

# Violations of rational choice principles in pricing decisions



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## ABSTRACT

Research on behavioral and psychological aspects of pricing is concerned with violations of rationality. This paper presents a comprehensive overview of the current literature by highlighting those studies that have specific relevance for industrial pricing. I hereby examine two different perspectives. First, by taking the customer perspective, I analyze under which circumstances customer purchase decisions violate basic principles of rational choice. Second, by taking the perspective of managers, I examine which biases affect the process of price setting within firms. This overview meaningfully advances industrial pricing theory and practice: It allows both customers and managers to guard themselves against widely diffused traps in decision making. It also enables managers to favorably influence customer perceptions of value and price without actually changing the price. Finally, by pulling together a number of different research areas into a more parsimonious framework and a tighter narrative, this framework offers systematic directions for future research.

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## 1. Introduction

What are central research questions that fall within the domain of behavioral and psychological aspects of B2B pricing? Central research questions are, in my view, all those instances where decisions about price violate basic principles of rational choice. Decisions about price involve two main actors. First is the customer. We are interested in how customer purchase decisions exhibit behavioral patterns that are inconsistent with rational choice models. As we will see, violations of rational choice can take many forms: demand that increases with price increases, choices that are influenced by the addition of irrelevant options, preferences that are unstable, and a willingness to pay that is fluid and subject to contextual influences. In this context we thus summarize how firms can influence customer perceptions of value and price without changing the price. Second is the manager. Managers set prices and in this process are equally susceptible to violating fundamental principles of rational choice. These violations can take the following forms: conformity bias, competition neglect, competitor obsession, simple heuristics, and underpricing for new product introductions.

This paper is organized as follows. The paper first provides an overview of the current research on behavioral and psychological aspects of pricing: since most of what we know in this respect stems from experimental research done with individual consumers, this paper sheds light on those areas where there is a strong need for quantitative studies with B2B customers and managers: We weave extant research into a parsimonious framework and highlight implications for industrial marketing theory and practice. We conclude by taking a stand on the way forward.

## 2. Behavioral and psychological aspects of pricing—what we know about violations of rational choice in decisions about prices

Rational choice models posit that actors behave in a way that maximizes their expected utility. Indicators are, for example, that preferences are transitive, invariant of alternative descriptions and independent of irrelevant alternatives (Fawcett et al., 2014; Tversky, & Kahneman, 1986). This view of rational choice posits that decision makers act consistently with regard to their preferences, regardless of the nature of these preferences. This view of rational choice is thus able to incorporate a wide range of commonly observed choice anomalies: The fact that customers, for example, do not regularly check prices before purchases—an apparent example of irrationality (Lester, 2011)—does not at all, to be clear, violate rationality: the costs of collecting and evaluating price information probably outweigh potential savings. Likewise: the fact that managerial pricing actions are shortsighted at times does not, in principle, indicate non-rational behavior: the short-term, more likely, gains of these activities (e.g., price cuts) outweigh the perceived long-term, less likely, costs. The current literature provides abundant evidence that decisions about prices—by customers as well as by managers—regularly violate principles of rational choice as defined here. We discuss this evidence in turn and provide an illustrated overview in Figs. 1 and 2.

### 2.1. The customer perspective: violations of rationality in decisions about purchase prices

Perceptions of value and price are not given: marketing managers can influence how customers perceive value and price and thus, to a

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Fig 1. Customers: violations of rational choice principles in decisions about purchase prices – a graphical overview.

degree, direct customer choice without actually changing the price. Based on the context, otherwise identical objects are perceived differently based on external cues, as Figs. 3 and 4 illustrate (see, for example, Coren, Girus, Erlichman, & Hakstian, 1976).

More broadly, violations of basic principles of rational choice arise as a result of cognitive limitations—illustrated by the optical illusion –, as a result of incomplete information and as a result of limitations due to thinking styles which are less rational than the models imply.

### 2.1.1. The price–quality effect

Price and quality are only weakly correlated (Mitra & Golder, 2006); numerous studies in consumer markets, however, suggest a positive and significant relationship between price and customer perceived quality (Rao & Monroe, 1989; Völckner & Hofmann, 2007). Especially when customers cannot easily evaluate product quality, they rely on price as an indicator of quality (Brucks, Zeithaml, & Naylor, 2000). Higher prices signal higher quality. For some categories (e.g., higher price, durable products, luxury goods), a price increase leads to an increase in demand (Hwang, Ko, & Megehee, 2014; Knauth, 1949). High prices may have tangible outcomes: improved performance after consumption of an expensive versus discounted energy drink (Shiv, Carmon, & Ariely, 2005), lower pain for expensive versus discounted analgesics (Waber, Shiv, & Carmon, 2008), and increased brain activity related to pleasantness for expensive versus cheap wine (Plassmann, O'Doherty, Shiv, & Rangel, 2008). Whereas the price–quality effect is robust in consumer markets, studies in industrial markets report mixed results (Dodds, Avila, & Wahlers, 1993; Kumar & Grisaffe, 2004; Lambert, 1981; White & Cundiff, 1978).

