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Value-based pricing in competitive situations with the help of multi-product price response maps

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ABSTRACT

This article introduces multi-product price response maps for various value pricing applications in competitive situations. The maps are based on the direct elicitation of individual willingness to pay (WTP) as a range for competing products; they reveal an individual's or market's choice probability for a focal product, at its own and competing products' prices. Transforming the price response into profit, revenue, or unit sold maps supports optimal pricing decisions. The maps are also useful for optimizing profit differences from the closest competitor and for portfolio pricing. Managers can use a consumer indecisiveness map, gained from the WTP range data, to devise complementary marketing measures at prices where consumer uncertainty is high. The illustration of this approach uses two empirical examples, featuring two or more competing consumer goods, and demonstrates the predictive and external validity of these proposed maps.

1. Introduction

Managers' knowledge of consumers' willingness to pay (WTP) – or reservation price – is the cornerstone of pricing strategy (Anderson, Jain, & Chintagunta, 1993; Homburg, Koschate, & Hoyer, 2005). Knowledge of individual WTP levels allows one-to-one pricing (Shaffer & Zhang, 1995). Aggregate WTP levels – such as in a price response curve – permit managers to optimize market prices according to microeconomic theory (e.g., Homburg, Kuester, & Krohmer, 2009; Varian, 1992). Such pricing approaches are referred to as value pricing, because they optimize a manager's goal metric (usually profit) by pricing with respect to consumers' perceptions of the (relative) value of the product or service.

Value pricing is the most desirable pricing approach (Liozu, Hinterhuber, Perelli, & Boland, 2012), but because they often lack up-to-date WTP information – especially joint WTP for their own and competitors' products – or the skills to exploit that information, few managers actually engage in value pricing (Liozu et al., 2012; Rao & Kartono, 2009). Intriguingly, managers are even less likely do so when they focus more on competitors' prices (Rao & Kartono, 2009). Yet if managers knew and considered consumers' WTP for their own and competitors' products, they could determine how many consumers would purchase which product, for each combination of their own and competitors' prices (Jedidi & Zhang, 2002). Despite a rich body of marketing research on WTP, a key direction for continued research remains the effort to get "to know the joint distribution of consumers' reservation prices (WTP) for its products and those of its competitors" (Jedidi & Jagpal, 2009, p. 58).

This article builds on advances in the conceptualization and measurement of WTP as a range (Wang, Venkatesh, & Chatterjee, 2007) and proposes eliciting empirical WTP range distributions for several products at the same time. Such an approach facilitates optimal price setting for multiple products and different pricing goals in nonlinear, uncertainty-rich, real-life settings. It also supports data elicitation at minimal cost and helps integrate pricing strategy with other marketing activities. The proposed approach consists of four steps: First, it elicits consumers' WTP for multiple, competing products, employing direct, individual WTP measures (Wertenbroch & Skiera, 2002). This study uses WTP ranges instead of traditional point-based WTP measurements, because they incorporate more information in the shape of consumer uncertainty about preferences and product performance (Schlereth, Eckert, & Skiera, 2012; Wang et al., 2007). Using WTP ranges also allows for comparatively smaller sample sizes, as demonstrated subsequently.

Second, the individual WTP range values for competing products support the construction of so-called price response maps, which represent empirical, multi-product distributions of consumers' price responses. They indicate consumers' aggregated choice probabilities for one product at a certain price, given the prices for competing products.

Third, by integrating the volume sold and cost information for the focal products, the authors construct maps of the units sold, revenue,

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and profits, which can help managers set optimal prices, depending on their goal. These revenue and profit maps can enable product price optimization in initial price setting environments or define reactions to competitors' price changes (manufacturer view), as well as lead to product portfolio price optimization (retailer view). By considering both manufacturer and retailer views, this methodology also helps uncover potential conflicts of interest in the value chain.

Fourth, the information in WTP ranges can be used to optimize not only the pricing decision but also the accompanying marketing measures (Dost, Wilken, Eisenbeiss, & Skiera, 2014; Wathieu & Bertini, 2007). At the aggregate level, WTP range information may indicate market responsiveness to other marketing activities at current or target price levels (Schlereth et al., 2012). The aggregated consumer floor and ceiling prices (i.e., end points of individual WTP ranges) produce an indecisiveness map, which can help managers decide at what level of their own and competitors' prices their additional, supportive marketing measures are especially effective. Combining optimal pricing maps with maps for consumer indecisiveness helps managers trade off competing price and non-price marketing activities and consider truly integrated marketing campaigns.

The rest of this article is structured as follows: Section 2.1 presents the method to elicit WTP as a range in a competitive environment, followed by the methodological basis for computing price response maps, as well as profit, revenue, and indecisiveness maps. Sections 2.3 and 2.4 detail managerial applications of the different maps. The illustration of the approach to value-based pricing in competition with an empirical example in Section 3 features two consumer products. After describing the empirical study, Section 3.1 establishes support for the approach's predictive and external validity and the method's robustness, even with small sample sizes, through a simulation study. Section 3.2 demonstrates its applicability to a range of value-based pricing questions, such as initial price setting, reactions to competitor price changes, or portfolio price optimization. Section 4 provides a second empirical application, featuring more than two competing products. The approach and examples, as well as the contributions to research and practice, are the focus in Section 5.

