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European Retail Research

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Preface

EUROPEAN RETAIL RESEARCH is a new bi-annual that is in the tradition of the reputable book series “Handelsforschung” (Retail Research) which has been published by Prof. Dr. Volker Trommsdorff in Germany for more than two decades. Since 2008, this publication is edited by a team of retail researchers from Austria, Germany, and Switzerland.

The aim of this book series is to publish interesting and innovative manuscripts of high quality. The target audience consists of retail researchers, retail lecturers, retail students and retail executives. Retail executives are an important part of the target group and the knowledge transfer between retail research and retail management remains a crucial part of the publication’s concept.

EUROPEAN RETAIL RESEARCH is published in two books per year, Issue I in spring and Issue II in fall. The publication is in English. All manuscripts are double-blind reviewed and the book invites manuscripts from a wide regional context but with a focus on Europe. We respect the fact that for many topics, non-English literature may be useful to be referred to and that retail phenomena from areas different from the US may be highly interesting. The review process supports the authors in enhancing the quality of their work and offers the authors a refereed book as a publication outlet. Part of the concept of EUROPEAN RETAIL RESEARCH is an only short delay between manuscript submission and final publication, so the book is – in the case of acceptance – a quick publication platform.

EUROPEAN RETAIL RESEARCH welcomes manuscripts on original theoretical or conceptual contributions as well as empirical research – based either on large-scale empirical data or on case study analysis. Following the state of the art in retail research, articles on any major issue that concerns the general field of retailing and distribution are welcome, e.g.

- *different institutions in the value chain*, like customers, retailers, wholesalers, service companies (e.g. logistics service providers), but also manufacturers’ distribution networks;
- *different value chain processes*, esp. marketing-orientated retail processes, supply chain processes (e.g. purchasing, logistics), organisational processes, informational, or financial management processes;
- *different aspects of retail management and retail marketing*, e.g. retail corporate and competitive strategies, incl. internationalisation, retail formats, e-commerce, customer behaviour, branding and store image, retail location, assortment, pricing, service, communication, in-store marketing, human resource management;
- *different aspects of distribution systems*, e.g. strategies, sales management, key account management, vertical integration, channel conflicts, power, and multichannel strategies.

Basically, we seek two types of papers for publication in the book:

- *Research articles* should provide a relevant and significant contribution to theory and practice; they are theoretically well grounded and methodologically on a high level. Purely theoretical papers are invited as well as studies based on large-scale empirical data or on case-study research.
- Manuscripts submitted as more *practice-oriented* articles show new concepts, questions, issues, solutions and contributions out of the retail practice. These papers are selected based on relevance and continuing importance to the future retail research community as well as originality.

In addition, the editors will invite articles from specific authors, which will also be double blind reviewed, but address the retailing situation in a specific country. Manuscripts are reviewed with the understanding that they are substantially new, have not been previously published in English and in whole, have not been previously accepted for publication, are not under consideration by any other publisher, and will not be submitted elsewhere until a decision is reached regarding their publication in EUROPEAN RETAIL RESEARCH. An exception are papers in conference proceedings that we treat as work-in-progress.

Contributions should be submitted in English language in Microsoft Word format by e-mail to the current EUROPEAN RETAIL RESEARCH managing editor or to info@european-retail-research.org. Questions or comments regarding this publication are very welcome. They may be sent to anyone of the editors or to the above mentioned e-mail-address.

Full information for prospective contributors is available at <http://www.european-retail-research.org>. For ordering an issue please contact the German publisher “Gabler Research” (www.gabler.de) or a bookstore.

We are very grateful for editorial assistance provided by Tim Böttger.

