Journal of Revenue and Pricing Management
https://doi.org/10.1057/s41272-023-00418-w

RESEARCH ARTICLE

Price fairness: square equity and mean pricing

Dubravko Radic[1]

Received: 19 December 2022 / Accepted: 1 February 2023

Abstract
Prices have a leverage effect on firm profits. Prices, however, have also an impact on customer's perceived price fairness and thus indirectly on firm's bottom line. A growing body of literature shows this. Papers on the level of the fair price, however, are rather scarce. Based on different concepts of justice, two levels of fair prices are proposed: square equity and mean prices. I run an experiment which shows that both are considered fairer than cost-based or value-based prices. The results can be used to assess fairness implications of prices ex ante and hence complement traditional pricing approaches.

Keywords Price fairness · Proportional justice · Equity theory · Distributive justice · Value-based pricing · Cost-based pricing

Introduction

We live in times of increasing inequality. In the USA, for example, the top 10% share of total income has risen from less than 35% in the 1970s to 50% in the 2010s (Piketty 2014). The wealth inequality is even more dramatic. In 2007, the top 1% of American households held about 38% of the nation's total wealth (Stiglitz 2017). Based on this finding, the international protest movement "We are the 99 Percent" arose, demanding more equality and denouncing the increasingly perceived injustice.

Prices contribute to this inequality and can lead to radical political consequences. The 2018 yellow vests ("gilets jaunes") protest movement in France was triggered by a price increase of three euro cents on gasoline and seven euro cents on diesel. Price increases also played a role in the protests in Sudan against the government in Khartoum at the end of 2018. The unrest was triggered by the tripling of the price of a loaf of bread to three Sudanese pounds, the equivalent of around five euro cents.

Prices are not only socially relevant, but also one of the strongest profit leverages for companies (Simon and Fassnacht 2019). For example, given a gross return of 10%, the price leverage is 9% for a 1% price increase and 11% for a price decrease of the same amount. So, a 1% price increase can decrease quantity by up to 9% without reducing profit. A price reduction of 1%, on the other hand, must be compensated for with a volume increase of at least 11%.

Prices not only have a direct leverage effect on profits, but also an indirect one via the influence on the price fairness perceived by customers (Fig. 1). A number of works were able to prove this (Xia et al. 2004; Ferguson 2014; Malc et al. 2016; Choi and Mattila 2004; Belarmino et al. 2020). Price fairness has a positive effect on customer satisfaction, purchase intention, willingness to pay, loyalty, and recommendations and thus on profit. Influence is moderated by switching costs, the perceived value of the service under consideration, and emotions.

In business literature, price fairness is typically defined in terms of a reference price or the process that produced a particular price (Fig. 1). According to the first explanation, a price is perceived as unfair if it deviates significantly from a reference price. This reference price can be a past price or the price that other customers have paid for comparable services. This explains why certain forms of price differentiation, such as discounts for new customers, are perceived as unfair (Reinartz et al. 2017; Tarrahi et al. 2016). This concept of fairness is also known in business literature as the equity theory (Xia et al. 2004).

A price is also perceived as unfair if the process that led to this price is unfair. In business literature, this concept is known as the dual entitlement theory, according to which

✉ Dubravko Radic
radic@wifa.uni-leipzig.de

[1] Chair of Service Management, Faculty of Economics and Management Science, Grimmaische Strasse 20, 04109 Leipzig, Germany