### 2.1.2. Irrelevant attributes

If decision makers were rational, the addition of irrelevant product attributes would not influence choice. This is not the case. Carpenter, Glazer, and Nakamoto (1994) show that the addition of irrelevant—in other words, meaningless—product attributes increases the perceived attractiveness of the product. This effect persists even if customers know that the attribute is meaningless (Broniarczyk & Gershoff, 2003; Sun, 2010): adding an irrelevant attribute to a product and increasing the price, even dramatically, creates a meaningfully differentiated brand, if the true relevance of the differentiating attribute is not known to customers. If, by contrast, customers understand that the differentiating attribute has no value, the presence of a meaningless attribute combined with a high price creates meaningful differentiation, but not in combination with dramatically high prices (Carpenter et al., 1994). Irrelevant attributes acquire value if linked to a positive outcome. It appears that customers infer that the provision of information means that this information is actually relevant. This may explain why brands built on meaningless differentiation—such as Red Bull and the meaningless ingredient Taurin, or Shell V-Power and the irrelevant attribute of 100 octane fuel (Beukert, 2003)—are widespread in consumer markets, despite—or probably because of—substantial price premiums.

To the best of my knowledge, there are no comparable studies in industrial markets. It is beyond question that this is a very significant gap in the literature and would make for a fascinating study.

### 2.1.3. Framing

Decisions take place within a context. In prospect theory the context is represented by risk perceptions: decision problems are usually posed

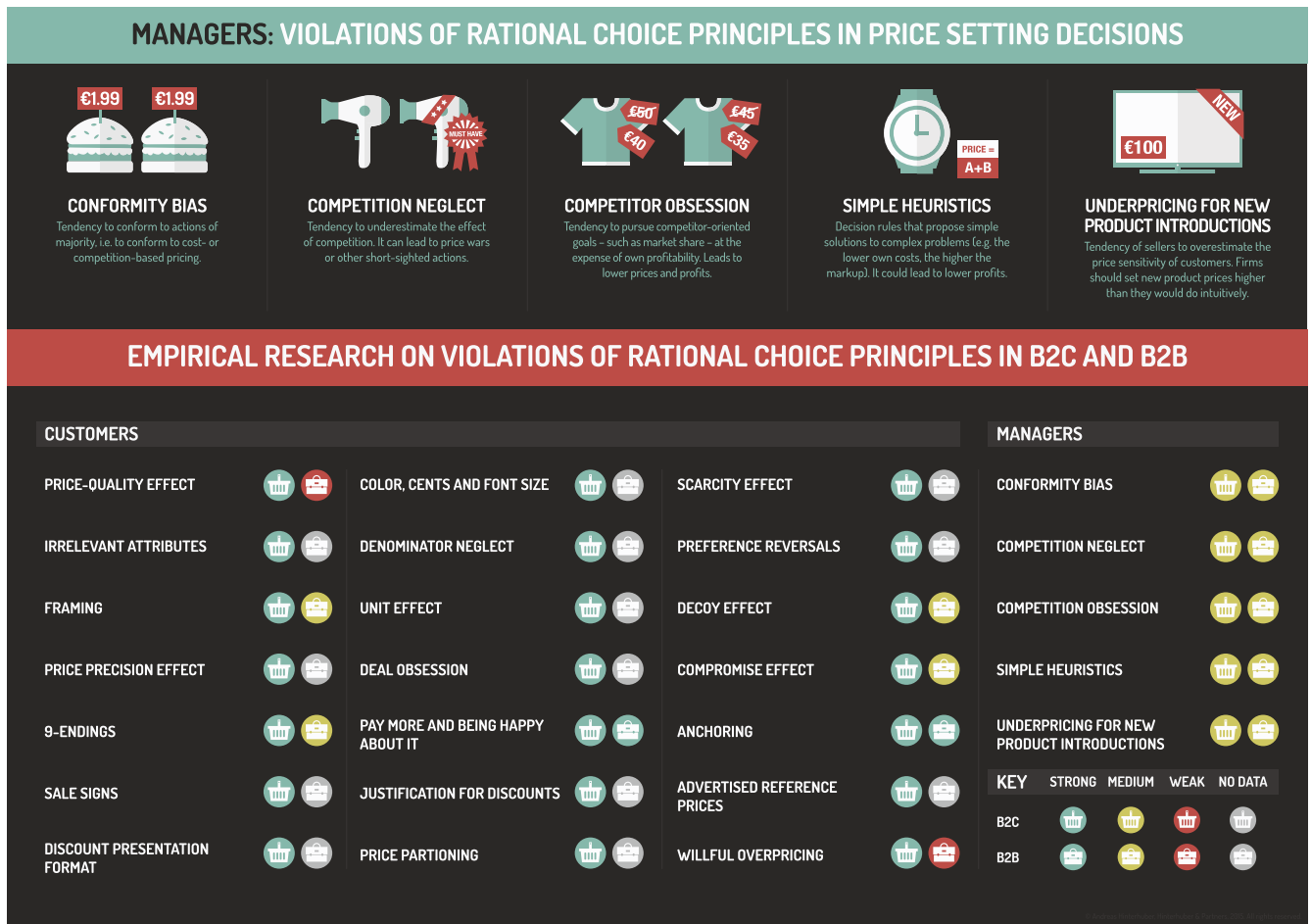


Fig. 2. Managers: violations of rational choice principles in price setting decisions – a graphical overview and an overall summary of empirical research.

as gambles, with two choices, a certain, lower-expected-value choice and a risky, higher-expected-value choice. A core tenet of prospect theory is that when decision makers view outcomes as a gain relative to the status quo, they become risk-averse. When the same outcomes are framed as a loss, decision makers become risk-seeking (Kahneman & Tversky, 1979). Framing outcomes as either a gain or a loss from the status quo thus changes behavior. Frequently, the status quo is represented by reference prices, that is, price expectations based on past prices. Recent research confirms the presence of reference price effects also in business markets, where loss-averse buyers adjust purchase quantities more strongly for price increases than for price reductions and where prices paid in previous periods have strong effects on reference prices in subsequent periods (Bruno, Che, & Dutta, 2012).