Graz, Fribourg, Siegen, Trier, Vienna and St.Gallen, Fall 2011

*Thomas Foscht, Dirk Morschett, Hanna Schramm-Klein, Peter Schnedlitz, Bernhard Swoboda
Thomas Rudolph (managing editor for Volume 25 Issue II)*

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Several Aspects of Psychological Pricing: Empirical Evidence from some Austrian Retailers

Udo Wagner and Jutatip Jamsawang

Abstract

This empirical study concentrates on several aspects of price perceptions, especially on price endings, the first (non-zero) digit in a price, symbolic meanings, eye-catching sequences, and price cuts framed in percentage or euro terms and uses a descriptive design to determine the extent to which retailers of grocery, furniture, clothes, hardware, consumer electronics, and food apply these psychological pricing methods in Austria. Odd and even pricing are common practices for a wide range of prices. Remarkably, a low number of price points generate more than half of the sales for groceries and clothing. Benford's law regarding first digits applies for furniture shops. The unlucky digit 4 appears less frequently in price endings in Chinese restaurants. The lucky number 9 is more frequently used on Chinese menus. Few retailers employ prices made up of digits that form a striking pattern. Finally, the lower the price cut, the more likely the discount gets promoted in terms of percentages off.

Keywords

price endings, Benford's law, number symbolism, price promotion framing

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1 Introduction

Many types of discount stores have gained considerable market shares throughout the industrialized world in the past two decades, largely driven by customers' favorable perceptions of their prices. Prices thus determine profits more effectively than sales quantity or costs (Simon/Fassnacht 2009, pp. 1-5), and pricing plays a dominant role in terms of ensuring the economic prosperity of a company. Yet in view of their generally small margins, the success of discount stores is remarkable. Discounters demonstrate that it is possible to (over)compensate for decreased unit profit contributions by increasing sales quantity, store traffic, cross-selling, and other methods that help leverage discounters' positions when they negotiate wholesale prices. From a marketing perspective, it also appears that price-setting procedures might not be driven solely by cost considerations but also by, for example, psychological reasoning. Retailers other than discounters also have adapted their pricing strategies, such that psychological pricing has become a common practice.

In contrast, several text books on pricing (e.g., Nagle/Hogan 2007, Schmalen 1995) do not discuss aspects of behavioral pricing at all. Reasons for this might be that the use of psychological pricing probably depends on culture (Levy et al. 2007) or has intensified recently. Previous research carried out by the authors revealed an important role of such pricing tactics at least in Austria and, therefore, it was decided to document this phenomenon more systematically. By doing so, further research on this issue should be stimulated.

In seminal early papers, Monroe (1971a, 1971b) applied psychophysical principles to marketing issues and introduced the notion of price perception, that is, customers' subjective encoding of price impressions, induced by objective prices and other (price) signals. Subsequently, other scholars have worked on this issue and introduced various theoretical concepts underlying behavioral pricing (for an overview, see Diller 2008, pp. 120-132). This article in turn investigates the spread of psychological pricing in various retail markets in Austria. In particular, this analysis investigates the use of five different aspects of psychological pricing: price endings, the first (non-zero) digit in a price, symbolic meanings, eye-catching sequences, and price cuts framed in percentage or euro terms.

The remainder of this article proceeds as follows: Section 2 provides a brief overview of the different ways available to shape price perceptions. Section 3 then describes the design of the empirical study, and Section 4 presents the results. Finally, Section 5 concludes with a summary of the implications, some limitations, and avenues for further research.

2 Conceptual outline of price perceptions

The proposed research agenda deals with behavioral pricing applied in practice by asking, to what extent are the psychological price-setting tactics discussed in prior literature actually used in selected retail markets in Austria? Because of space limitations, this article concentrates on five aspects of price perceptions, though extant literature has proposed many others. In addition, pragmatic reasons when collecting data for this analysis called for a moderate research agenda. These types of behavioral pricing are briefly introduced herein; the references cited provide more detailed explanations.

2.1 Price endings

Monroe was the first author to conduct psychophysical experiments to analyze price threshold, in which he found that consumers compare actual prices for a prospective purchase against a mental interval of acceptable prices (Monroe 1971a, 1971b). Prices outside the ranges of acceptable prices, whether beneath or above the price threshold, likely exert a strong impact on demand. Monroe (1973, 1990) also has extended his work to introduce the notion of psychological pricing to the marketing discipline.

