Penny Wise and Pound Foolish: The Left-Digit Effect in Price Cognition

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Journal of Consumer Research

Objectives of the Research

This study conducts five experiments to elaborate why nine-ending prices are recognized as significantly smaller than a price one cent higher. Past studies (Monroe 2003 et al.) hold different views that customer do not react to slight price change. Nevertheless, recent researchers suggest that the last digit of a price does matter (Anderson et al.). Firstly, this phenomenon occurs when the leftmost digits differ. Secondly, the numerical and psychological distances of the target price and the competing product price will influence the left digit effect. Thirdly, the left digit effect is not only confined to prices; it is also applicable to other multidigit numbers, such as pure numbers or quality ratings.

Literature Review

The research apply analog model to illustrate how nine-ending prices are evaluated. The conversion from number to magnitude influences the precision of the numbers being encoded (Dehaene 1997). The underlying proposition is that left-to-right processing of digits affects the magnitude conversion process and view the leftmost digit as the index of price magnitude. Following are three effects that support the proposition.

➢ Left-Digit Effect

The left-digit effect emphasizes the change in the left digit rather than the one cent drop that really affect the magnitude perception. During the comparison process, leftmost digit plays a crucial role. Customers tend to underestimate the magnitude of nine-ending price if the leftmost digit is 1 dollar smaller. One possible reason for the effect is that the encoding process starts even before we finish reading all the digits. Consequently, we will consider the leftmost digit to be its magnitude.

➢ Distance Effect

The left-digit effect does not hold for every situation. When it is difficult for the internal mechanism to distinguish between two numbers, left-digit effect happens. However, if it is easy to compare two numbers, left-digit effect will not activate. The distance effect can explain this phenomenon. If the perceived distance of the two numbers get closer, more efforts (time) are required to compare their magnitude. The

research proposes that distance effect will determine the left-digit effect by some extent. When comparison gets more difficult, our brain will compare the leftmost digit directly.

➢ Domain Invariance

Domain Invariance indicates that the left-digit effect and distance effect does not confine to the domain of prices only. These two effects also manifest with other multidigit numbers. If the effects are partly draw from the left-to-right processing, these effect should be applicable to other domain. Consequently, the research hypothesizes that if the distance between the numbers decreases, left-digit effect will enhance not only in the domain of prices but in other types of nine-ending numbers.

Research Method

The research invites around 200 undergraduate students from a large northeastern university to participate in the experiments. The study employed a 2×2, a 2×2×2×3 and other mixed factorial designs. The participants are told to compare the designed price in each product category. Carrying on, participants reported their price magnitude for each designed product on five-point Likert scales with responses, 1= "Strongly disagree"and 5="Strong agree"for the statement " pens's price is high".

The research then applied ANOVA to verify whether the results reach significance or not.

Discussion

Results from the five experiments support the left-digit effect, the distance effect, and domain invariance. The research indicates that nine-ending prices are not always perceived significantly lower than a price one cent higher. The left-digit effect may happen when the leftmost digit change. Also, the perception is more likely to appear when the nine-ending price is close to the comparing price. Furthermore, the study demonstrates that left-digit effect also applicable to the domain of quality ratings and unspecified general numbers. However, there are some unanswered questions for future research. Will the primacy effect of left digit appear when the right digits are not 99? A related question aroused: will numbers such as 2.95 and 2.93 also be underestimated in the same way as 2.99. Another unanswered question is that whether the second left or other non-leftmost digits have an impact on the perception of the number's magnitude.

<u>Comments</u>

The study did not take product categorizes into consideration. For luxury goods, the left-digit effect may manifest as well.But it may not be that important as other dimension. Some people buy luxury good to demonstrate their high class image and different social status. Consequently, even they perceive 19,999 to be smaller than 20,000. They don't really care about the difference. The price of 20,000 may be perceived to be with higher quality or higher class.

Left-digit effect may have different impact on tangible products and intangible services. I am wondering if a barber shop implements the nine-end price strategy, will this strategy increase their revenue.

Choosing What I Want Versus Rejecting What I Do Not Want: An Application of Decision Framing to Product Option Choice Decisions

C. Whan Park, Sung Youl Jun, and Deborah J. Macinnis

Journal of Marketing Research

Objectives of the Research

Applying different means to present alternatives may have varied impacts on the information been perceived by the decision maker. Consequently, this may lead to various ultimate decisions. To get deeper insight of the way customer make their final decision, three studies are conducted to examine how, why, and when two different option framing methods affect customers' option choice decisions.