Published online: 14 March 2023

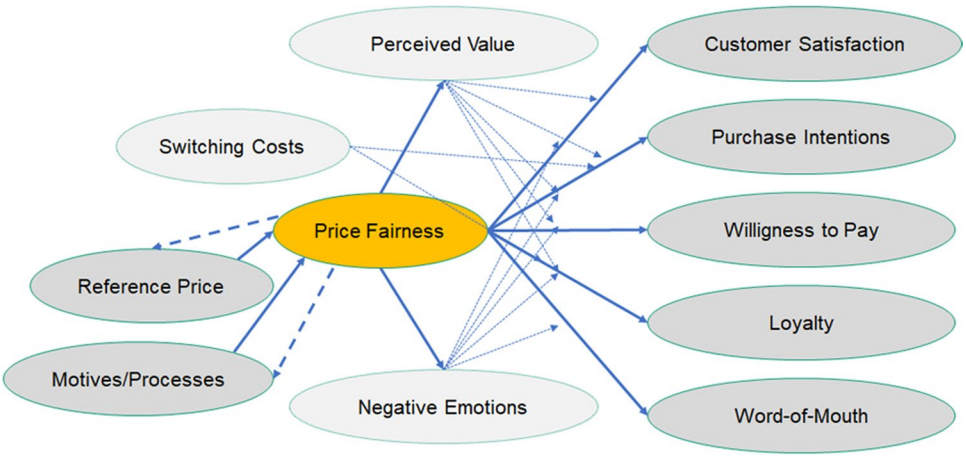

Fig. 1 Price fairness

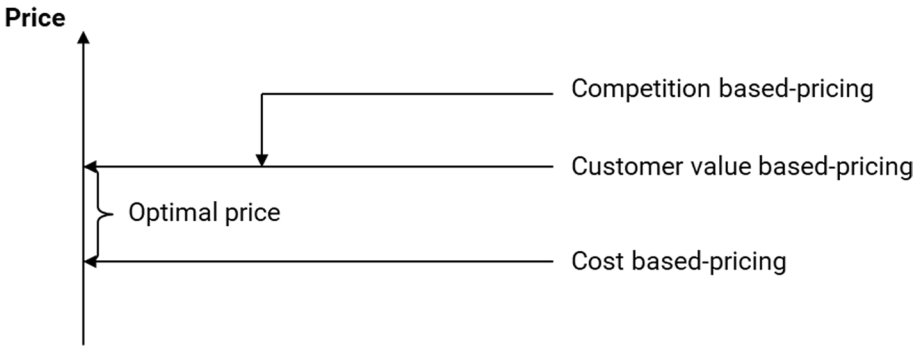

Fig. 2 The 3Cs of pricing

each market participant has a reasonable claim to consumer surplus and profit (Cox 2001). A cost-based pricing process, in which the price is based on the costs, is perceived as fair, but not a value-based pricing approach, in which the price skims off the maximum willingness of the customer to pay. In particular, revenue management carried out by many service companies is perceived by customers as unfair (Frey and Pommerehne 1993), since price increases are only raised due to an increase in demand and thus lead to an unreasonable profit.

A number of empirical studies on perceived price fairness look at various forms of price differentiation and price increases in particular (Xia et al. 2004). Empirical studies examining how high the fair price should be, on the other hand, are rare. The business literature typically does not deal with a normative analysis of the fair price, but assumes that this results from a marginal analysis of costs and utilities (Walsh and Lynch 2002). In this study, this gap should be closed and the level of the fair price should be considered.

In the following section, I discuss possible ways of deriving fair prices based on two concepts of justice: distributive proportional justice and balancing distributive justice. The first concept of justice, which corresponds to the equity theory mentioned above, applied to the level of prices leads to a fair price that corresponds to the geometric mean of costs and benefits. The second concept of justice, on the other hand, leads to a fair price that corresponds to the arithmetic mean of costs and benefits. In the third section, I present an experiment that examines these two concepts with regard to perceived price fairness from a consumer perspective and discuss the empirical findings. In the fourth section, I derive possible recommendations for action and supplements for the traditional price management of companies.

The fair price

The level of the fair price is typically not considered in business literature and practice. Instead, three pricing approaches ("The 3Cs of Pricing") are discussed and applied: cost based, competition based, and customer value based (Nagle et al. 2017). The unit costs indicate the lower limit of the price, while the customer's maximum willingness to pay, which corresponds to his marginal utility or equivalently to his economic value, forms the upper limit (Fig. 2).

The width of the interval is determined by competing offers. In the case of easily comparable products and services in particular, this interval is narrower because the competitive pressure is pushing the maximum price down. In perfect competition, this interval is zero. In the case of

a monopolist, the interval is limited only by the prohibitive price. The typical case of monopolistic competition lies between these two extremes. The wider the gap between costs and customer value, the greater the price range of the provider.

With cost-based pricing, the price is calculated based on the unit cost, C, multiplied by a margin, m:

$$P^{\text{cost}} = mC.$$

This pricing approach is often used in practice, e.g., by retail or utility companies. It is easy to use and only requires information that is typically available in the company itself. Prices set this way are clear and understandable for customers. This and the fact that prices react symmetrically to changes in costs typically lead to a high level of acceptance and a high degree of perceived price fairness on the part of customers (Reinartz et al. 2017).

