



Competitive strategy when consumers are affected by reference prices



Ofer H. Azar*

Department of Business Administration, Guilford Glazer Faculty of Business and Management, Ben-Gurion University of the Negev, P.O.B. 653, Beer-Sheva 84105, Israel

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ABSTRACT

The article presents a model that analyzes the optimal strategy of multi-product firms when consumers are affected by reference prices. Generally, the stronger the consideration of reference prices is, the more intensified the competition is and the lower are the prices and profits. In some cases it becomes optimal to sell the good for which consideration of reference prices is stronger at a negative markup. The model offers several practical implications, for example, suggesting that firms should usually avoid focusing advertisements on the price differences between the firm and its competitors.

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1. Introduction

An important consideration of consumers when making purchase decisions is the perceived fairness of prices, which in turn depends on a comparison between the firm's prices and some reference prices. [Kahneman, Knetsch, and Thaler \(1986a, p. 729–730\)](#), for example, write "A central concept in analyzing the fairness of actions in which a firm sets the terms of future exchanges is the reference transaction, a relevant precedent that is characterized by a reference price or wage..." A rich literature studies price fairness perceptions and reference prices, and how these are determined (see for example [Bolton, Warlop, & Alba, 2003](#); [Kahneman, Knetsch, & Thaler, 1986b](#); [Thaler, 1985](#); [Urbany, Bearden, & Weilbaker, 1988](#)). [Rajendran](#)

* Tel.: +972 8 6472675; fax: +972 8 6477691.

E-mail address: azar@som.bgu.ac.il

and Tellis (1994) write that “An emerging consensus in marketing is that consumers respond to price relative to some standard or reference price” and argue that not only past prices in the store but also other prices in the store can serve as reference prices. Maxwell (2002) finds in two studies that consumers’ perceptions of price fairness and consequently their willingness to purchase are affected not only by the price itself but also by the process in which that price has been determined. Dodonova and Khoroshilov (2004), who examine empirical data from the auction website Bidz.com, provide additional evidence for the importance of reference prices. They find that people bid more for the same item when its posted “buy now” price is higher, suggesting that the reference “buy now” price affects buyers’ valuation of a good.¹ Briers, Pandel-aere, and Warlop (2007) suggest that even deciding how much to donate to charities is affected by reference prices. Heidhues and Koszegi (2008) assume that consumers are loss averse relative to a reference point that is provided by their expectations and build a model that analyzes the impact of this on demand and equilibrium prices. Trautmann and Traxler (2010) study whether reserve prices serve as reference prices in online auctions of virtual football players. Karle and Peitz (2012) study how contextual consumer loss aversion affects firm strategy in duopoly, when some consumers are initially uninformed about their tastes and form a reference point that consists of an expected match-value and price distribution. Rosato (2013) presents a model with consumers who have a reference point that is affected by their expectations about consumption value and price. He shows that limited-availability sales can cause consumers to make an ex-ante unfavorable purchase.

Another psychological issue that has implications for pricing is the utility that consumers may derive from finding a good bargain, beyond the utility that can be obtained from using the money saved for additional consumption. Darke and Freedman (1995), for example, find that subjects enjoyed bargains regardless of any financial gain, implying that non-financial motives might also be involved. In addition, they report that bargains acquired through skill were not enjoyed more than bargains achieved because of luck, suggesting that achievement motives could not explain why subjects enjoyed bargains when there was no associated financial gain. Xia and Monroe (2010) suggest that perceptions of price fairness share many similarities with transaction value (consumers’ psychological satisfaction from taking advantage of a good deal), but also have important differences. In three studies that address these differences they show that a “bad deal” is usually perceived to involve an unfair price, but a “good deal” is not necessarily perceived to offer the fairest price.

The psychological evidence mentioned above has important implications for optimal pricing strategy in general and in particular for pricing of multi-product firms. However, models of multi-product firms’ pricing (e.g., DeGraba, 2006; Doraszelski & Draganska, 2006) have not yet considered these implications.² The purpose of this article is therefore to model how incorporating reference prices affects optimal pricing in the presence of multiple goods, thus contributing to the literature on pricing of multi-product firms. The article also contributes to the growing literature that addresses the effects of psychological biases on industrial organization and firm strategy.³

In the model presented below, two multi-product retailers compete by choosing prices and take into account that consumers are affected by reference prices. Each firm offers two goods, L and H , where L is the good with the lower cost. Consumers are interested in either one good or both. When considering the reference prices consumers may pay more attention to the reference price of the expensive good, or they may consider more the reference price of the cheap good (e.g., because the same absolute price difference creates a larger percentage difference when the price is lower). The model allows for both possibilities; the former corresponds to $k > 1$ and the latter to $k < 1$. The extent to which consumers care about reference prices in general is captured by the parameter g .

In equilibrium both firms choose the same markups. For most parameter values the markups are decreasing in g : more consideration of reference prices by consumers leads to more aggressive competition, lower prices and lower profits. This result has practical implications for firms, as it suggests that firms should generally not encourage consumers to think about reference prices. This implies that advertisements that focus on the price differences between the firm and its competitors may be dangerous, because they may intensify the price competition in the market and erode profits.

Another result shows that when consumers pay more attention to the reference price of one of the goods, the competition for this good intensifies. As a result, the markup on L decreases and the markup on H increases if $k < 1$, and the opposite happens when $k > 1$ (compared to the equilibrium without consumers who buy both goods). A practical implication of the model is that the firm should take into account in its pricing decisions for which of its goods consumers are particularly affected by reference prices. Generally, these goods should be priced very competitively, especially if consumers who buy these goods also buy other goods on the same shopping trip.

In some cases firms present the behavior of loss-leader pricing. One of the two goods is sold for a price that is lower than its cost. This attracts also consumers who buy both goods, and the gain from their purchases of the second good justifies the

¹ For more detailed reviews of this literature, see Xia, Monroe, and Cox (2004) for a review and conceptual framework of price fairness perceptions, and Mazumdar, Raj, and Sinha (2005) for a literature review on reference price research. Another related topic is the expectations and perceptions of price changes and inflation; the interested reader is referred to the review by Ranyard, Del Missier, Bonini, Duxbury, and Summers (2008) and the studies of Antonides (2008), Gärling and Gamble (2008), Christandl, Fetchenhauer, and Hoelzl (2011); and Huber (2011).

² DeGraba (2006) presents a model in which loss-leader pricing is a way to price discriminate between more profitable consumers who also buy large quantities of other goods and other consumers (his model is discussed in more detail below). Doraszelski and Draganska (2006) present a multiproduct duopoly and examine whether firms should offer general-purpose products or tailor their offerings to fit specific consumer needs, at the cost of fitting less the needs of other consumer segments.

³ For theoretical models in this area, see DellaVigna and Malmendier (2004), Gabaix and Laibson (2006), and Ho, Lim, and Camerer (2006). DellaVigna and Malmendier (2006) analyze empirically the case of gym pricing. For literature reviews, see Ellison (2006) and Camerer and Malmendier (2007).

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