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Price Endings and Consumer Segmentation - Research Paper
Abstract

Purpose

To investigate the area of price endings to determine which groups of consumers are more likely to respond with 9-endings as opposed to round-endings.

Methodology

A questionnaire was developed that tested respondents' use of 9-endings as opposed to round-endings dependent on classification by gender and age. Respondents were required to estimate the price they would be expected to pay in stores for six products. This methodology enabled the researchers to generate a large sample size and to encourage accuracy of response.

Findings

The main finding was that there was a difference between gender groups; women were more likely to respond with 9-endings than men and hence segmenting the market is the way forward when investigating price endings.

Research limitations

The research only considers segmentation by gender and age. Further research needs to be undertaken to fully understand the consumer responses.

Practical implications

Although the difference between 99 cents and a $1.00 is small, for high volume items this can have a significant impact on gross profit and margins, particularly for low value items. If retailers understand which groups of consumers were more likely to be attracted to the round-endings they could use this knowledge to determine the most effective prices.

Originality/value

This research follows on from a price trial conducted into price endings and is the second phase of an investigation into whether 9-endings are effective. It proposes a theory that has been empirically tested and points the way forward for future research in this area.

Biographies

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Introduction

The authors are involved in a long-term project investigating issues concerned with price endings and the strategies that need to be adopted to generate the maximum gross profit. Retailers have long assumed that pricing the product just below a round number is favorable. It has been reported that of all advertisements in American newspapers, 60% of the prices ended with a 9 (Holdershaw et al., 1997). More recent observations show that 64% of all prices in the UK end with a 9 (Daily Mail, 2000). This practice is continuing despite a growing body of academics questioning the effectiveness of the practice (e.g. Bray and Harris, 2006, Georgoff, 1971) .

Research attempting to measure this phenomenon is limited, and a number of authors have found inconsistent results with some products appearing to favor round-ending prices while others appear to attract higher sales when 9-endings are used, the most notable of these being Ginzberg (1936). Most researchers conclude that price endings exert some influence on the consumers' decision making; however analyzing this effect has proved difficult. Anomalies in results always raise questions and research into differences around price ending effects was warranted. A proposed hypothesis was that in previous studies consumers have been assumed to be a homogenous mass, rather than groups of like-minded individuals and that only by segmenting the market would it have been possible to interpret the results. This paper reports the findings of research undertaken into one aspect of the price phenomenon; i.e. to determine the segments of consumers that were most susceptible to the 9-ending.

It has been noted that a variety of terminologies have been adopted by researchers to describe the price endings they have investigated. The precise nature of the studies perhaps reflected subtle changes in description. Early works in the area appear to have

favored the terms, Odd and Even price endings, with Odd pricing being the "ubiquitous practice of expressing a price so that it falls just below a round number" (Schindler and Wiman, 1989). Other terms used include Psychological pricing (alluding to the psychological effect odd pricing is purported to exert on the consumer), Round pricing (as the term suggests), and a number of variants around a '9-ending' theme. Work adopting any of these terminologies has relevancy to this study, which itself will use two terms: 9-ending prices and round-ending prices representing the two possibilities under evaluation.

The study did not aim to provide the definitive answer as to the 'right price' for a product as this depends on other factors within the marketing mix. Its aim was to provide research into part of the complex issue of determining the optimum price for a product in order to maximize gross profit for the retailer.

Literature Review

It has been suggested by some authors (Burns, 1995, Hower, 1943) that 9-ending pricing was introduced for operational reasons with the introduction of cash registers in 1879. The rationale behind this was thought to be that shop proprietors wanted to ensure tills were opened for each transaction to stop dishonest assistants from pocketing cash. However, opposing operational considerations have also been presented, suggesting that a number of retailers have adopted round-ending prices to prevent the need to give change, thus increasing transaction speed and reducing in-store queues (Stiving and Winer, 1997).

If retailers relied entirely on a cost plus system to set prices, there would be a greater variety of price endings. For the decision to use 9-ending prices to be a rational one retailers must perceive some benefit in the practice and assume a higher demand will be present at these price points.

Many authors have acknowledged that empirical evidence conclusively proving or disproving the theory that price endings affect sales volumes is extremely limited (e.g. Anderson and Simester, 2003, Holloway, 1973, Schindler and Kibarian, 1996). The few studies that have been conducted have mostly focused on the US market and have been undertaken in catalogue based fashion (Anderson and Simester, 2003, Ginzberg, 1936, Schindler and Kibarian, 1996).