The study includes two different option-framing methods: additive option framing (+OF) and subtractive option framing (-OF). +OF displays the base model with a bottom price. Customers are asked to include the options they do want and hence raise the total price. In contrast, -OF offers customer with a fully equipped product and a relatively high price. Customer then asks to delete unwanted options and hence decrease the total payment. Under +OF condition, the customer has to determine the tradeoff between utility gain and monetary loss. In the -OF case, customer are put in the position of losing utility by deleting options but compensated by a lower price.

Past marketing research has provide limited insight of whether –OF is more managerial preferred than +OF. Consequently, empirical validation are included in the research to support the relative efficacy of –OF on the number of options chosen. Secondly, not only the numbers of option chosen is important to manager but moderator variables that affect the differential attractiveness of +OF and –OF are crucial. These moderators are option prices, product categories, regret anticipation, and product category commitment. Lastly, the study explores the relative ability of –OF versus +OF on consumer-relevant outcomes.

Literature Review

Following are the theoretical backgrounds of the research. Firstly, +OF and –OF have different vantage or reference point when consumers start their choosing process. +OF's reference point is the base model while –OF's one is the fully equipped model. Loss aversion (Thaler, 1985) is then introduced to illustrate the major difference of the two reference state. Loss aversion implies that –OF consumers may be more sensitive to losing utility resulted from deleting an option than +OF consumers are to gain

utility by adding the same option. Furthermore, loss aversion for utility is greater than aversion to price (Hardie, Johnson, and Fader 1993). Therefore, greater utility loss aversion is expected to make –OF consumers more unlikely to delete options than +OF consumers to add options. This will result in more option chosen in the –OF condition.

Past researches suggest that when facing with choosing or rejecting alternatives, people tend to keep more choices by using choosing mechanism than by using rejecting (Shafir, 1993). Accordingly, this research expect that subjects will choose more options with –OF than with +OF.

Research Hypotheses

The research identifies seven hypotheses. Hypothesis 1 to 3 are to examine the perception of higher price, greater difficulty in choosing decision, and more value from the final decision in the –OF condition than in the +OF condition. Hypothesis 4 , 5, and 6 are designed to examine the influence of three moderator variables(option prices, product category price, and regret anticipation) on option numbers selected in the two OF conditions. Hypothesis 7a and 7b are used to investigate the relationships between product category buying commitment and real category purchase under two OF conditions.

Discussion

According to the three studies, consumers tend to choose more options and paid more under –OF condition than +OF. The –OF effect manifest regardless of varying option prices and various product categories. When participants are requested to take regret into consider, the effect magnified. The research also discovers that applying –OF will make the option-choosing task more enjoyable than using +OF strategy. However, the –OF effect does not always manifest. Under –OF condition, low buying commitment will have a negative effect on product category purchase.

Incidental Prices and Their Effect on Willingness to Pay

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Journal of Marketing Research

<u>Objectives of the research</u>

Past research has examined the relationship between internal and external reference prices and how the reference prices influence the actual price consumer willing to pay. Past research also identified the impacts of exposing to prices for the same product or similar products. Very little studies have illustrated that irrelevant numbers will have impact on willingness to pay. Therefore, this research focuses on discovering how irrelevant prices (incidental prices) or numbers affect consumer's willingness to pay.

The authors identify how extraneous goods' prices presented in the buying environment alter consumer's willingness to pay systematically. First of all, the study shows that the anchoring effect happens oblivious. Consumers are not aware of their subconscious comparison for incidental price. Secondly, the study discovers that extreme value have greatest impact on willingness to pay when it come across just before the buying process.

<u>Literature Review</u>

Psychological research unveils that unrelated numbers can affect decision making. The term anchoring refers to how random starting points systematically affect people's estimation. Anchoring effects are remarkably robust, occurring even when anchor values are uninformative.(Tversky and Kahneman 1974). People are always subject to confirmation bias(Klayman and Ha 1987), they incline to concentrate on semantic information that is consistent with the anchor. This will lead to estimating somehow toward the anchor. Nevertheless, other research indicates that anchors can be effective even if it is designed to be semantically irrelevant (Wilson et al. 1996). Some researchers suggest that numbers or subliminally primed numbers can affect the standards selected for comparative judgments (Adaval and Monroe 2002). This research is the first to examine the different aspects of individual values in a sequence of potential anchors.

