rounding \$4.99 to \$5.00 is based on memory processing time. Rounding upward involves an additional decision compared with storing the first digits. Furthermore, due to the vast quantity of information available for consumers to process, the information on price must be stored in a very short interval. The cheapest way to do so, in memory and attention terms, is by storing the first digits.

Odd pricing is also believed to suggest to consumers that goods are marked at the lowest possible price (Harper 1966). Many retailers believe that the more specific a statement is, the more inclined people are to believe it (Schwartz 1973). By using odd prices a retailer may thus convey an image of honesty which would not be achieved by charging a slightly higher round figure.

Other explanations for the effect of odd pricing include a belief that "circles attract the eye", thereby drawing consumers to the digit 9, and that customers like to receive change. However, despite the apparent plausibility of some of these explanations, they are largely based on speculation rather than objective evidence (Kreul 1982; Dodds & Monroe 1985).

Common Price Endings

In 1948, an analysis of 3,025 retail store advertisements in newspapers in 37 American cities revealed that 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).

Later, an extensive analysis of scanner data from a major supermarket chain revealed that over 80% of the store's prices ended in the digit 9 (Wisniewski & Blattberg 1983, 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).

Recent Research

An Observation of Price Endings in New Zealand

A pattern similar to overseas observations was found during a more recent odd pricing study carried out in Palmerston North, New Zealand (Holdershaw 1995). All home-drop advertising material, and all advertising displayed in two free weekly newspapers, and the local daily (*Manawatu Evening Standard*), was analysed over a seven day period.

An odd price was defined as a price which fell just below and within:

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

Thus, not every price which ended in an odd digit was considered 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 (in column centimetres), 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 (see Table 1).

Table 1. End digit preference: Palmerston North study 1995

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 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 retail pricing is far from equally distributed. 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 a further 30% of prices ending in the digit 5. Thus, 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%. Whatever pricing methods retailers use, there is a definite bias in favour of odd price endings.

Because the practice of odd pricing is widespread, its effectiveness may therefore seem self evident. 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). However, widespread use of odd pricing does not necessarily equate to greater than expected demand, at these prices.

Empirical Testing Of the Odd Pricing Assumption

Until recently there was no conclusive research evidence to support the assumption that odd pricing increases demand (Dodds & Monroe 1985; Schindler & Wiman 1989). Arguments for and against odd pricing have mainly been based on situations lacking experimental controls.

A study designed to empirically test this assumption involved analysing the differences between expected purchase probabilities and actual purchase probabilities for six products

(Holdershaw 1995). In total, ten odd price points were tested for an odd pricing effect in which estimated demand was noticeably greater at odd values. The test odd price points consisted of five 95 cent endings, three 99 cent endings, and two whole dollar odd prices; \$95 and \$99. Sensitivity to pricing occurred with nine of the ten odd prices tested. Although the differences between expected purchase probabilities and actual purchase probabilities were not statistically significant, the noticeable pattern that occurred of greater than expected demand at these price points offers support for the odd pricing assumption.

A more recent study (Wilton 1996) involved using choice modelling to estimate demand curves for three product categories and testing whether the predicted demand at price points which ended in 95 cents or 99 cents was significantly higher than expected. The findings of this study also provided strong support for the assumption that odd pricing generates greater than expected demand for some products. For each of the three product categories analysed by Wilton, demand was greater at both odd price points.

Another recent odd pricing study involved testing sales response to three versions of a direct mail catalogue for women's clothing (Schindler & Kibarian 1996). The catalogues were identical except for the price endings which were evenly divided between 00, 99 and 88 cent price endings. The 99-ending version produced 8% more sales volume than the 00-ending catalogue. The 99-ending catalogue generated more purchasers than the 00-ending catalogue, and those purchasers spent larger amounts. The 88-ending catalogue produced a similar sales volume and number of purchasers to the 00-ending catalogue. Schindler & Kibarian concluded from this study that the right-most digits may have a substantial effect on consumer purchasing.

Discussion

There is now some evidence to support the firm belief which exists amongst retailers that greater than expected demand occurs at odd price points. However, the reason for this effect is not known. The illusion of odd prices being much cheaper than even prices is certainly promoted in retail advertising by displaying a much smaller type size for cents digits than for dollar digits, thereby emphasising the dollar amount of the price. This factor may contribute to the illusion that odd prices are much cheaper than they actually are.

Alternatively, the odd pricing effect could be the result of 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-fulfilling outcome.

Factors that may influence the overall effect of odd pricing on demand include product quality, product type and price level. For example, some retailers traditionally use even pricing for expensive, high quality products to avoid an association between lower price and lower quality (Nagle 1987; Monroe 1990). However, it is not known whether odd pricing is effective for all product types and price levels. In relation to price level, there is some evidence that greater sensitivity to pricing occurred with lower priced products (Holdershaw 1995) and that sensitivity to particular price endings varied with price level (Wilton 1996). Further studies are required to investigate other factors which may determine the overall effect of odd pricing on demand.

The firm belief amongst retailers that odd pricing increases demand for products is reflected in the widespread practice of odd pricing. There is some support from three recent studies for the odd pricing assumption that greater than expected demand occurs at odd price points. However, there is still very little known about how the process occurs and whether the effect is the same for different products and at different price levels.

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