Ginzberg (1936) reported highly inconsistent findings, while both Schindler and Kibarian (1996) and the later work by Anderson and Simester (2003) found consistent support for the use of 9-ending prices. Schindler and Kibarian's (1996) trial found a price elasticity of -267 between the round-ending prices and the 9-ending equivalent. While Anderson and Simester (2003) go to some lengths to justify the use of catalogue retail as a trial medium, (namely that it is possible to identify the sample of consumers and guard against the effect of stock-outs inherent in a store based environment), it is clear that this does present a somewhat false environment. When the consumer cannot physically interact with the product or its surroundings then 'price' may assume a greater informational role. Furthermore each of these studies have been conducted with relatively small sample sizes, and have focused solely on fashion purchasing; it is therefore unclear the extent to which these findings can be generalized.

Only three studies have been published where price endings have been empirically tested in a store-based environment. While the first two studies conducted in the 1970's did not find a statistically significant difference in the sales between round-ending prices and their 9-ending alternatives (Dalrymple and Haines, 1970, Georgoff, 1971), a recent study based in a UK non-fashion retailer discovered that sales in most

instances rose when product prices were increased from 9-endings to round-ending prices (Bray and Harris, 2006).

Despite the inconsistencies presented between these studies many academics have attempted to explain the effect that different price endings have. Anderson and Simester (2003) provided a useful taxonomy of these studies. The first group suggested that consumers analyze prices from left to right, stopping analysis once a difference is detected, essentially rounding down 9-ending prices (e.g. Bizer and Schindler, 2005, Gabor and Granger, 1964, Lambert, 1975, Schindler and Kibarian, 1993, Schindler and Kirby, 1997, Schindler and Wiman, 1989). These authors supported the propositions that suggested a lack of analysis of price endings, a premise that was opposed by the second group of researchers who suggest that consumers discern meaning from the price ending used (e.g. Schindler, 2006, Schindler and Warren, 1988, Stiving, 2000, Stiving and Winer, 1997). Within this research it is proposed that 9-ending prices communicate good value to a consumer, possibly highlighting a reduced price, and inferring lower quality, where the round-ending prices suggested higher quality.

It is clear that researchers over the years have experienced differing results from pricing trials leading to the diverse range of theories. For such diversity in results to occur there must be additional individual or contextual factors that influence the consumer's evaluation of price. Anderson & Simester's (2003) research did in part highlight this as they found that when a product was highlighted as 'new' or as a 'sale' item this increased the attractiveness of using 9-ending prices leading them to comment that:

> … the evidence that the effectiveness of price endings is moderated by
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> the context, in which they are used, may offer an explanation for the
>
> inconclusive findings in past studies (Anderson & Simester 2003 p.95).

The individual factors that may influence consumer evaluation of price endings are yet to be investigated. Consumer Behavior has been and continues to be a complex area of study, however much research has highlighted differences in the actions of males and females and consumers of different ages (e.g. Lui et al., 2006, Maxwell, 1999, Ndubisi, 2006, Powell and Ansic, 1997). The work of Maxwell (1999) has been the only research that assesses gender roles in price evaluation, however this work focuses on attitudes to price changes rather than assessment of discrete price endings. It is clear that a gap existed in the current body of knowledge which, once examined, may aid our understanding of optimal price setting.

Methodology

In order to investigate the price ending phenomenon two hypotheses were developed: H$_1$ the effectiveness of 9-endings depends on the gender of the consumer, and H$_2$ the effectiveness of 9-endings depends on the age of the consumer. The challenge was to design a research method that tested the consumers' susceptibility to the use of the 9-ending without leading them in any way. A decision was made to ask consumers to state the price they would expect to pay for products in store. This method would highlight which ending they used and hence which ending would be most appropriate for each target segment. It was decided to administer this by questionnaire rather than face-to-face interview in order to reduce the pressure on the respondent. The ease of administration meant that the sample size was large, increasing accuracy. The questionnaire was simply and concisely designed to ensure full completion by avoiding respondent fatigue. Respondents were presented with

photographs of six products and asked to write the price they would expect to pay for each product adjacent to it. Discussions took place as to whether a box should be provided for the answer but it was felt that this might indicate the number of digits to use. The questionnaire was entitled the 'The Generation Gap' and those respondents who inquired were informed that it was concerned with examining which sectors of the population could guess the correct price. A Comic Sans MS font was used throughout to emphasize the light-hearted aspect of the questionnaire and to discourage respondents from thinking too deeply about the price ending. Post questionnaire interviews with a sample of respondents revealed that they were surprised that the research was concerning the price endings and had not considered this when completing the questionnaire. On the back of the questionnaire respondents were asked to tick two boxes, one indicating their gender and one their age group. It would have been possible to also segment the sample using additional parameters, but the difficulty was determining the parameters and these additional parameters would also have necessitated a more intrusive questionnaire. Parameters such as class and geographic location were discussed, and a further study may be undertaken to examine these. A balance had to be made between increasing the questionnaire length and encouraging a high completion rate.