Likewise, the framing of discounts changes behavior: framing savings as a free bonus pack leads to higher sales than framing

identical monetary savings as a percentage price reduction (Chen, Marmorstein, Tsiros, & Rao, 2012). The same principle applies also to the framing of price increases: the elasticity of package size is about one fourth that of price elasticity (Çakır & Balagtas, 2014). Presenting an otherwise identical price change as package-size reduction thus leads to a lower sales loss than a straight price increase.

Much of what we know about loss aversion and framing stems from research with consumers. Research with industrial marketing and purchasing managers is thus warranted.

2.1.4. The price-precision effect

On a stand-alone basis, precise prices are perceived to be smaller than round prices, since precise prices are quite common for smaller magnitudes (Thomas, Simon, & Kadiyali, 2010). In a study of transactional data of house prices Thomas et al. (2010) find that buyers underestimate the magnitude of precise prices, defined as prices with fewer than three ending zeros: precise list prices increase actual sales prices by 0.6%, even when the precise list price is above a comparable round price (e.g., \$385,120 vs. 385,000). For big-ticket items, precise list prices increase customer willingness to pay. The effect of precise prices on

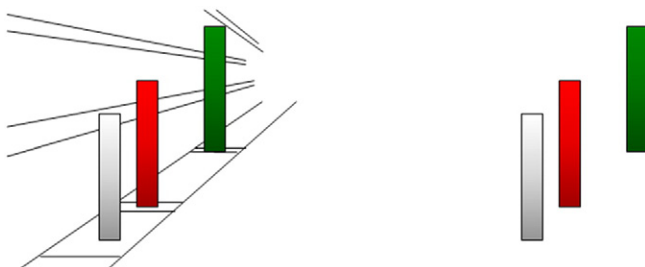


Fig. 3. Context influences perceptions.

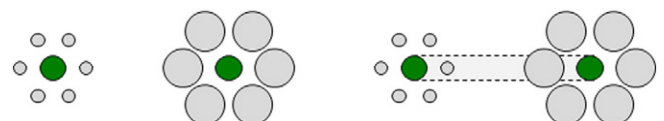


Fig. 4. Comparisons influence perceptions.

industrial customer willingness to pay is hitherto unexamined and needs to be studied.

#### 2.1.5. 9-Endings

Research shows that customers consistently underestimate the prices of products ending in 9: this may be because customers process prices from left to right or because they erroneously assume that these prices refer to products on sale (Stiving & Winer, 1997). Studies show that increasing prices to a price ending in 9 frequently leads to an increase in sales (Anderson & Simester, 2003). Companies selling a product portfolio can thus steer customers towards targeted products, simply by manipulating prices ending in 9 (Manning & Sprott, 2009): the share of the lower-priced product is maximized if it has a 9-ending and the higher product has a round ending (e.g., \$1.99 vs. \$3.00). By contrast, the share of the higher-priced product is maximized, if price endings minimize the difference in the left-most digits (\$2.00 vs. \$2.99). Across studies, the effect of 9-endings on sales is robust in consumer markets (Gedenk & Sattler, 1999; Schindler & Kibarian, 1996; Stiving, 2000). In a recent conjoint study among industrial purchasing managers, the largest spike in demand for telecommunication services occurs at prices ending in 0, but prices ending in 9 also show a significant spike in demand over other prices (Larson, Reicher, & Johnsen, 2014). The effect of 9-endings on sales may thus be significant also in industrial markets, and quite possibly for lower-priced products.

#### 2.1.6. Sale signs

The mere presence of a sign stating “Sale” increases demand (Anderson & Simester, 1998). Customer price knowledge is low (Dickson & Sawyer, 1990). Companies can thus increase sales without actually lowering prices, simply by adding a sale sign. There is an upper limit: category sales are maximized if approximately 25% of products have sale signs (Anderson & Simester, 2001).

#### 2.1.7. Discount presentation format

How discounts are presented—percentage off versus absolute monetary savings—has an impact on price perceptions and purchase intentions. Recent studies confirm earlier research (Heath, Chatterjee, & France, 1995): for low-price products, the framing of discounts as percentage figures increases the perceived attractiveness of the offer, whereas for high-price products the opposite is true: absolute discounts are indicated for high-price products (McKechnie, Devlin, Ennew, & Smith, 2012). Thus: If percentage savings are high, they should be displayed; if absolute savings are high, they should be highlighted. Furthermore, value perceptions and purchase intentions are generally higher if the sales price is presented to the right of the original price (e.g., was \$200, now \$149) as opposed to presenting the sales prices first and then the original selling price (Biswas, Bhowmick, Guha, & Grewal, 2013).

#### 2.1.8. Color, cents, and font size

Male participants perceive prices in red type as more attractive than prices in black type; by contrast, there is no effect of price color on females (Puccinelli, Chandrashekar, Grewal, & Suri, 2013). Furthermore, across subjects, for large prices (i.e., above \$1000), eliminating cents reduces the perceived magnitude of prices—consumers seem to assume a relationship between syllabic length and numerical magnitude (Coulter, Choi, & Monroe, 2012). Finally, font size matters (Coulter & Coulter, 2005): presenting the lower sale price in a smaller type results in higher purchase likelihood and lower price perceptions than presenting the sale price in large font size—as many retailers typically do. Since all these studies originate from experiments with consumers, we do require studies that examine the effect of color, cents, and type size in industrial markets.