With customer value-based pricing, the price is set equal to or as close as possible to the economic value that the customer attaches to the alternative, U:

$$P^{\text{value}} = U.$$

The customer value, U, is the willingness to pay that a customer attributes to a certain alternative. It depends on the available and comparable competitive offers (Nagle et al. 2017). The cheaper these are, considering relative advantages and disadvantages, the lower the U value of the alternative considered and thus also the willingness to pay.

Customer value is related to customer utility. In the standard models of microeconomics, utility is defined as an alternative representation of ordinal customer preferences that results from a monotonous transformation of the indifference curves. Given the budget constraint and relative prices, a demand function can be derived. Under the condition of a quasi-linear utility function, the customer's willingness to pay, i.e., the customer value, can be interpreted as marginal utility (Varian 2009). The terms customer value, willingness to pay, and customer utility are therefore interchangeable in this context.

The benefit of value-based pricing is that the company captures all of the consumer surplus. A disadvantage is the need to empirically determine the willingness to pay, U, using suitable statistical methods, such as conjoint analysis. With changing willingness to pay, e.g., for different consumers or different points in time, the price also changes. This pricing approach is therefore viewed by customers as unfair, as it contradicts both equity and dual entitlement concepts.

Typically, in practice, these three approaches are not applied separately but simultaneously. It is therefore appropriately also referred to as "Pricing Tripod." (Simon and Fassnacht 2019). A hotelier, for example, knows the directly allocable costs of an overnight stay, for example, in the form of cleaning costs, which form the lower limit of his price. At the same time, he knows the prices of comparable hotels in his neighborhood, which form the upper limit. And he will be informed about special events that increase customer benefit, e.g., concerts or large trade fairs. He will take all this into account simultaneously when determining the price.

From the point of view of fairness, there are two other pricing approaches that I will call square equity pricing and mean pricing in the following. The square equity price is based on the proportional justice concept or equity theory, while the mean pricing approach draws on the concept of balancing distributive justice (Cook and Hegtvedt 1983; Deutsch 1975; Katyal et al. 2019). Aristotle defines proportional justice in his famous Nicomachean Ethics (5th book) as follows (Aristoteles 2018): "[…] awards should be 'according to merit' […] The just, then, is a species of the proportionate. […] Mathematicians call this kind of proportion geometrical. […] This, then, is what the just is --- the proportional." Alternatively it says at (Turner and Homans 1961): "A man's rewards in exchange with others should be proportional to his investments."

In formal terms, according to equity theory, a transaction is fair if all parties involved, either directly (e.g., buyer and seller) or indirectly (e.g., two different buyers of the same seller), have the same relations between output, O, and input, I:

$$\frac{O_f}{I_f} = \frac{O_r}{I_r},$$

where f stands for the focal person and r for the reference person.

Equity theory has been empirically tested successfully in a number of applications. A seminal study on equity theory in marketing was conducted by (Huppertz et al. 1978). Two sources of inequity were considered: price and service. Subjects perceived high-price inequity situations as less fair than low ones. Equity theory has also been successfully applied in work settings, testing, e.g., the overpaid/underpaid hypotheses, and the impact on work effort and job satisfaction. (Sweeney 1990) found that pay and job satisfaction and work effort increase when equity with co-workers increases. Support for the equity theory has also been demonstrated in studying intimate relationships. (Davidson 1984) found that equitable relationships are more satisfying and last longer.

I want to apply the equity theory to the level of the fair price and interpret the utility, U, which the good bestows on the buyer as its output. The price, P, which he has to pay, corresponds to his input. On the other hand, the seller receives the price as output, P, and the input must be the unit costs, C. If both input–output relations are the same, the result is fair, i.e., if the following equation is fulfilled:

$$\frac{U}{P} = \frac{P}{C}.$$

Solved for the price, P, the result is the following fair price according to the equity theory, which I will refer to as the square equity price:

$$P^{\text{square}} = \sqrt{CU}.$$

Another fair price can be derived by resorting to balancing distributive justice. Here, too, I quote from Aristotle's Nicomachean Ethics (Aristoteles 2018): "[…] it is as though there were a line divided into unequal parts, and the judge took away that by which the greater segment exceeds the half and added it to the smaller segment. The equal is intermediate between the greater and the lesser line according to arithmetical proportion."