<u>Research Studies</u>

The research conducted three studies that consist of laboratory and empirical studies. These studies investigate several possible moderator variables. The first experiment is a real case setting; they advertise a high price for a certain period than

change to a low price of the irrelevant product in the buying environment. The authors hypothesize that high incidental price will elevate consumer's willingness to pay for the focal product. In study 2, the authors examine the effects of moderator variables that include their attention on the anchor, applicability of the anchor, and the order of the anchor which exposed to the consumers. In study 3, the research gathered real world data from one of the automobile auctioneers in the United States. Two major characteristics make English automobile auction suitable for an anchor study. First, Bids on previous car provide little or limited information for bidders on future, dissimilar cars. Second, information is fully displayed to the bidders. Comprehensive price guide that offer detailed information are widely available.

Discussion

This research uncovers the underlying mechanism of how incidental price alter people's willingness to pay to some extent. According to the result of the first experiment, the authors pointed out that a relatively high incidental price will elevate the maximum price a person willing to pay for the focal product. Second study gives us an insight of how potential moderators affect people's willingness to pay. If the anchor is applicable to the focal product, the effect will be enlarged. Changing the order of an anchor will lead to different effect. Final number will have an uneven effect. Furthermore, the research discovers that trying to draw people's attention from the anchor does not decrease the effect. In the last study, statistics prove that incidental price will indeed affect customer's willingness to pay.

An Empirical Analysis of Internal and External Reference Prices Using Scanner Data

Glenn E. Mayhew and Russell S. Winer

Journal of Consumer Research

Objectives of the Research

It has aroused widely attention to analyze whether the subject of the reference prices are helpful to provide insights of consumer choice. Two major types of reference prices are identified: internal reference price and external reference price. Internal reference price refers to the price that exists in consumer mind already. It is the concept of last purchase, fair, or other price concepts (Klein et al. 1987). External reference prices are the price presented in the purchase environment. In short, it is always the "suggested retail price."

Past research examine the effects of the two reference prices on consumer decision separately. No further comparisons are done. To understand the relative effects of the two reference prices on consumer decision, this research analyzes empirical data to identify their impact on brand choice. In other words, the research attempts to realize whether internal reference price and external reference price influence brand choice simultaneously.

Literature Review

Prior research has concentrated on internal reference price. Winer (1989, 1996) analyzes coffee category scanner data and discovers that internal reference price influence to be substantial. Various studies include prospect theory. Gurumurthy and Little discover that losses and gains respect to the reference price had significant and asymmetric effects on choice probabilities. Past researchers also uncover that newspaper features or display variables heavily affect brand-choice probabilities (Gurumurthy et al. 1988). None of the studies above endeavor to take external reference price into account.

One lately research on external reference price investigates whether the signaling effect or the amount saved is more important in brand choosing. Other research indicates that consumers may respond more strongly to promotional signals than to the size of the discount (Dickson et al. 1990). Another research demonstrates that consumers react more strongly to the number of discounts than the size of the discounts in making value judgments (Buyukkurt 1986).

Past research examines the effect of internal and external reference price individually. This study investigates their influence on brand choice together rather

than examine their effect separately.

Research Models

The study develops two models based on McFadden's (1974) conditional multinomial logit model. The models are as follow:

$$U = \beta_1 Item_t + \beta_2 LagPurch_t + \beta_3 P_t^{store} + \beta_4 IntLoss_t + \beta_5 IntGain_t + \beta_6 ExtValue_t$$
$$+ \beta_8 AdFeat_t + \beta_9 Coupon_t$$

$$U = \beta_1 Item_t + \beta_2 LagPurch_t + \beta_3 P_t^{store} + \beta_4 IntLoss_t + \beta_5 IntGain_t + \beta_7 ExtDummy_t$$
$$+ \beta_8 AdFeat_t + \beta_9 Coupon_t$$

$Item_t$　：A brand specific dummy variable

$LagPurch_t$：0 or 1 variable indicating whether the brand was purchased last time

P_t^{store}　：Regular price for the brand

$IntLoss_t$：If P_t^{store} is bigger than internal reference price, $IntLoss_t$ is the difference between P_t^{store} and internal reference price. If P_t^{store} is smaller than internal reference price, 0.

$IntGain_t$：If P_t^{store} is smaller than internal reference price, $IntGain_t$ is the difference between internal reference price and P_t^{store}. If P_t^{store} is bigger than internal reference price, 0.

