The market value for product attribute improvements under price personalization

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1. Introduction

New product development is crucial to sustained firm performance. Companies that fail to develop new products risk being supplanted by more nimble competitors responding to shifts in consumer demand. While new companies often focus on creating disruptive technologies that alter the competitive landscape, most new product development activity focuses on incremental innovation devoted to improving existing products. For example, at Sony, over three quarters of new product activity is dedicated to improving existing products (Kotler & Keller, 2006). Bayus (1994) notes the existence of a similar pattern across a range of industries (Abernathy & Utterback, 1978) as well as evidence that incremental innovation is more crucial to profitability than breakthrough technology (Comory, 1989). While new product development is undeniably important, it is also risky. Some studies suggest a failure rate of 95% in the U.S. (Kotler & Keller, 2006). To improve the odds of success, product managers must carefully assess how consumers value product attribute improvements and, importantly, how to aggregate consumer valuations into a market-level valuation useful for product planning decisions.

From the perspective of an individual consumer, the value for a product attribute improvement is typically defined as the change in price that would keep consumer utility constant given the attribute improvement (Train, 2003). Appealing to discrete-choice theory of consumer and firm behavior, Ofek and Srinivasan (2002) derive a market-level analog to this consumer-level valuation termed the market value for an attribute improvement (MVAI). MVAI can be compared to the marginal cost of the attribute improvement, providing product managers with guidance in assessing the overall profitability of the improvement. However, the Ofek and Srinivasan (2002) derivation of MVAI assumes that firms charges a common price to all consumers. In contrast to a homogenous pricing policy, the notion of personalized pricing is of great appeal to both marketing academics and managers (Fay, Mitra, & Wang, 2009). A stream of research in the marketing literature has considered the personalization of the marketing mix from both an empirical and theoretical perspective (Chen & Iyer, 2002; Choudhary, Ghose, Mukhopadhyay, & Rajan, 2005; Heilman, Kaefer, & Ramenofsky, 2003; Khan, Lewis, & Singh, 2009; Knox & Eliashberg, 2009; Liu & Zhang, 2006; Rossi, McCulloch, & Allenby, 1996; Shaffer & Zhang, 2002). Firms from the apparel, airline, bank issued credit-card, and enterprise software industries have engaged in personalized pricing (Choudhary et al., 2005; Montgomery & Smith, 2009; Shaffer & Zhang, 2002). In light of academic and practitioner attention to the topic of personalized pricing, it is interesting to consider whether and how price personalization affects the market value for product attribute improvements.1

1 Rather than focusing on the normative question of whether or not firms should engage in price personalization, we adopt a positive point of view to understand the implications of engaging in one-to-one price personalization for estimates of the market value for a product attribute improvement.

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2. Personalized pricing in marketing

The marketing literature has discussed numerous examples of personalized marketing in both consumer and business-to-business markets. Choudhary et al. (2005) discuss examples of firms in the enterprise software industry, such as IBM, Hewlett-Packard, and Sun Microsystems, that use personalized pricing discounts for products of the same quality. In consumer markets, information technology has enabled firms to develop rich databases of consumer information giving firms the ability to reach individual consumers and personalize the marketing mix. Direct marketing firms such as Land’s End and LL. Bean use promotional discounts to tailor prices to individual households (Shaffer & Zhang, 2002). Firms in the bank issued credit card industry, such as Wells Fargo, engage in price personalization through personalized discounts on card fees (Choudhary et al., 2005). The consulting firm Accenture offers clients a personalized pricing tool to assist in implementing a one-to-one price promotion program. A CNN.com report details price variation across consumers for the same product in a variety of online product categories, including airline tickets, digital cameras, and personal computers. The online data provision company Lexis–Nexis sells to different consumers at different prices (Chose & Huang, 2009). Even when met initially with consumer resistance, firms such as Amazon continue to find innovative ways to implement personalized pricing, such as the Gold Box (Choudhary et al., 2005).

A challenge in implementing a personalized pricing strategy is that firms must obtain consumer willingness-to-pay for the products in the competitive set. Fay et al. (2009) consider conditions under which firms invest in technology to solicit preferences from consumers at the point of purchase versus technology that allows the firm to infer preferences based on past observations. Wertenbroch and Skiera (2002) discuss different methods for determining consumer valuations, or willingness-to-pay, in market research. These methods include Vickery auctions, the Becker–DeGroot–Marshall (BDM) elicitation procedure, and discrete choice models applied to either stated preference data or market transaction data. Cameron and James (1987), Jedidi et al. (2003), and Ofek and Srinivasan (2002) use discrete choice models to estimate consumer valuations for product attributes. Most empirical applications of personalized marketing also utilize discrete choice models (Ansari & Mela, 2003; Khan et al., 2009; Knox & Eliashberg, 2009; Rossi et al., 1996; Zhang & Krishnamurthi, 2004; Zhang & Wedel, 2009). An advantage of using discrete choice models is that with an attribute based utility function (Fader & Hardie, 1996), the valuation for the product can easily be decomposed into the valuations for the product attributes. Furthermore, if the valuations can be linked to consumer characteristics, such as demographics or purchase history, the model can be used to impute the valuations for new consumers conditional on the characteristics enhancing the firm’s ability to implement a personalized pricing strategy (Rossi et al., 1996).

In considering the question of whether and how the firm’s pricing strategy affects the market value for product attribute improvements it is natural to address the problem from the perspective of firms selling direct to consumers. Shaffer and Zhang (2002) study one-to-one promotions among competing direct marketing firms. Chen and Iyer (2002) study competition among firms that offer personalized prices assuming that firms have an imperfect ability to reach consumers. Choudhary et al. (2005) consider how price personalization in a duopoly impacts firm choices over product quality. It is important to note, though, that selling through a retailer does not preclude the

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