The most frequently used psychological pricing method applies price endings, that is, odd and even prices. These prices represent a straightforward managerial implementation of potential threshold effects and are frequently used by retailers (Gendall/Fox/Wilton 1998, p. 421). Odd prices usually are a little less than a round number (e.g. 0.65€, 0.98€, 5.99€), and the round number is assumed to be the threshold. However, a round number in psychological terms clearly depends on the price level, such that 95€ or even 890€ might be regarded as odd prices. In the class of odd prices, 9-ending prices are of particular importance. Bizer/Schindler (2005, p. 772) emphasize that odd prices increase the probability that purchase transactions involve receiving change from the cashier, which might induce (positive) perceptions of getting something extra in return for a purchase (also see Guéguen/Legoherel 2004, p. 195).

In contrast, even prices equal a round number (e.g. 0.70€, 1.00€, 6.00€) (Pechtl 2005, p. 34). Schindler/Wiman (1989) show that people recall 0-ending prices more precisely than odd prices. Even prices also facilitate communication and increase price perceptions and recognition (Schindler/Kirby 1997, p. 193). In addition, even prices ending in 00 (e.g. 10.0€, 100€, 1000€) might induce even more pronounced effects.

Stiving/Winer (1997) also analyze price endings from a behavioral point of view, such that they consider *level* and *image effects* that support odd pricing. Level effects describe consumers' tendencies to ignore the last significant digits, rather than undergo a proper rounding calculation. Even though consumers see the cents, they subconsciously ignore them partially

(e.g. 31.95€ and 31.99€ both get truncated to 31€). These level effects also include left-digit anchoring, such that buyers judge the numerical difference of two prices by anchoring on the left-most digits (e.g. the difference between 7.99€ and 9.00€ seems closer to 2€ than to 1€ because their judgments are anchored on the left-most digits; Anderson/ Simester 2003, pp. 105-108). Furthermore, level effects take account of customers' limited memory capabilities, in that people tend to recall only the left-most digits of a price (e.g. a price of 57.95€ might be retrieved as 57€ from memory; Schindler/Wiman 1989, pp. 166-168). Stiving/Winer (1997, p. 60) also distinguish between two types of image effects: a price image effect that indicates odd prices are associated with a bargain or a product on sale (Schindler 2006, pp. 71-72) and a quality image effect that implies odd prices signal products of lower quality, whereas even prices communicate high quality (Stiving 2000, pp. 1617-1618; Schindler/Kibarian 2001, p. 96).

Many authors reveal heavy usage of odd pricing by retailers, especially for frequently bought goods (Gendall/Fox/Wilton 1998, p. 421; Levy et al. 2007, p. 10; Wagner/Grohs/Stadler 2001, pp. 112-114). The popularity of odd prices is also evident in higher-priced merchandise sectors, especially if consumers are highly involved (Kleinsasser/Wagner 2011, pp. 59-61). However, empirical evidence about the effects of odd pricing on profits for a single product (i.e., ignoring potential increases in store patronage, cross-selling, or the like) is mixed (for a review, see Harris/Bray 2007).

Literature thus reports common application of odd pricing, both for frequently bought as well as higher-priced products. As a consequence, this study analyzes various retail markets in Austria (retailers of grocery, furniture, clothes, hardware, and consumer electronics).

2.2 First non-zero digit in a price

In 1881, the astronomer and mathematician Simon Newcomb made a note of "how much faster the first pages of logarithmic tables wear out than the last ones" (qtd. in Hill 1995) and thus concluded that "the first significant figure is more often 1 than any other digit, and the frequency diminishes up to 9" (qtd. in Raimi 1976). In 1938, the physicist Frank Benford discovered the same behavior in more than 20229 data sets (Nigrini/Mittermaier 1997, p. 53) and introduced what is now called Benford's law. This law states that the first digits of any specific amount of data will not be distributed uniformly but instead will follow a logarithmic distribution (Sehity/Hoelzl/Kirchler 2005, p. 473):

$$[1] \quad P(d) = \log_{10} \left(1 + d^{-1} \right) \\ d \in \{1, 2, \dots, 9\}$$

Thus, the majority of data starts with the digit 1 (30.1%), and 9 rarely occurs as the left-most digit (4.6%).