For a pilot questionnaire nine products were used, which was reduced to six for the final questionnaire by choosing those products that had the lowest standard deviation for price. It was felt that although the value placed on the product was not important, where there was a low standard deviation, it would suggest that the respondents had engaged with the product to a greater extent and were more likely to have considered the price carefully.

With any study of this nature, the choice of products was important. The products were selected on the following basis.

1. Products should as far as possible appeal to both sexes and all age groups.

2. Products should be classified as comparison products.

3. The product should be priced under $30 in order to minimize quality versus value issues.

4. Product pictures should be capable of good reproduction in 2D and black and white. Black and white was chosen as the preferred medium to avoid any color/price associations that might exist.

5. Products should be instantly recognizable with the aid of a brief description.

6. Products should not be known value items.

7. Products should not carry a brand name or be associated with a brand name.

8. Products photographs should all be taken from the same retailer Internet site to ensure that there was consistency of image quality.

The six products used on the final questionnaire were a desk fan, DVD tower, pine shelf, metal cash box, extension reel and a set of mugs. It was decided to have two columns each containing three images and respondents were asked to write the prices of the items in the order presented. It was thought that the order in which the items were presented might have affected the results. Given that there were six pictures in total the possible combinations were six factorial i.e. 720 ways in which the images could be presented. Six different layouts were generated, in each instance the items were moved one position in a counterclockwise direction. The authors made the decision not to use a random approach as it was considered that randomizing the order would eliminate the problem, but the authors' aim was not to eliminate the problem if it existed but to identify it and negate it.

The questionnaire was administered to a variety of groups of people, a Quota-sampling technique was used to ensure that each age group and gender was equally represented. The sample collected was mainly, but not exclusively, based on people resident in the south of the country. The results were based on a sample size of 580 completed questionnaires, giving a total of 3480 endings. Any questionnaires that were incomplete were discarded, some analysis was undertaken on these and they were found to contain a higher proportion of the 60 plus age group, suggesting that the methodology might have needed adapting for this age group.

Findings

The initial analysis of the results concentrated on testing the validity of research design in terms of the layout and the product. For each questionnaire the number of 9-endings was recorded, as only fully completed questionnaires were analysed, the number of round-endings was represented by the residual data. The number of 9-

endings in each position on the questionnaire and for each product is shown in Table I.

Take in Table I

Visual inspection revealed that there was very little difference between the number of 9-endings between different layouts and products. This was tested empirically using the Chi-squared test that resulted in values of 0.559 for the position on the questionnaire and 0.783 for the products indicating that any small differences in the number of 9-endings were likely to be due to chance.

Having established that the survey design was not influencing the results, attention was then focused on the research hypotheses, the first of which was concerned with gender differences. The males in the survey used a 9-ending on 560 occasions compared to the women's 670. Using the Chi-squared test a significance level of 0.004 was obtained, which meant that the Null Hypothesis had to be rejected in favor of H_1, that women were more likely to use the 9-ending than men were. There was a 0.4% likelihood that this result is due to chance. Further inspection of the data showed that men were more likely to use round endings for all products than women were.

The second hypothesis H_2 focused on age differences and the use of 9-endings. At the midpoint of the data collection the results indicated that use of 9-endings decreased marginally with age. The final results showed the number of 9-endings used was consistent across the age groups with the exception of the 60 plus age group that used fewer. Empirically the authors were unable to prove that the use of 9-endings was age dependent. It was felt that one of the reasons for this was perhaps that the grouping of ages had been flawed. The following age groups had been used in the survey: 15-29, 30-44, 45-59 and over 60. It was thought that viable results might have been obtained

if the exact age of the respondent was known, but this would have made the questionnaire more intrusive and led to more incomplete questionnaires.

Although not part of the original purpose of the questionnaire there were a number of interesting insights that came to light upon further exploration of the data. 49.65% of the respondents within the sample did not use any 9-endings at all compared to 30.86% who did not use any round endings. The remaining 19.49% used a mixture of endings, which was the group of most interest. This was examined further by researching the lowest and highest priced item in the respondents' set, to determine whether there was any pattern to the way in which respondents had used the price endings. Of this group who used a variety of endings, 67.64% used a round ending for the highest item and a 9-ending for the lowest price, whilst 32.34% had done the opposite of this. This would suggest that there are some links between price level and the type of ending that consumers associate with it. The authors felt that further research needed to be carried out in this area using the same methodology but with a wider range of prices before conclusive evidence could be presented.

There was a variation in the prices offered by respondents, further exploration revealed that the prices assigned with 9-endings, were lower by more than 1p than those assigned round-endings. The mean prices for all products are shown in Table II.