So, applied to the price, let's imagine a horizontal line with the costs, C, left and the utility, U, to the right. The fair price P, ensures that the UC line is divided into two equal segments, i.e.,

$$U - P = P - C.$$

Solving for P, the mean price is therefore

$$P^{\text{mean}} = \frac{U + C}{2}.$$

The mean price is therefore the arithmetic mean of U and C, where the consumer surplus, U–P, equals the producer surplus, P–C. Seller and buyer receive an equal share of the transaction. For most combinations of C and U the mean price is above the square equity price.

The distributive concept of justice is deeply rooted in economic thinking, as much experimental evidence from behavioral game theory shows, especially the so-called ultimatum game (Cappelen et al. 2016). In this game a proposer is given a sum of money and asked how much of that he would like to give to the receiver. The receiver then must decide to either accept the offer, in which case the receiver gets what he is given and the proposer keeps the rest or to reject the offer, in which case both get zero. Experiments conducted in a lot of different contexts and countries and with different probands show that the acceptance rate peaks at a share of roughly 50%, i.e., at the arithmetic mean (Cartwright 2018).

Based on the equity theory and the distributive justice concept, the square equity price and the mean price should be perceived as fair because both have similar input–output relations for buyers and sellers, while utility-based and cost-based prices affect either the buyer or prefer the seller (Fig. 3). These should therefore be perceived as less fair. I summarize these considerations in the following two hypotheses H1 and H2, which are to be tested empirically as below:

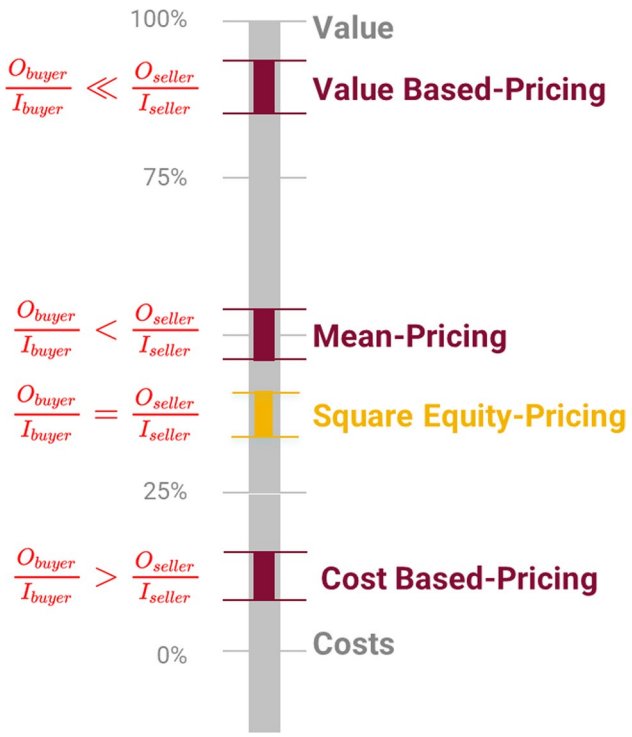

Fig. 3 Prices and input–output relations

H1 Square equity pricing and mean pricing are perceived fairer than value-based pricing or cost-based pricing.

H2 Deviating from square equity pricing to mean pricing and vice versa decreases perceived fairness less than deviating to value-based or cost-based pricing.

Experiment

The experiment was carried out with 60 master's degree students in economics at the University of Leipzig. At the time of the survey, according to the curriculum, they had no event on the subject of price fairness. The subjects were asked to imagine an economic transaction between an unknown person and a supplier who produces and sells the good. The good gives the person a value of 100 euros. The unit cost for a unit of the good is 10 euros. The subjects were randomly assigned to one of four groups, which differed only in the price the seller charged for the goods: (1) Value-Based Price = 95 euros, (2) Mean Price = 55 euros, (3) Square Equity Price = 32 euros, and (4) Cost-Based Price = 15 euros (Fig. 4).

The subjects were then asked to use a Likert scale to indicate how much they agreed or disagreed with the following statement (Fig. 5): "The seller gets a better deal than the buyer in this transaction."