Benford's law applies in a variety of fields: detecting fraudulent balance sheets, tax fraud, investor fraud, and the exposure of erroneous and fraudulent data, to name a few (Diekmann 2007; Durtschi/Hillison/Pacini 2004). The first digit law also extends to diverse other data sets, such as numbers reported on the front pages of newspapers, baseball statistics, river lengths, and molecular weights. It also has been used to investigate stock market prices (Pietronero et al. 2001), prices in eBay auctions (Giles 2007), and grocery prices before and after the EURO introduction (Sehity/Hoelzl/Kirchler 2005). These authors also claim, that Benford's law might enable to disclose pricing interventions by price setters (Sehity/Hoelzl/Kirchler 2005, p. 478). No further applications pertain to the area of marketing though, to the best of the authors' knowledge.

As the distribution of the leading digits of any data is supposed to conform to Benford's law, the first non-zero price digits of various Austrian retail markets are investigated here.

2.3 Symbolic meanings of price endings

Prices ending in 9 are overrepresented in Austria, Belgium, Canada, Germany, and the United States; in contrast, in Hungary, Italy, Poland, and Spain, prices ending in 0 are more prevalent (Levy et al. 2007, p. 13). In China, Hong Kong, Japan, Malaysia, and Singapore, 8 ending prices are popular (Heeler/Nguyen 2001, p. 4), likely because both Chinese and Japanese cultures assign positive symbolic meaning to the number 8. Culture thus appears to have some influence on price setting and demands a closer, more systematic analysis of the potential symbolic meanings of price endings. For example, an exploratory step in this research compared the ethnic characteristics of (psychological) prices between Chinese and non-Chinese menu prices in the Austrian restaurant industry, with the prediction that cultural differences would emerge in their price endings, due to the influence of ancient Chinese traditions and beliefs. Hence, Chinese restaurant owners or managers would intentionally or unconsciously set symbolic prices based on their traditional beliefs and superstitions, i.e. using certain digits in a price would yield good luck regardless of where customers come from. If customers also share these traditions, price perception might be beneficial for both sides.

The restaurant business was chosen for two reasons. First, Naipaul/Parsa (2001) already have demonstrated that certain menu prices cause image effects, such that prices ending in 9 are less often used in fine-dining restaurants than 0-ending prices, whereas the digits 0, 5, and 9 are used almost evenly in quick-service restaurants. Second, the vast number of Chinese res-

taurants in Austria makes data collection a relatively easy task and popularity of Chinese restaurants increased recently.

Chinese society is characterized by a preference for harmony with nature, and Chinese communities and markets likely are affected by traditional beliefs regarding feng shui, as well as traditional superstitions (Simmons/Schindler 2003, pp. 102-103). For centuries, Chinese decision making, thinking, and behavior have been influenced by feng shui. Bourassa/Peng (1999, p. 81), for example, write: “Feng shui is literally defined as wind and water, which are the elemental forces of the earth, and are believed to have hidden power to determine the course of events.” According to this theory, digits possess symbolic meanings, certain denotations, and otherworldly powers. The numbers and their acoustic code then can be interpreted to produce a categorization of either lucky or unlucky numbers (Bourassa/Peng 1999, pp. 80-82; Naipaul/Parsa 2001, p. 31; Simmons/Schindler 2003, p. 103). The unlucky numbers are 4 and 7, the former because it is pronounced in the same way as the Chinese word for “death,” and the latter because it is pronounced as the Chinese word for “walked away” or “left.” In contrast, 6, 8, and 9 are lucky numbers, because 6 is pronounced the same way as the Cantonese word for “prosperity,” 8 stands for luck and enrichment and is regarded as the most talismanic of all numbers, and 9 can be interpreted as “longevity,” is related to the emperor in the Chinese culture, and is seldom used in everyday life.

2.4 Eye-catching sequences of digits in a price

A price of, say, 197€, might be interpreted as a sequence of the digits 1, 9, and 7. Diller (2008, pp. 130-131) proposes that price perceptions are shaped in particular when such a sequence follows a notable pattern that gains the attraction of potential buyers. He introduces three different types of eye-catching strings: (monotonically) increasing or decreasing digits or identical digits (e.g. 234€, 432€, 444€). Schindler/Kirby (1997) find that a descending sequence has a positive impact on sales; it likely stimulates consumers’ inclination to truncate the seemingly less important digits of a price. Stiving/Winer (1997) argue that prices that consist of identical digits are memorized more easily. Figure 1 provides empirically observed examples.