Take in Table II

This would also support the view that products with round-endings have greater quality/value associations than those with 9-endings.

Discussion

The research suggests that men are more likely to respond to round-endings whereas women are more likely to respond to the 9-ending price point. This factor needs to be considered when setting prices. These findings were used to try and understand the

previous field trials that had been conducted. The research of Bray and Harris (2006), which was conducted in a predominately male retail store, concluded that sales increased when prices were rounded up. Earlier research by Dalrymple and Haines (1970), and Georgoff (1971) had been undertaken in predominately female environments and this new research supports their view that the introduction of 9-endings increases sales. This, however, presents a simplistic view of what is a complex phenomenon and other factors within the marketing mix cannot be ignored. Men do not exclusively prefer round-endings and the converse is also true for women. There was a group of respondents (19.49%) including males and females that used both ending types on the questionnaire.

Explanations for price ending effects fall broadly into two categories. Firstly those that suggest the consumer does not assert great attention to the right hand digits of a price, and those that purport that the price ending is highly communicative of some attribute of that product as highlighted in the literature review. The research presented here has shown that some respondents are not interested in using decimals for price and limited themselves to one and two digit answers. It would have been interesting to see how many significant digits they would use if the price of the item was in thousands rather than tens. People's ability to process information deteriorates with age once maturity is reached. This might explain why the over 60's in the sample showed some preference for round-endings. The information presented in Table II, opposes this theory, if an item is priced at $9.99 then theory suggest that this will be processed as $9.00 a round-ending. In the research, however, the average price for round-endings was significantly higher than for those given 9-endings. Whilst this result is contrary to the digit processing theorist it supports the second group theorists who purport the view that price communicates a value/quality attribute. Of those

respondents using a mixture of 9-endings and round-endings, 67.64% used the round-ending for their highest priced product and the 9-ending for their lowest priced product. This should, however, be viewed in the context of the research design. The products were chosen that had very similar prices in order to try and avoid quality/value issues. Again further research needs to be undertaken to fully explore this area. There were 33 respondents who used the 9-ending for their highest price item and a round-ending for their lowest priced item and their actions remain unexplained.

This research furthers our understanding of price ending effects significantly, however it poses a number of further questions that need probing in future research. The why questions, why did the male consumer use more round-ending prices? Is it their inability to, or lack of interest in processing digits or do they seek higher quality goods? Conversely is the female shopper more budget conscious, looking for value and analyzes prices in detail?

This research does, however, significantly aid our understanding of the inconsistencies that empirical trials into price endings have demonstrated.

Conclusion

This research demonstrates that men and women do consider price ending differently, and that women are more likely to favor 9-endings prices. Further research is necessary to provide greater understanding of this assertion, however these findings complement rather than contradict the existing literature in this area and serve to explain why academics over the years have found that field trials in this area have presented inconsistent findings.

Research into a multifaceted problem always needs to be taken one step at a time. The aim of this research was to put one of the building blocks in place. The research has

shown that in order to understand consumers' response to price researchers need to segment the market, rather than treat it as a homogeneous mass. Gender and age are not the only means of segmentation and researchers will need to try many different factors one at a time. Directions for further empirical research into this area have been highlighted through the findings and discussion sections, such as exploring age further, value/quality issues and digital processing. The authors would suggest that the first action should be for other academics and practitioners to test the theory that men and women respond differently to price endings using their own methodology in order to validate this research.

Practical implications

Whilst the research has focused on one small aspect of the pricing decision process its implications are inversely proportional. If, in every male dominated store, product prices were raised by 1 cent without adversely affecting sales and potentially increasing them, then the increase in gross profit would be significant, particularly when selling fast moving consumer goods. For every 100 items sold an extra $1.00 is added to the gross profit.

For retailers at this stage it is sufficient to understand that the 1p extra margin will not be at the expense of sales. In the long term it is important to understand why this is valid for some consumers and not others.

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Tables to be taken in

Table I Number of 9-endings by position and product

Position	Number of 9-endings		Product	Number of 9-endings
1	220		Fan	208
2	220		Shelf	193
3	197		Metal Cash Box	202
4	193		Set of Mugs	198
5	193		Lamp	222
6	207		Extension Reel	207
Total	1230		Total	1230

Table II Comparison of mean price endings

Product	Mean 9-ending price	Mean round-ending price	Mean price all endings
Fan	12.50	15.31	14.27
Shelf	10.97	13.64	12.77
Metal Cash Box	8.62	10.53	9.87
Set of Mugs	5.59	6.60	6.26
Lamp	8.32	10.16	9.47
Extension Reel	10.00	11.97	11.29