2. Theoretical considerations

2.1. Direct multi-product WTP as a range measurement

The foundation of this proposed approach is the measurement of individual WTP as a range (Dost & Wilken, 2012; Wang et al., 2007) for a set of competing products. This method obtains, from each respondent, a floor and ceiling reservation price, which reflect the limits of her or his WTP range, for all competing products, after that respondent has been exposed to all focal products. Thus, the reservation prices of different products are not assumed to be independent. These data are needed to compute the subsequent multi-product price response maps; however, several different WTP range elicitation methods could be used.

Direct WTP range elicitation is very easy to implement and can be applied to all types of product categories. Nor does it require any prior data history, so this approach can apply to new product introductions. It can predict consumer price responses across all possible prices, instead of a limited set (Wertenbroch & Skiera, 2002), whereas choice-based methods focus on a limited set of prices, commonly assume linearity in individual preferences, and cannot account for real-life, non-linearly related WTP distributions across competing products (Jedidi & Jagpal, 2009). The relatively few data points for estimating utility functions in choice-based approaches also may lead to inaccuracies in WTP estimates (Wilken & Sichtmann, 2007). Although direct WTP measurement frequently leads to overstatements and hypothetical bias (Voelckner, 2006), hypothetical and incentive-aligned direct WTP measurement both fare better in eliciting truly price-optimizing WTP distributions than their respective choice-based counterparts (Miller, Hofstetter, Krohmer, & Zhang, 2011). When increased bias reduction is necessary, direct WTP range measurement can draw on incentive-aligned approaches (Dost & Wilken, 2012; Wang et al., 2007), assuming their application is practically feasible in the respective product category.

The proposed procedure uses the WTP as a range measurement, which captures consumer uncertainty as point-based WTP does not and also elicits more information from consumers than do point-based WTP measurements. Wang et al. (2007) argue that consumers suffer from uncertainty and therefore construct their WTP as a range of reservation prices, each with a corresponding choice probability. This range of reservation prices subsumes diverse definitions of reservation price like the floor reservation prices, "at or below which a consumer will demand one unit of the good" (Varian, 1992, p. 152), which indicates 100% choice probability; "the price at which a consumer is indifferent between buying and not buying" (Moorthy, Ratchford, & Talukdar, 1997, p. 265), or 50% choice probability; and the ceiling reservation price, "the minimum price at which a consumer would no longer purchase" (Hauser & Urban, 1986, p. 449), which indicates 0% choice probability. A WTP range also can be understood as a measure of variance (or scale parameters) in the individual distribution of choice probability around a true, yet latent, individual WTP (Dost & Wilken, 2012; Schlereth et al., 2012). For example, a consumer might be sure to buy a product up to a price of $4 (floor reservation price) and equally sure not to buy the product at prices higher than $8 (ceiling reservation price). For any price between $4 and $8 (the consumer's WTP range), she is indecisive about whether to purchase. The width of the WTP range indicates her uncertainty about preferences and product performance; her average reservation price is a measure of her latent true WTP, somewhere within that WTP range (Maier, Wilken, & Dost, 2015). Fig. 1 illustrates this WTP range example.

For value pricing—the main goal of the proposed procedure—capturing uncertainty is useful, because when consumer uncertainty in a market is higher, WTP range measurement better predicts consumer choice, compared with point-based WTP (Dost & Wilken, 2012). More consumer uncertainty in a market increases the bias in optimal pricing decisions based on point-based WTP measurements, for both optimal one-to-one pricing and optimal market pricing (Dost & Wilken, 2012). The price response map resulting from WTP range measurements thus is likely less biased, and such measurements are particularly useful in markets with uncertainty, such as those for experience or credence goods (Zeithaml, 1988).

The rich information contained in the WTP ranges is also managerially useful. A challenge for direct point-based WTP measurement is the need for large samples, whereas WTP ranges already capture information about market-level consumer heterogeneity, because consumers observe other market participants' behavior and adjust their preferences accordingly (Park, MacLachlan, & Love, 2011). This richer information per measured consumer should reduce the sample size needed for predictions of market choice. Alternatively, with comparable sample sizes, measuring WTP ranges may result in smoother price response curves or maps, with fewer of the jagged lines that are common in traditional price response curves obtained with point-based WTP measurements and that often distort optimal price estimation with their partial non-differentiability. This research empirically demonstrates that with WTP range measurements, even sample sizes as low as 40 respondents can produce valid multi-product price response maps.

2.2. Computing multi-product price response and consumer indecisiveness maps

The first step for building a price response map is to transform WTP range estimates into a continuous function of product choice probability for each individual consumer and each product. Consistent with extant approaches (Dost & Wilken, 2012; Schlereth et al., 2012), this study relies on a logistic choice probability function with values from 1 to 0,

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