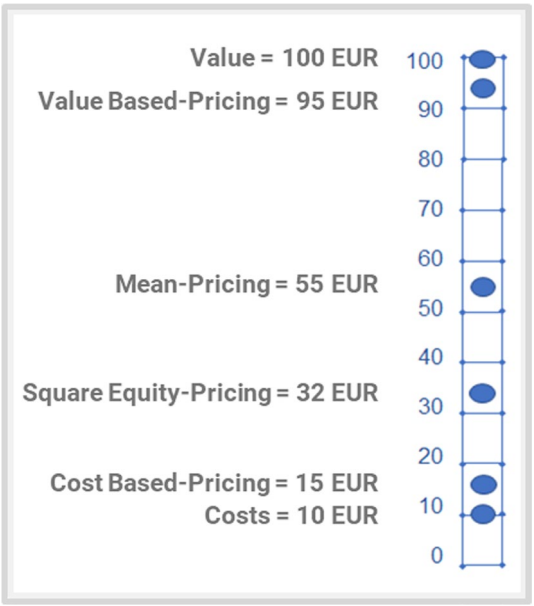

Fig. 4 Treatment groups

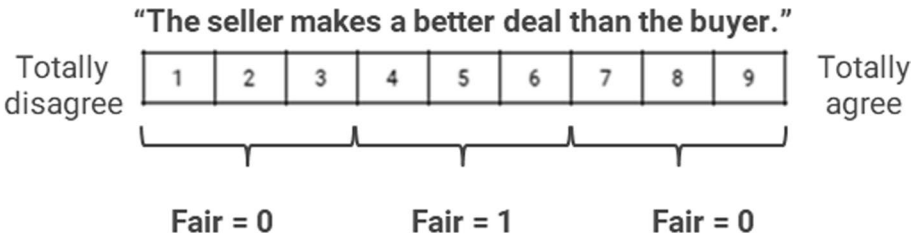

Fig. 5 Definition of dependent variable Fair = 1

Many empirical works operationalize price fairness with a direct question, such as "How fair do you think this price is on a scale of 1 to 9"? (Chark 2019; Matzler et al. 2006, 2007). However, such a question can lead to distorted answers, depending on whether a buyer or supplier perspective is taken (Walsh and Lynch 2002). I have therefore chosen this indirect question (Oliver and Swan 1989). I interpret answers near the middle of the scale, i.e., where neither the seller nor the buyer are better off, as a fair price (Fair = 1). And deviations from the middle as an unfair price (Fair = 0).

Figure 6 contains the results. 43% of all test subjects see mean pricing as fair, followed by square equity pricing with 36%. Value-based pricing and cost-based pricing are almost equal at 20% and 19%, respectively, and are perceived as the least fair.

A t test is used to check whether these differences are significant (Table 1):

I can therefore state the following with regard to both hypotheses:

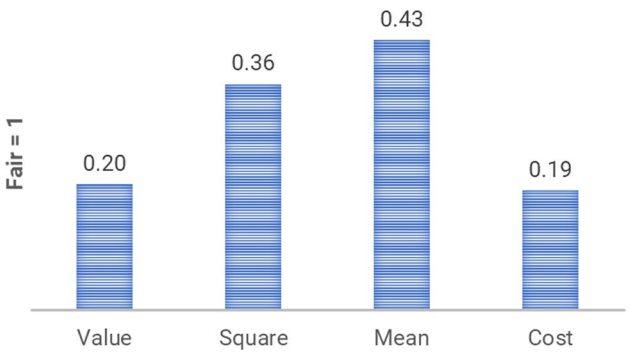

Fig. 6 Results of the experiments

H1 is supported: Square equity pricing and mean pricing are both perceived significantly fairer compared to cost-based or value-based pricing.
H2 is supported: Deviating from square equity pricing to mean pricing does not decrease perceived fairness (p-value = 0.27), but so does deviating to value-based or cost-based pricing.

Recommendations for action

More and more companies understand that prices have not only a leverage effect on profits but also affect customers' perceived price fairness and that this perceived price fairness can have an impact on the company's bottom line. Therefore, the 3Cs of pricing need to be complemented by considerations of price fairness. Companies should therefore move from the 3Cs of pricing to a 3C + 1F pricing framework (Fig. 7). This work is an attempt to derive prices from the point of view of fairness and to balance them with the other 3Cs of price setting.