#### 2.1.9. Denominator neglect

For some product categories in industrial markets, failure rates are important purchase criteria (Wu, Hou, Fu, & Chang, 2013). Kahneman (2011, p. 329) uses the expression “denominator neglect” to suggest that low-probability events—such as failure rates—weigh more heavily in the mind of decision makers when expressed in absolute terms (e.g., 5 failures per 1000 h of operation) than when expressed in terms of probabilities (e.g., failure rate of 0.5%). When presented with uncertain outcomes, decision makers seem to neglect the denominator, that is, the absolute number of outcomes, focusing instead excessively on the numerator. Also here, further research with industrial customers appears promising.

#### 2.1.10. Unit effect

Attribute differences appear larger on scales with higher numbers of units (Pandelaere, Briers, & Lembregts, 2011). Expressing product attributes on scales with higher unit values—for example, expressing a guarantee as 84 months as opposed to 7 years—leads customers to perceive these attributes as larger than if expressed on a scale with lower unit values. This influences not only customer preferences but also willingness to pay. It would be interesting to understand whether the unit effect is present also in industrial markets.

#### 2.1.11. Deal obsession

The remote possibility of obtaining something for free clouds customer judgment. Research on the widespread diffusion of conditional—that is, uncertain and delayed—promotions indicates that customers overestimate the probability of actually getting something for free (Ailawadi, Gedenk, Langer, Ma, & Neslin, 2014). Customers, in other words, are deal obsessed, and the unlikely possibility of a obtaining a high win reduces search incentives and increases willingness to pay.

#### 2.1.12. Paying more and being happy about it

In a survey among customers of Internet service providers, Lambrecht and Skiera (2006) find that 28% of customers on a flat-fee plan would have been better off under a pay-per-use plan. This flat-fee bias is driven by displeasure associated with metering (taxi-meter effect), by the desire to insure against variation in the monthly billing rate (insurance effect), and by overestimation of actual usage (overestimation effect). In a study of business customers of mobile phone services, Stingel (2008) finds that the flat-rate bias affects 73% of all tariff choices, driven mostly by the overestimation effect and the insurance effect (Backhaus, Koch, & Stingel, 2011). The flat-fee bias is thus more prevalent in industrial than in consumer markets, and supplier profits are threatened much more if business customers on a flat fee select the least expensive plan (i.e., pay-per-use) than if individual consumers do likewise. Taken together, these studies thus suggest that the principles of rational decision making are not necessarily more widespread in B2B than in B2C settings.

The effect of paying more and being happy about it is observable also in the context of conditional discounts: customers who qualify for the minimum purchase requirement (e.g., US \$500) and are offered a lower discount (e.g., 20%) end up being more satisfied than customers who are offered a larger discount (e.g., 30%) without the minimum purchase requirement (Yoon & Vargas, 2010). This B2C study would suggest that companies can increase perceived customer satisfaction not by increasing discounts but, on the contrary, by reducing discounts and making these discounts contingent on a minimum purchase requirement. Also here we need a study in B2B.

#### 2.1.13. Justification for discounts

A rational actor should not care about the reasons for a price reduction, as long as the price itself meets predefined criteria. Research, however, suggests that customers care about motivations for discounts and that plausible motivations (e.g., cost reductions as opposed to more selfish motives such as stock clearance) positively enhance price

perceptions (Bobinski, Cox, & Cox, 1996). Similarly, experimental research suggests that repurchase intentions after price increases depend on the perceived fairness of the motivation for the price increase (Homburg, Hoyer, & Koschate, 2005). This study apparently confirms the notion that fairness matters in pricing (Thaler, 1985): Fairness in pricing, however, is a very tricky terrain, because “it is difficult to articulate what is fair” (Xia, Monroe, & Cox, 2004, p. 1). Like beauty, fairness is largely in the eyes of the beholder. For industrial marketing theory we thus need, first and foremost, a robust construct of price fairness before linking price fairness with demand, as research in consumer markets attempts to do (Anderson & Simester, 2008).

#### 2.1.14. Price partitioning

Sellers in industrial markets have the option of offering an all-inclusive price or of separating out the individual price components. Price partitioning highlights secondary attributes customers may otherwise overlook (Bertini & Wathieu, 2008). Companies are thus well advised to partition prices so that prices for low-perceived-benefit components are low and vice versa (Hamilton & Srivastava, 2008). Numerous studies indicate that price partitioning leads customers to underestimate the total price (Lee & Han, 2002) and increases price perceptions and purchase intentions (Xia & Monroe, 2004). Customers seem to insufficiently adjust from the initial price of the focal product. For products or customers where the price-quality effect is present, price partitioning may be especially beneficial (Völckner, Rühle, & Spann, 2012). Also here, studies in industrial markets are required.

#### 2.1.15. Scarcity effect

The perception of scarcity increases willingness to pay and purchase quantities. Customers will purchase substantially larger quantities if the offer is limited—by product quantity, purchase time, or location. In a study on a price promotion for a fast-moving consumer good, purchase quantities per person more than double when the promotion is accompanied by a purchase limit—“limit of 12 per person”—compared to the no-limit condition (Wansink, Kent, & Hoch, 1998). In a more recent study of scarcity effects in the U.S. automotive industry, Balachander, Liu, and Stock (2009) find that a 1% increase in scarcity—measured as inventory during introduction relative to industry average—increases car sales by 0.5% even after accounting for sales lost due to greater scarcity. Artificially restraining demand thus increases demand. Studies in industrial markets seem beneficial.