Figure 1: Eye-Catching Price Sequences for Consumer Electronics



2.5 Framing of price cuts in percentage versus euro terms

When implementing a price reduction, several alternatives are available (e.g. absolute versus relative price discounts, price coupons, promotions). In addition, promotions might be emphasized effectively with the use of appropriate words, colors, fonts, and the like. Although mathematically, savings might be identical, consumers often respond differently depending on the framing of a price reduction (DeVecchio/Krishnan/Smith 2007, p. 158; Frisch 1993, pp. 399-403; Kirchler 1995, p. 29), or as Monroe (1990) puts it, implementing price reductions in various ways is the same as framing buying choices with different frames.

This study compares price promotions framed in percentage versus euro terms. Grewal/Marmorstein (1994) analyze a similar problem and find that consumers mentally compare price cuts relative to one another. Their respondents thus prefer a markdown of the same dollar amount granted for a lower priced rather than a higher priced product (i.e., \$20 saving on a \$100 microwave versus a \$400 television), because it offers higher *relative* savings on the cheaper product. In other words, consumers translate absolute discounts into relative savings when they compare the attractiveness of different buying options. Gendall/Fox/Wilton (1998) and Sinha/Smith (2000) both investigate price promotion frames in different product categories; relative discounts are more popular for non stock-up categories (e.g. groceries) than for stock-up categories (e.g., toilet paper, laundry detergent). In their experimental study of the effects of differently framed price cuts on price perceptions and purchase intentions, Chen/Monroe/Lou (1998) find that people regard a price reduction advertised in dollar terms as more significant than the same price cut promoted in percentage terms when the item is high priced, whereas the opposite preference holds for a low-priced good.

3 Research design

This study uses a descriptive research design to analyze the frequency with which Austrian retailers employ these five different aspects of psychological pricing. Data is collected by observing prices in selected markets. This observational design should restrain from getting biased results when using a communication method because of the only subtle influence of behavioral prices.

Specifically, for the *price endings/beginnings* data set and with the approval of the management of retail stores, research assistants approached customers after they had checked out with a cashier and asked for their sales slips (or to take a picture of their sales slips). This procedure turned out to be feasible in grocery, clothes, and hardware stores. Some shoppers refused to cooperate because they feared an invasion of privacy if they were to provide the information on their sales slips. Moreover, permission to collect sales slips was not granted in

the furniture stores; management cited their care for their customers' well-being and preference for an undisturbed shopping atmosphere. Therefore, in these stores, the price collection procedure involved analyzing their advertising leaflets. This kind of sampling bears a risk of generating results biased toward promoted goods.

The data about the *symbolic meanings of price endings* were collected from menus of restaurants located in Austria. Price endings were recorded and categorized by ethnicity (Chinese versus non-Chinese).

All previously collected prices were checked to determine if they contained *eye-catching sequences of digits*. In addition, flysheets that displayed prices were collected from many types of shops (e.g. cosmetics, perfumeries, consumer electronics) and online. However, price figures only appeared for the consumer electronic stores owned by the Metro-group (i.e. Saturn and Media Markt).

Finally, for the *framing of price cuts in percentage versus euro terms*, the focus was on price promotions by grocery stores, from which leaflets and posters were collected. The framing in each of these communications therefore could be analyzed.

Table 1 summarizes the data collection procedures, as well as the sample sizes achieved.

Table 1: Data Collection Overview

Studies	Analyzed Stores	Data Collection Methods	Sample Size (n of prices)
Price endings and first digits	Grocery stores	Sales slips	9299
	Furniture stores	Leaflets	6223
	Clothes stores	Sales slips	1378
	Hardware stores	Sales slips	3148
Symbolic meanings of price endings	Restaurants	Chinese	} menus 10853
		Non - Chinese	
Eye-catching sequences	Consumer electronics	Flysheets, store visits	14
Framing of price cuts	Grocery stores	Leaflets, posters	120