$ExtValue_t$：$P_t^{reg} - P_t^{store}$

$ExtDummy_t$：Indicator variable to show whether there was a special reduced price

$AdFeat_t$：0 or 1 variable of ad feature that were not accompanied by price reduction

$Coupon_t$：The value of coupons used in the purchases

Discussion

　　　The study comes up with some conclusions. Empirical evidences support that internal reference prices play an important role in purchase decisions. It also suggests that external reference prices heavily influence brand-choice decision. Following on, the study indicates that price cut signal probably is more crucial than the size of price cut. This agrees with the indications of Inman et al.'s research.

Integration

There has been a considerable amount of research on consumer purchasing behavior. Four related topics are included this time. To look at these researches in a more comprehensive way, we first outline the key findings of each research. Carrying on, we will identify the relationship and interconnection between these ideas.
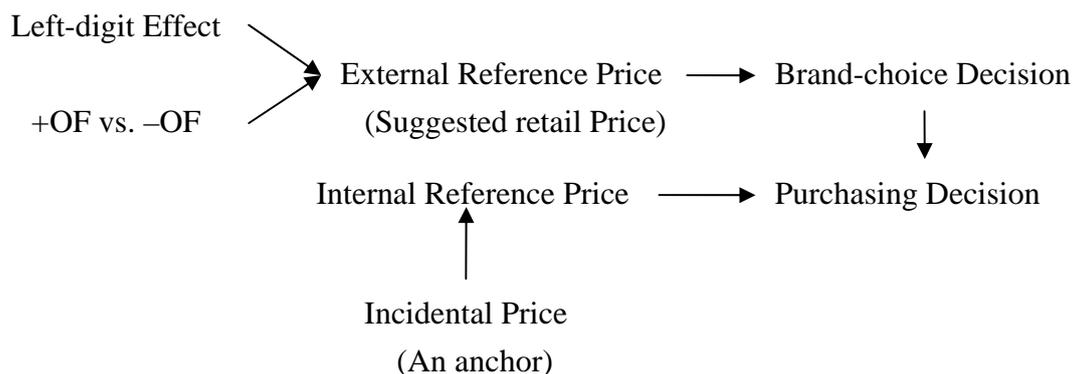
Price perceived by a consumer always heavily affects his/her purchasing decision. Manoj Thomas and Vicki Morwitz (2005) conduct five studies to investigate the effects on price perception of left-digit effect. The researcher discover that the left-digit effect will occur only when the leftmost digit differ Secondly, the numerical and psychological distances of the target price and the competing product price will influence the left digit effect.

Different ways to display alternatives may lead to varied effects on the information been observed by the decision maker (Brown et al. 1997). In the purchasing condition, the decision maker is always the consumer. C. Whan Park et al. (2000) investigate the effects of +OF and –OF on customers' option choice decisions. The research suggests that consumers tend to choose more options and paid more under –OF condition than +OF. –OF will be perceived to have higher price. It also reveals that when product category purchase commitment is low, OF will have no effect on purchasing decision.

Irrelevant numbers and prices seem to have connection with consumer's willingness to pay for the focal product. However, the statement is wrong. On the contrary, past research identifies that incidental price in the buying environment will change willingness to pay (Nunes and Boatwright 2004). The research suggests that high incidental price will elevate consumer's willingness to pay. It also examines the moderators' impact on willingness to pay. Further, changing the order of extreme number will have uneven influence on willingness to pay.

Prior research indicates that not only internal but external reference price will influence purchase decision. Mayhew and Winer (1992) suggest that internal reference prices greatly influence purchase decisions. Moreover, the researcher suggests that external reference prices largely affect brand-choice decision. Also price cut signal probably is more crucial than the size of price cut.

The following picture is the interconnection of the ideas or theories mentioned above.

Left-digit Effect

+OF vs. –OF　　　　→　External Reference Price　——→　Brand-choice Decision
　　　　　　　　　　　(Suggested retail Price)　　　　　　　　　↓

　　　　　　　　　　Internal Reference Price　——→　Purchasing Decision
　　　　　　　　　　　　　　↑

　　　　　　　　　　　Incidental Price
　　　　　　　　　　　　(An anchor)

Firstly, we can identify that the external reference price will be influenced by left-digit effect and the underlying option-framing method. Left-digit effect will make the external reference price perceived to be smaller (Thomas and Morwitz 2005). Under –OF condition, external reference price will perceive to be higher (C. Whan Park et al. 2000). According to Mayhew and Winer (1992) research, external reference prices greatly influence brand-choice decisions. Being served as an anchor, incidental price will influence consumer's willingness to pay (Nunes and Boatwright 2004). Under this construct, willingness to pay is the price that consumer have in mind and consider it to be reasonable. I think that maybe willingness to pay is exactly the same as internal reference price of a consumer. If this inference is right, incidental price will affect consumer's internal reference price and hence influence his/her purchase decision.