#### 2.1.16. Preference reversal

Beginning with the work of Slovic and Lichtenstein (1968), numerous studies find that similar methods of preference elicitation lead to substantially different preference orderings. Also here, these results violate basic principles of rationality. The effect of preference reversals is best illustrated by comparing preferences in joint—that is, comparative—versus separate—that is, stand-alone—evaluation methods. Numerous studies by Hsee (1998) suggest that the low-value option is more highly valued than the high-value option in the single evaluation method, but not in joint evaluation. “Less is better” is the term coined by Hsee (1998) for this instance of preference reversals. An illustration: in joint evaluation, a used dictionary with a small cosmetic defect is valued more than a dictionary with fewer entries but in like-new condition. In separate evaluations, the reverse is true. Hsee explains these preference reversals with the “evaluability hypothesis” (Hsee & Leclerc, 1998): attributes that are difficult to evaluate independently (e.g., number of entries in a dictionary) loom larger in joint evaluations, whereas attributes that are easy to evaluate independently (e.g., cosmetic condition) loom larger in single evaluations. Thus: If a product scores low on an attribute that is difficult to evaluate, separate evaluation increases willingness to pay. A final example: in joint evaluation, willingness to pay for 8 oz of ice cream in a 10-ounce cup is larger than the willingness to pay for 7 oz of ice cream in a 5-ounce

cup—so far, so good. In separate evaluation, the reverse is true: simply by modifying the context (i.e., cup size), the willingness to pay for the small product is higher than the willingness to pay for the large product (Hsee, 1998). We know next to nothing about preference reversals in industrial markets.

#### 2.1.17. Decoy effect

Consider the following experiment: a company is selling a product in two formats: the small size costs \$4, the large size \$8. Let the majority of customers purchase the small size. Assume the company introduces a medium size at a price of \$7.50. The share of customers purchasing the large size is expected to increase substantially. Formally: The introduction of an irrelevant (“decoy”) option provides a strong justification for the choice of an initially unappealing option if this option is close to the decoy option (Huber, Payne, & Puto, 1982). In consumer-goods markets the use of decoy options is widespread (Hinterhuber & Liozu, 2014). The decoy effect is heavily dependent on thinking styles: it is completely absent for consumers scoring low on intuitive thinking, and it is very strong for consumers relying heavily on intuitive thinking (Mao & Oppewal, 2012). There are indications that industrial goods manufacturers are starting to include decoy options in their product portfolio (Kivetz, Netzer, & Srinivasan, 2004). We do not have, to date, empirical research on the effect of decoy options on sales in industrial markets.

#### 2.1.18. Compromise effect

When faced with a range of non-dominant options that vary along price and quality, consumers tend to opt for the intermediate option (Simonson, 1989). Also, this effect is a clear and well-researched violation of rational choice: an option gains share when it is the intermediate option in an arbitrarily arranged choice set, whereas it loses share when it becomes an extreme option. Except where options involve a non-compensatory assortment (Gourville & Soman, 2007), the compromise effect is widespread. Simonson (1989) reports an average share gain of 17.5% when an option becomes the intermediate option. Customers exhibit choice patterns consistent with the compromise effect also in the context of industrial purchasing situations (Kivetz et al., 2004).

#### 2.1.19. Anchoring

In stark contrast to rational behavior, Ariely, Loewenstein, and Prelec (2003) find that willingness to pay is strongly influenced by arbitrary anchors: in a series of experiments students indicate whether they are interested in buying a set of objects at a price greater than the last two digits of their social security numbers; thereafter, they indicate their maximum willingness to pay. Strikingly, the maximum willingness to pay between the top-quintile and bottom-quintile subjects differs by a factor of three, depending entirely on a randomly supplied anchor. A core tenet of research in anchoring is thus: externally supplied anchors, such as prices, influence internal standards of comparison that are used in subsequent price judgments. In an analysis of 1474 pieces of auction data for classic cars, Nunes and Boatwright (2004) find that the price for a winning bid is strongly influenced by the price for the immediately preceding car. In numbers, if the preceding car sells at two times its Blue Book value, the high bid for the immediately subsequent car is 30% higher on average: willingness to pay is influenced by totally unrelated sales prices. Experimental data corroborate these findings (Adaval & Wyer, 2011; Koçaş & Dogerlioglu-Demir, 2014). The powerful effect of anchors is visible in negotiations (Ritov, 1996), in catalogue retailing (Krishna, Wagner, Yoon, & Adaval, 2006), in investment decisions (Shapira & Shaver, 2014), in contingent valuations (Green, Jacowitz, Kahneman, & McFadden, 1998), and even in settlements in lawsuits (Poundstone, 2010). Anchors exert a powerful influence also in B2B negotiations: a recent study suggests that settlement prices in negotiations between buyers and sellers in the chemical industry are strongly influenced by the seller's aspiration price and the seller's initial price

offering (Moosmayer, Schuppar, & Siems, 2012): the more sellers in industrial markets ask for, the more they get.

#### 2.1.20. Advertised reference prices

Advertised reference prices (ARPs) highlight the difference between a sales price and a regular list price. Ample research, albeit limited to consumer markets, suggests that ARPs raise internal reference prices of customers, favorably influence the perceived attractiveness of the offer, and increase purchase likelihood (Lichtenstein, 2005). ARPs are widespread and frequently exaggerated. A fascinating finding, consistent throughout the studies, is that customers are influenced by implausible ARPs, even when they themselves understand that these ARPs are inflated. Customers know that these ARPs cannot possibly be true, yet implausible ARPs still influence customer behavior, that is, purchase intentions (Suter & Burton, 1996; Urbany, Bearden, & Weilbaker, 1988). Exaggerated ARPs are even more effective when the offer induces a feeling of time pressure (Krishnan, Dutta, & Jha, 2013).

