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De-targeting: Advertising an assortment of products to loss-averse consumers☆

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ABSTRACT

We consider product markets in which single-product firms sell differentiated products to consumers through an intermediary. Consumers are interested only in a specific product category, but do not know before inspection which products belong to this category. An intermediary knows each consumer's preferred product category and which products belong to it. It makes personalized product announcements to consumers. Such targeted advertising reduces overall advertising costs and, as a direct effect, maximizes industry profits. However, as we show in this paper, when consumers form reference prices and are loss averse, announcing additional products relaxes competition between firms. As a result, firms may earn higher profits from "de-targeting"; i.e., when the intermediary deliberately informs about some products and their price quotes from outside a consumer's preferred product category.

1. Introduction

Consumers often have a clear idea about what kind of products they are interested in and use shopping portals by entering a search query specifying their purchase intent. Which products are shown to consumers is, however, at the discretion of the shopping portal. While the posted offers typically better reflect a consumer's taste than a random draw from a wider product category, some posted offers often turn out, after inspection, to be off the mark and therefore irrelevant for the consumer. As we show in this paper, a portal may deliberately post such ex post irrelevant offers because sellers may actually benefit from such "de-targeting" and the portal participates in these gains.

The core of our argument is based on reference pricing: As is well known from the marketing literature (for example, Rajendran and Tellis, 1994), posted prices affect the utility of consumers when picking one among several products. For instance, if a consumer observes a high-price and a low-price product, which, from an ex ante point of view, she considers relevant, she receives a lower utility when buying the high-price product than in the situation in which she had observed two high-price products. Thus, the posted price of an ex post "irrelevant" alternative may affect consumer evaluations and demand.

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With the use of portals and other intermediaries, reference pricing develops a new life because portals can tailor the set of products and prices a consumer observes to the consumer's search request. Using the concept of expectation-based loss aversion, we show in this paper that the assortment of products encountered by consumers may affect their demand. Note that this holds only for products a consumer expects to buy with positive probability when seeing them listed. Portals decide on the assortment of products and thus determine a consumer's consideration set. We show that with loss-averse consumers using reference prices, competition between producers becomes less intense the larger the consumers' consideration set, while it is neutral in a setting with loss-neutral consumers. As a result, from an industry perspective, it may be optimal to expand the consumers' consideration set.

We embed a discrete choice problem among differentiated products within a product category into a model in which products are announced by an intermediary and firms selling through the intermediary set price. Each consumer is interested in one product category only; within each product category products are differentiated. The intermediary – for example, an online shopping portal such as Ebay (only "buy it now" listings) – can identify the specific product category a consumer is interested in, but not the consumer's preferred product within this category.[1] The intermediary informs consumers about the existence and price of some products – thus, the intermediary employs informative advertising.

Perfect targeting in our context means that the consumer sees only announcements of the products from her preferred product category; we call this *perfect category targeting*. Alternatively, under *de-targeting* the intermediary advertises additional products that do not belong to a consumer's preferred category and consumers will never buy. How can such costly advertising be optimal from the perspective of the industry and be implemented by an intermediary?

We present a novel explanation based on the interaction between the effect of reference prices (when consumers are loss averse) and the set of advertised products. In a nutshell, consumer loss aversion and the announcement strategy of the intermediary interact: the intermediary, acting on behalf of advertising firms, uses de-targeting to mitigate the expected gains and losses consumers experience and, thereby, relaxes competition between firms. When advertising costs are not too high, the intermediary optimally refrains from perfect category targeting and advertises more products even though it knows from the start that consumers will never buy them.

Consumer obtain information in two steps. We distinguish between a contact stage and an inspection stage. At the contact stage, advertising informs a consumer about the existence and price of a set of products, and these advertised products constitute a consumer's consideration set. At the inspection stage, the consumer learns about which products belong to her preferred product category and her match value of these products. Based on the information received from advertising, but prior to learning about whether a product belongs to her preferred product category and which match value it generates, a consumer forms expectations about how likely she is to buy an advertised product (this timing resembles that in Karle and Peitz, 2014). After the inspection stage, when evaluating the options to make purchases, she experiences gains or losses if her actual choice does not confirm her initial expectations, where losses loom larger than gains.[2] Consumers assign the correct purchasing probabilities ex ante; thus, their expectations are rational given the information available, which is in line with the concept of expectation-based loss aversion by Kőszegi and Rabin (2006, 2007).[3]

Under consumer loss aversion, advertising additional products – i.e., de-targeting – affects a consumer's reference point and thus the consumer's demand function. If more products are advertised to consumers, then, due to consumers' initial taste uncertainty, the purchase of any given product becomes less likely. This also applies to products which are offered at a reduced price relative to other products. Observing more products then makes consumers less price sensitive to each product. Therefore, de-targeting results in higher equilibrium prices. What de-targeting does, is that it places consumers in a different context. In this sense, our model formalizes contextual inference about the expected purchase price when consumers are loss averse and addresses the role of the intermediary in "manipulating" consumer beliefs.

To illustrate the idea of de-targeting under consumer loss aversion, we return to the example of a shopping portal such as Ebay (only "buy it now" listings). The portal learns about a consumer's preferred product category from her search query. Some portals, in addition, make use of a consumer's personal data, for instance, consisting of her search and purchase history, to infer her preferred category. Casual observations suggest that portals often list product in response to search queries that, upon closer inspection by the consumer, turn out to be completely off the mark, but that the portal could have discarded as irrelevant to the consumer on the information available to the portal. Based on the product announcements, consumers consciously or unconsciously form their probability distribution over the different posted prices. Then, after reading about the announced products and before making their purchase decision, they figure out which product best fits their tastes. According to our theory, even though the portal knows ex ante which narrow set of products a consumer is interested in, it announces additional products to manage a consumer's expectations. This reduces the price elasticity of

[1] In line with the discrete choice literature of product differentiation, a consumer's utility function for products in her preferred category includes a random variable whose realization is unknown to firms and the intermediary. Product differentiation within a category arises from i.i.d. realizations of this random variable across consumers.

[2] In our base model, we restrict attention to loss aversion in the price dimension only. As we show in Section 5.1, including loss aversion in the taste dimension does not affect our main result.

[3] There is extensive recent empirical evidence from the lab (Abeler et al., 2011; Ericson and Fuster, 2011; Gill and Prowse, 2012, and Karle et al., 2015) and from the field (Pope and Schweitzer, 2011 and Crawford and Meng, 2011) that losses drive behavior more strongly than gains, and that reference points are expectation based. Support also comes from earlier contributions in the marketing literature which suggests that loss aversion with respect to price affects consumer choice (for an overview, see Mazumdar et al., 2005). In particular, Rajendran and Tellis (1994) suggests that reference prices are based on the prices of similar products at the moment of purchase.