Critiques

Thomas and Morwitz (2005) prove that left-digit effect does hold under some conditions. However, the research did not take internal reference price into account. Maybe it will affect consumers' perception of the price. For example, a consumer has an internal reference price for an ipod nano which is 480 RMB (The price he/she checked from online 3C-shopping lately). There is a 3C-product sale in a mall priced the ipod nano to be 499 RMB. The consumer may not think the price to be cheap or significantly lower than 500 RMB. Therefore, left-digit effect may not distort consumer's perception.

Nunes and Boatwright (2004) make great contribution to prove that incidental price will influence willingness to pay for the focal product. According to their three studies, we can conclude that when consumer has high product category purchase commitment, incidental price will affect willingness to pay. However, under low purchase commitment, will incidental price still influence consumer willingness to pay? Monroe (1990) indicates that when product category purchase commitment is

low, consumer may be highly sensitive to price. Therefore, I am wondering whether the effect of incidental price will be weakened. For example, consumer already thinks the product is not essential. If in the end, he/she decides to buy the product. Will the incidental price still have its impact on willingness to pay? More empirical evidences are needed to provide insight of this thought.

When consumer has low purchase commitment, consumers may be highly price sensitive (Monroe 1990). It is shown that external reference prices greatly influence brand-choice decisions (Mayhew and Winer (1992). Under this condition, applying the promotion signal and change the leftmost digit may be useful. The price will perceive to be lower. This strategy may somehow change consumers' purchasing decision and encourage them to buy those product unwanted in the beginning. I am thinking that's why most of the supermarkets implement this trick all over the world.

According to the research, incidental price will influence willingness to pay. If this is the case, then every cover of a product can print on a very big number on it, such as product identification number. All the stores can put an extreme big numbers sign near their counter. Also the extreme number will influence most when it is seen most recently (Nunes and Boatwright 2004). I am wondering the effect should not manifest all the times. There must be some exception for this phenomenon.

Research Extensions

Nunes and Boatwright (2004) advanced that further research of incidental price can focus on examining the effects of not only high anchor but also low anchor. Further research on low anchoring effect is desired. If low incidental price will influence consumer willingness to pay, say have a negative effect. This may be interesting. For example, most of the stores want their product or service be influenced by high incidental price (high anchor). They may choose to open besides a Luxury product store. On the contrary, the stores that provide service or product with high price do not want to be influence by low incident price (low anchor). Choosing places to operate their business will become very difficult.

In Taiwan, TV shopping is getting more and more popular in recent years. There are three major companies that run more than seven channels. There are some local TV shopping companies as well. I am wondering that we can collect the data from the three major companies to conduct empirical experiment to examine the effect of incidental price. These TV channels sell a variety of products, from luxury jewels to daily supplies. Consequently, we can examine not only the high anchor effect but also low anchor effect.

Left-digit effect may have different impact on tangible products and intangible services. I am wondering if a hair salon implements the nine-end price strategy, will this strategy increase their revenue. I choose hair cut for example owing to its own characteristics. Usually people have their hair cut once in a month (a certain period), the period may be longer or shorter for each individual. Some of the people preferred to have their hair cut by only one or two fixed hair designers and some do not. For those who have certain designers, the left-digit effect may not influence him/her significantly. Maybe this can be viewed as the result of having high loyalty.

Moreover, if they really change the leftmost digit to make the price of cutting hair perceived to be lower, will there be a negative effect of this strategy. I am wondering customers may have a pre-conceived mindset that the hair salon does not provide good quality service because of the cheap price. If this is the case, then left digit effect will certainly not increase its revenue.

All the marketing strategies mentioned in the four articles have their benefits, but their limitations as well. If companies can correctly and strategically implement these ideas at the right place and the right time, it should be very likely that they would experience a revenue increase. By doing so, it would also increase the usage value of the four articles.

Reference

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