#### 2.1.21. Willful overpricing

A price may induce customers to think about whether they need a benefit or not: setting prices moderately higher than what consumers expect to pay leads to deeper engagement with product and sales to a smaller, polarized, committed pool of consumers (Wathieu & Bertini, 2007). Recent studies in fact suggest that willingness to pay is not a stable amount but a fluid concept that can be shaped by marketing actions (Ariely, Loewenstein, & Prelec, 2006; Hinterhuber, 2014; Park, MacLachlan, & Love, 2011). Anecdotal evidence indicates that not only consumer-goods companies (e.g., Apple, Louis Vuitton, Starbucks) but also industrial manufacturers (e.g., HP, Maersk, Monsanto, Sandvik, SAP, SKF) set prices moderately higher than the initial willingness to pay with the specific intent of increasing willingness to pay.

Table 1 summarizes the customer perspective: violations of rational choice principles in decisions about purchase prices.

### 2.2. The firm perspective: violations of rationality in the process of price setting

Managers as price setters likewise commit violations of basic principles of rational choice. I briefly present salient studies below.

#### 2.2.1. Conformity bias

This refers to the tendency to conform to the actions and opinions of the majority. In a now classic study, Asch (1955) examines whether individuals accept the clearly aberrant opinions of opponents. The error rate, that is, the tendency to accept a wrong opinion, rises substantially with the number of opponents: with only one opponent, the error rate is 3.6%, with three opponents the error rate jumps nearly tenfold, to 32%. A confidently expressed and aberrant opinion, if widely held, is able to induce a behavioral change in decision makers. Conformity bias can thus explain why the vast majority of companies practices cost- or competition-based pricing even though value-based pricing is recognized as a superior approach to pricing (Hinterhuber & Liozu, 2012; Liozu & Hinterhuber, 2013b).

#### 2.2.2. Competition neglect

Overconfidence leads managers to neglect competition (Camerer & Lovallo, 1999). It induces managers to take on large risks based on the assumption that they can beat the odds (Camerer & Lovallo, 1999). Overconfidence may thus explain why executives engage in frontal attacks, start price wars, or select a crowded competitive arena without sufficiently anticipating the effect of a competitive response. In a study of selling prices on eBay, Simonsohn (2010) finds that 40% of auctions end during peak selling times, leading to both lower prices and lower sales probabilities as a result of excess supply. The author notes that this concentration is driven primarily by professional sellers. Sellers

seem to systematically neglect competition. Critically, overconfidence depends on managerial abilities: more experienced, better educated managers tend to enter markets with fewer competitors, which leads to higher survival rates and higher revenues of their companies (Goldfarb & Xiao, 2011).

#### 2.2.3. Competitor obsession

This refers to the tendency to pursue competitor-oriented goals—such as market share—to the detriment of one's own profitability (Arnett & Hunt, 2002). When comparative profits are provided, managers show a consistent tendency to price below optimal levels in order to hurt competition, as opposed to maximizing their own profits (Armstrong & Collopy, 1996). Field studies suggest that competitor orientation and market share goals are detrimental to profitability (Armstrong & Collopy, 1996; Foreman, Donthu, Henson, & Poddar, 2014). Anterasian, Graham, and Money (1996, p. 74) warn explicitly: "The use of market share as a measure of corporate or executive performance is at best a waste of time; at worst, it is totally misleading. We recommend that you never make the market share calculation. If you emphasize competitive goals, you are letting the competition define your business and its success." Competitor obsession leads to lower prices and lower profits. This effect is well documented in industrial markets (Armstrong & Collopy, 1996).

#### 2.2.4. Simple heuristics

Heuristics are tools built to find simple solutions to complex problems (Mousavi & Gigerenzer, 2014). In pricing, these heuristics can take the following forms (Hinterhuber, 2004; Hinterhuber & Liozu, 2012; Liozu & Hinterhuber, 2013a; Nagle & Holden, 2002): "The lower the cost, the higher the markup," "Price slightly below the market share leader," or "For differentiated products, set the price at a moderate premium." Since these heuristics relate to costs and competitors, extant research (Liozu & Hinterhuber, 2013b) would suggest that they are associated with lower profitability. In fact, we do not know. For simple tasks, complex models outperform simple heuristics on explanatory power, but simple heuristics outperform the models on predictive power (Czerlinski, Gigerenzer, & Goldstein, 1999). For complex tasks—such as decisions by large retailers on whether or not to classify customers as inactive—simple heuristics perform at least as well as complex models (Wübgen & Wangenheim, 2008).

Since heuristics are so widespread, an examination of performance implications of pricing heuristics would make for a fascinating study.

#### 2.2.5. Underpricing for new product introductions

The widely held assumption that managers tend to underprice new products (Hinterhuber, 2004; Marn, Roegner, & Zawada, 2004) is supported by recent findings from behavioral economics: Shen, Hsee, Wu, and Tsai (2012) suggest that sellers, engaging in joint evaluation modes when considering alternative prices, overestimate the price sensitivity of customers, who, in single evaluation mode, see only the final set price. The authors suggest that firms should set new product prices higher than they would do intuitively, especially for those products where price information is not readily available to buyers.

Table 2 summarizes the manager perspective: violations of rational choice principles in price setting decisions.

On customer biases about pricing decisions: we cannot conclude that behavioral biases are consistently more pronounced in B2C than in B2B. The price-quality effect is, for one, strong in B2C and receives only mixed support in B2B. Reference prices, 9-endings, and anchoring are well-documented biases both in B2B and in B2C. For other effects that are well documented in consumer markets—decoy options, compromise effect, willful overpricing—there is at least anecdotal evidence in B2B. The tariff-choice bias, finally, is stronger in B2B than in B2C.