Companies that incorporate these price fairness considerations into their pricing process are offered a number of strategic competitive advantages. On the one hand, they can estimate how much the prices actually set deviate from fair prices in order to prevent possible indirect negative effects in advance. Figure 8 contains a well-known example. The iPhone X will retail for USD 999. In an interview, Apple's

Table 1 *t* Tests

t Tests (fair = 1)	Difference	*t*-Value	*p*-Value
Mean—square	0.07	1.09	0.27
Mean—cost	0.24	3.90	< 0.01
Mean—value	0.23	3.84	< 0.01
Square—cost	0.17	2.69	0.01
Square—value	0.16	2.55	0.11
Value—cost	0.01	0.29	0.77

price is USD 685. The actual price deviates from these two fair prices by 64% and 46%, respectively.

The results of this work cannot only be used ex ante for price fairness assessment but also offensively as a marketing tool by those companies that set their prices according to square equity or mean prices. And finally, the approach could also be used by external institutions to benchmark companies or entire industries with regard to fair prices. The square equity or mean price could thus become the basis of a future price fairness index. May further researchers be encouraged not only to replicate the empirical findings in this work but also to develop further in this direction.

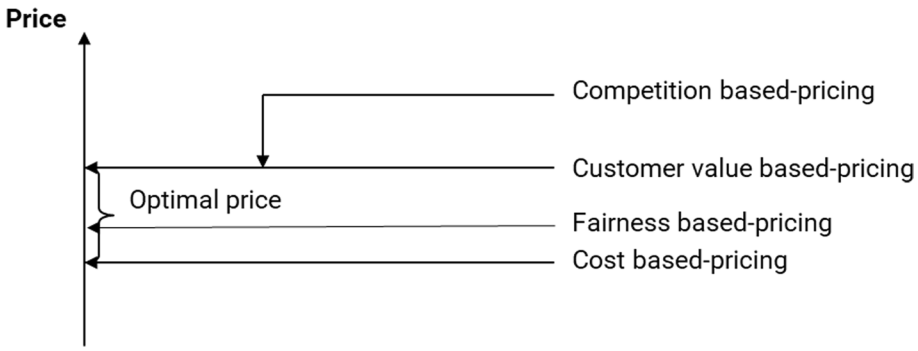

Fig. 7 The 3Cs + 1F of pricing

Fig. 8 Ex ante assessment of price fairness

CEO Tim Cook claims that "in terms of the way we price, we price to the value that we're providing."[1] Therefore, I set the value equal to the price at USD 1,000. Industry experts from zdnet.com estimate the unit cost of an iPhone X at USD 370, including R&D spending, marketing, and sales.[2] The square equity price is therefore USD 610 and the mean

[1] https://www.macrumors.com/2017/11/03/iphone-x-coffee-price-comparison/.

[2] https://www.zdnet.com/article/iphone-x-this-is-how-much-it-costs-to-make-in-components/.

Funding Open Access funding enabled and organized by Projekt DEAL.

References

Aristoteles. 2018. *The Nicomachean Ethics of Aristotle, Tr. By R. Williams*. Minneapolis: Franklin Classics Trade Press.

Belarmino, Amanda, Carola Raab, and Tevfik Demirciftci. 2020. The Impact of Resort Fees on Perceived Fairness and Destination Brand Image: An Exploratory Study. *Journal of Revenue and Pricing Management* 19 (2): 129–137.

Cappelen, Alexander W., Ulrik H. Nielsen, Bertil Tungodden, Jean Robert Tyran, and Erik Wengström. 2016. Fairness is Intuitive. *Experimental Economics* 19 (4): 727–740.

Cartwright, Edward. 2018. *Behavioral Economics. Routledge Advanced Texts in Economics and Finance*. London: Routledge.