**Table 1**  
Customers—violations of rational choice principles in decisions about purchase prices.

Effect	Implication	Representative literature	Dependent variable	B2B
Price–quality effect	High price signals high quality. For differentiated products, an increase in price may thus lead to an increase in volume.	Rao and Monroe (1989)	Purchase intentions, purchase behavior	Mixed evidence (Dodds et al., 1993; Kumar & Grisaffe, 2004; Lambert, 1981; White & Cundiff, 1978)
Irrelevant attributes	Adding an irrelevant attribute and increasing the price creates a meaningfully differentiated brand.	Carpenter et al. (1994)	Purchase intentions, purchase behavior	–
Framing	Customers react differently based on how offers are framed. Framing influences purchase decisions, e.g., framing identical savings as a free bonus leads to greater sales than framing these as a discount.	Kahneman and Tversky (1979), Chen et al. (2012)	Purchase intentions, purchase behavior	Reference price effects are powerful also in industrial markets (Bruno et al., 2012)
Price–precision effect	Precise prices are perceived to be smaller than round prices. Increasing prices to a precise number increases purchase likelihood.	Thomas et al. (2010)	Purchase intentions, purchase behavior	–
9-Endings	Prices ending in 9 increase sales volume.	Anderson and Simester (2003)	Purchase intentions, purchase behavior	Effect of prices ending in 0 is larger than effect of prices ending in 9 (Larson et al., 2014)
Sale signs	Merely adding a “sale” sign to a product increases product sales.	Anderson and Simester (2001)	Purchase intentions, purchase behavior	–
Discount presentation format	For low-price products, percentage discounts, for high-price products, absolute discounts, increase purchase intentions.	McKechnie et al. (2012)	Purchase intentions	–
Color, cents, and type size	Male subjects perceive prices in red as more attractive than prices in black. Eliminating cents increases the perceived attractiveness of large selling prices. Presenting the lower sale price in small type increases purchase likelihood.	Puccinelli et al. (2013), Coulter et al. (2012), Coulter and Coulter (2005)	Perceptions of price magnitude; purchase intentions	–
Denominator neglect	Customers underestimate likelihoods when probabilistic events are expressed in percentage terms rather than in absolute terms.	Kahneman (2011)	Perceptions of likelihood	–
Unit effect	Customers treat product attributes as dimensionless quantities: attributes expressed on a scale with higher numbers of units appear larger.	Pandelaere et al. (2011)	Purchase intentions and willingness to pay	–
Deal obsession	Customers will purchase substantially larger quantities and/or pay substantially higher prices than anticipated just to experience the benefits of having obtained a deal.	Ailawadi et al. (2014)	Purchase intentions, purchase behavior	–
Paying more and being happy about it	Flat-fee bias: Customers derive more pleasure from high, but predictable fees than from lower, but fluctuating fees. Conditional discounts: customer satisfaction is higher for lower, but conditional discounts than for higher, unconditional discounts.	Lambrecht and Skiera (2006), Yoon and Vargas (2010)	Purchase behavior, perceptions of satisfaction	Flat-rate bias is stronger in B2B than in B2C (Stingel, 2008)
Justifications for discounts	Perceptual responses to discounts depend on rationale that retailers provide: plausible discount explanations increase perceived attractiveness.	Bobinski et al. (1996)	Purchase intentions	–
Price partitioning	Customers underestimate partitioned prices: price partitioning leads to more favorable price perceptions and increased purchase intentions.	Xia and Monroe (2004)	Purchase intentions	–
Scarcity effect	Customers will purchase substantially larger quantities and/or pay substantially higher prices than anticipated if the offer is limited—by product quantity, purchase time, or location.	Balachander et al. (2009)	Purchase behavior	–
Preference reversals	The ability of customers to evaluate product attributes influences willingness to pay. Presenting products separately versus conjointly reverses preferences.	Hsee (1998)	Purchase intentions, purchase behavior	–
Decoy effect	The introduction of an irrelevant option provides a strong justification for the choice of an initially unappealing option.	Kivetz et al. (2004)	Purchase intentions, purchase behavior	Anecdotal evidence (Kivetz et al., 2004)
Compromise effect	When faced with a range of non-dominant options that vary along price and quality, consumers tend to opt for the intermediate option. Intermediate options are preferred to extreme options.	Simonson (1989), Kivetz et al. (2004)	Purchase intentions, purchase behavior	Anecdotal evidence (Kivetz et al., 2004)
Anchoring	Prices of totally unrelated products increase willingness to pay and prices actually paid.	Nunes and Boatwright (2004)	Purchase intentions, purchase behavior	Present in B2B: Moosmayer et al. (2012)
Advertised reference prices (ARPs)	ARPs influence customer behavior, even when customers know these ARPs to be untrue.	Lichtenstein (2005)	Purchase intentions, purchase behavior	–
Willful overpricing	Setting prices moderately higher than what consumers expect to pay increases willingness to pay.	Park et al. (2011), Wathieu and Bertini (2007)	Purchase intentions, purchase behavior	Anecdotal evidence: Bertini and Wathieu (2010)