Chark, Robin. 2019. Price Fairness in the Era of the Sharing Economy. *Cornell Hospitality Quarterly* 60 (3): 200–211.
Choi, Sunmee, and Anna S. Mattila. 2004. Hotel Revenue Management and Its Impact on Customers' Perceptions of Fairness. *Journal of Revenue and Pricing Management* 2 (4): 303–314.
Cook, Karen S., and Karen A. Hegtvedt. 1983. Distributive Justice, Equity, and Equality. *Annual Review of Sociology* 9 (1): 217–241.
Cox, Jennifer Lyn. 2001. Can Differential Prices Be Fair? *Journal of Product & Brand Management* 10 (5): 264–275.
Davidson, Bernard. 1984. A Test of Equity Theory for Marital Adjustment. *Social Psychology Quarterly* 47 (1): 36–42.
Deutsch, Morton. 1975. Equity, Equality, and Need: What Determines Which Value Will Be Used as the Basis of Distributive Justice? *Journal of Social Issues* 31 (3): 137–149.
Ferguson, Jodie L. 2014. Implementing Price Increases in Turbulent Economies: Pricing Approaches for Reducing Perceptions of Price Unfairness. *Journal of Business Research* 67 (1): 2732.
Frey, Bruno S., and Werner W. Pommerehne. 1993. On the Fairness of Pricing—An Empirical Survey among the General Population. *Journal of Economic Behavior & Organization* 20 (3): 295–307.
Huppertz, John W., Sidney J. Arenson, and Richard H. Evans. 1978. An Application of Equity Theory to Buyer-Seller Exchange Situations. *Journal of Marketing Research* 15 (2): 250.
Katyal, Kanupriya, Vinay Kanetkar, and Sanjay Patro. 2019. What Is a Fair Fare? Exploring the Differences between Perceived Price Fairness and Perceived Price Unfairness. *Journal of Revenue and Pricing Management* 18 (2): 133–146.
Malc, Domen, Damijan Mumel, and Aleksandra Pisnik. 2016. Exploring Price Fairness Perceptions and Their Influence on Consumer Behavior. *Journal of Business Research* 69 (9): 3693–3697.
Matzler, Kurt, Birgit Renzl, and Rita Faullant. 2007. Dimensions of Price Satisfaction: A Replication and Extension. *International Journal of Bank Marketing* 25 (6): 394–405.
Matzler, Kurt, Andreas Würtele, and Birgit Renzl. 2006. Dimensions of Price Satisfaction: A Study in the Retail Banking Industry. *International Journal of Bank Marketing* 24 (4): 216–231.
Nagle, Thomas, John Hogan, and Joseph Zale. 2017. *The Strategy and Tactics of Pricing*, 5th ed. London: Routledge.
Oliver, Richard L., and John E. Swan. 1989. Consumer Perceptions of Interpersonal Equity and Satisfaction in Transactions: A Field Survey Approach. *Journal of Marketing* 53 (2): 21.
Piketty, Thomas. 2014. *Capital in the Twenty-First Century*. London: Belknap Press.
Reinartz, Werner, Justus Haucap, Nico Wiegand, and Matthias Hunold. 2017. Price Differentiation and Dispersion in Retailing.
Simon, Hermann, and Martin Fassnacht. 2019. Fundamentals of Price Management. *Price Management*. https://doi.org/10.1007/978-3-319-99456-7_1.
Stiglitz, Joseph. 2017. *Globalization and Its Discontents*. Harlow: Penguin Books.
Sweeney, Paul D. 1990. Distributive Justice and Pay Satisfaction: A Field Test of an Equity Theory Prediction. *Journal of Business and Psychology* 4 (3): 329–341.
Tarrahi, Farid, Martin Eisend, and Florian Dost. 2016. A Meta-Analysis of Price Change Fairness Perceptions. *International Journal of Research in Marketing*. https://doi.org/10.1016/j.ijresmar.2015.10.004.
Turner, Ralph H., and George Caspar Homans. 1961. Social Behavior: Its Elementary Forms. *American Sociological Review* 26 (4): 635.
Varian, Hal R. 2009. *Intermediate Microeconomics: A Modern Approach*, 8th ed. New York: WW Norton.
Walsh, Adrian, and Tony Lynch. 2002. The Very Idea of Justice in Pricing. *Business & Professional Ethics Journal* 21 (3): 3–25.
Xia, Lan, Kent B. Monroe, and Jennifer L. Cox. 2004. The Price Is Unfair! A Conceptual Framework of Price Fairness Perceptions. *Journal of Marketing* 68 (4): 1–15.

Dubravko Radic is Professor for Service Management at the University of Leipzig, Germany and Deputy Head of the Unit Price and Service Management at the Fraunhofer Center for International Management and Knowledge Economy, Leipzig, Germany.