**Table 2**  
Managers—violations of rational choice principles in price setting decisions.

Effect	Implication	Representative literature	Dependent variable	B2B
Conformity bias	Tendency to conform to actions of majority, i.e., to conform to cost- or competition-based pricing.	Asch (1955)	Pricing decisions	Some evidence in B2B: Hinterhuber and Liozu (2012); Liozu and Hinterhuber (2013b)
Competition neglect	Tendency to underestimate effect of competition.	Simonsohn (2010)	Pricing decisions	Robust evidence: Goldfarb and Xiao (2011)
Competitor obsession	Tendency to pursue competitor-oriented goals—such as market share—to the detriment of one's own profitability. Leads to lower than optimal prices and profitability.	Armstrong and Collopy (1996)	Pricing decisions	Robust evidence also in B2B: Armstrong and Collopy (1996)
Simple heuristics	Decision rules that propose simple solutions to complex problems: e.g., the lower own costs, the higher the markup.	Mousavi and Gigerenzer (2014)	Pricing decisions	–
Underpricing for new product introductions	Tendency of sellers to overestimate the price sensitivity of customers.	Shen et al. (2012)	Pricing decisions	Anecdotal evidence: (Marn et al., 2004)

On managerial biases about pricing decisions: evidence for the biases we identify—conformity bias, competition, neglect, competitor obsession, simple heuristics, and underpricing for new product introductions—originates to a near equal degree from both B2C and B2B data.

### 3. Outlook

Customer biases in purchase decisions about price and managerial biases in price setting do not seem to make sense if viewed in light of rational decision making. This, in fact, may be the mistake. The assumption of rational decision making is the equivalent of defending the shopkeeper's position in Monty Python's most famous sketch (Montier, 2009). The sketch is about the incompatible positions of an annoyed customer and the shopkeeper regarding the vital state of a parrot (Monty Python's *Flying Circus*, 1969):

Customer: I wish to complain about this parrot what I purchased not half an hour ago from this very boutique.

Owner: Oh yes, the, uh, the Norwegian Blue ... What's, uh ... What's wrong with it?

Customer: I'll tell you what's wrong with it, my lad. 'E's dead, that's what's wrong with it!

Owner: No, no, ... he's resting.

Customer: Look, matey, I know a dead parrot when I see one, and I'm looking at one right now.

Owner: No no, he's not dead, he's, he's resting! Remarkable bird, the Norwegian Blue. ... Beautiful plumage!

Customer: The plumage don't enter into it. It's stone dead.

Owner: Nononono, no, no! 'E's resting! ....

Owner: The Norwegian Blue prefers keeping on its back! Remarkable bird, isn't it, squire? Lovely plumage!

Customer: Look, I took the liberty of examining that parrot when I got it home, and I discovered the only reason that it had been sitting on its perch in the first place was that it had been nailed there.

Owner: Well, of course it was nailed there! If I hadn't nailed that bird down, it would have nuzzled up to those bars, bent them apart with its beak, and Voom! Feeweewee!

Customer: "Voom"?! Mate, this bird wouldn't "voom" if you put four million volts through it! 'E's bleeding demised!

Owner: No no! 'E's pining!

Customer: 'E's not pinin'! 'E's passed on! This parrot is no more! He has ceased to be! He's expired and gone to meet his maker! He's a stiff! Bereft of life, he rests in peace! If you hadn't nailed him to the

perch he'd be pushing up the daisies! 'Is metabolic processes are now history! 'E's off the twig! 'E's kicked the bucket, he's shuffled off his mortal coil, run down the curtain and joined the bleedin' choir invisible!! This is an ex-parrot!

Owner: Well, I'd better replace it, then. Sorry squire, I've had a look 'round the back of the shop, and uh, we're right out of parrots.

Customer: I see. I see, I get the picture.

Owner: I got a slug.

Customer: Pray, does it talk?

Owner: Nnnnot really.

Customer: Well it's hardly a bloody replacement, is it?!

No matter how often the increasingly annoyed customer points out that the parrot is dead, the shop owner stubbornly replies that the parrot is resting. The shopkeeper is akin to mainstream economic models postulating rationality. Rationality is not merely resting, it may never have existed in the first place. The parrot is not resting, the parrot is dead. We need a replacement.

What form could this replacement take? I dare to offer a few suggestions. We will need an understanding of the neuroscientific foundations of human brain activity. Current research uses functional magnetic resonance imaging to understand the neural basis of human decision processes, also in the context of marketing and pricing research (Camerer, Loewenstein, & Prelec, 2005; Karmarkar, 2011; Knutson, Rick, Wimmer, Prelec, & Loewenstein, 2007; Somervuori & Ravaja, 2013). This research questions, to a degree, the role of the cerebral cortex in shaping decisions. Since the Enlightenment the cerebral cortex, the most highly developed part of the human brain responsible for complex functions such as language and information processing, has been seen as the center of decision making. This view is challenged by recent advances in neuroscience: "There is no one boss in the brain" (Gazzaniga, 2011, p. 44). Research in neuroscience indicates that emotional brain circuits are heavily involved in all stages of decision making, that is, preference formation, selection and execution of actions, and experience or evaluation of an outcome (Ernst & Paulus, 2005). In a widely cited experiment, researchers record increased brain activity related to the resultant action several hundred milliseconds before subjects report the first awareness of a conscious will to act (Libet, 1985). Conscious will follows previous brain activity. An analogy will clarify. Imagine a man on an elephant. The elephant is the brain, the man is the cerebral cortex. There may be circumstances when the man is able to command the elephant—this could be in an aseptic environment akin to university test labs. In most other circumstances, the man may whip the stick—the



elephant, of course, is most unimpressed and proceeds on own terms. So far, the models have looked at the man to understand how the system—man and elephant—works. It is now time to look at the elephant. This special issue constitutes an important step.

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