

Winter 12-6-2018

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## **An Economic Analysis of Incentivized Positive Reviews**

*(Work in Progress)*

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### **ABSTRACT**

It becomes increasingly popular that some large online retailers such as Amazon open their platforms to allow third-party retail competitors to sell on their own platforms. We develop an analytical model to examine this retailer marketplace model and its business impact. We assume that a leading retailer has both valuation advantage that may come from its reputation and information advantage that may come from its brand awareness. We find that the availability of relatively low-cost advertising through social media or search engine can effectively reduce the leading retailer's information advantage, and thus be an important driving force for its strategic decision to open its platform. Not only does the advertising option directly make small sellers more visible to consumers, but also incentivizes the online retailer to open its platform and dramatically increases small sellers' exposure, indirectly contributing to an even more prominent long tail phenomenon in e-commerce.

**Keywords:** Positive reviews, electronic commerce, cash-back rebate, pricing decision.

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### **INTRODUCTION**

Online reviews have been well documented as an important information source that affects consumers' purchase decisions (Zhu and Zhang, 2010; eMarketer, 2017). To encourage consumers to post reviews online, firms often provide various incentives. For example, after a consumer shops at Home Depot, the consumer is often invited to write reviews with the promise that he/she will have a chance to draw a lottery for some prize (e.g., an iPad). Over the last couple of years, a new approach has emerged on Taobao.com, the leading online trading platform in China: Many sellers offer consumers mail-in rebates after purchase, but the rebates can be redeemed only if the consumers post positive reviews online. This "rebate-for-positive-reviews" strategy is different from the typical "rebate-for-reviews" strategy because in some sense sellers bribe buyers for positive reviews rather than simply expanding the review pool using monetary incentives. In this paper, we aim to understand under what conditions sellers should optimally choose this "rebate-for-positive-reviews" strategy and how such a strategy affects buyers' purchase decisions and social welfare.

On the one hand, the motivation for such a strategy is rather clear. For example, prior studies show that one extra star in a Yelp review could increase revenues by 5–9% (Economist, 2015), which explains why restaurants often seek fake acclaim, offering customers discounts in exchange for positive reviews on social networking sites and other online platforms. On the other hand, offering rebate incurs cost for sellers. Therefore, it may not always be profitable to pursue such a strategy. Although poor ratings and reviews affect a seller's reputation and sales, favorable product price can mitigate these negative effects. The recent Better Business Bureau trust sentiment index report shows that roughly one in three consumers says they would still purchase from a business that has poor ratings or reviews if the price is right. Therefore, it is not immediately clear whether a strategic seller should provide monetary incentive to boost its positive reviews, increase consumers' perceived value of its product, and thus charge a price premium, or it should offer price discount to attract more consumers. This study aims to understand how a strategic seller should trade off the rebate incentive and product pricing to maximize its profit.

We develop an analytical model to study the strategic seller's rebate and pricing strategies. The seller first announces the product price and simultaneously decides whether to offer buyers a redeemable, mail-in rebate if they post positive reviews. Then, consumers make their purchase decisions based on the online review information, and buyers make their review posting decisions as well as rebate redemption decisions if they receive the mail-in rebate. Consumers have heterogeneous valuation of the product. Online reviews affect their perceived product valuation. Consumers who have purchased the product incur a cost to post online reviews. They enjoy satisfaction by sharing their true shopping experiences and suffer from a moral cost if they post fake reviews. We analyze the equilibrium rebate and price offered by the seller and the equilibrium online review volume and its effect on sales.

We find that offering rebate conditional on positive reviews plays a dual role in eliciting online reviews. It not only induces unsatisfied consumers to "lie" online, but also motivates more satisfied consumers to share their true experiences. The overall effect of reviews is an increased perceived valuation from the consumers. However, our analysis shows that the "rebate-for-positive-reviews" strategy is not always optimal. The seller's optimal rebate and pricing strategy critically depends on the cost of

posting review and the moral cost of posting fake reviews online. When the review-posting cost is low but the moral cost is high, a seller should not provide rebate to elicit positive reviews, because satisfied buyers are likely to post positive reviews anyway (due to low review-posting cost) and unsatisfied buyers are too costly to be induced to write fake reviews (due to high moral cost). The seller offers a relatively low price to attract customers. In contrast, we identify three scenarios where “rebate-for-positive-reviews” strategy is profitable. When both the review-posting cost and the moral cost are low, the seller should optimally provide a small rebate to encourage more satisfied customers to post reviews and incentivize some unsatisfied customers to provide positive reviews. The additional positive reviews increase consumers' valuation of the product and thus their willingness to pay, which enables the seller to charge a price premium from consumers. When the review-posting cost is high but the moral cost is low, the seller offers a large rebate to both compensate consumers for posting reviews and encourage them to provide positive reviews. Again, the increased positive reviews enable the seller to charge a price premium. Finally, when both the review-posting cost and the moral cost are high, the seller provides a moderate rebate, which is just enough to encourage more satisfied consumers to post positive reviews, while the unsatisfied consumers would not be interested in posting fake reviews and redeeming the rebate. In general, moral cost is more salient than the review-posting cost in determining the seller's optimal rebate and pricing decisions. The smaller the moral cost, the larger the rebate, the larger the price premium, and the higher the profit.

Not surprisingly, as the rebate increases, the online review volume increases. Its effect on sales, however, is unclear. This is because the seller can adjust its product price to influence market share, which may increase or decrease depending on the price levels. The social welfare effect of the “rebate-for-positive-reviews” strategy is also mixed. Comparing with the no-rebate benchmark, consumers who redeem the rebate are better off whereas other buyers are worse off. The overall consumer surplus and social welfare thus depend on the equilibrium rebate and price levels.

### Model

We consider an online seller selling a product to a unit of potential consumers. As in (Lal and Sarvary, 1999), we distinguish two types of product attributes—digital attributes and non-digital attributes. Digital attributes refer to the attributes that can be easily communicated to and assessed by consumers via the Internet. Non-digital attributes refer to those that are difficult to evaluate online. For instance, size and color of a product are examples of digital attributes, and how well the product fits a consumer's specific setting can be an example of non-digital attributes (e.g., whether a cloth fits a consumer's figure or whether a dish caters the consumer's taste). Similar to that in (Lal and Sarvary, 1999), a consumer's valuation of the product is determined by both the digital attributes and non-digital attributes in an additive form. In particular, we denote  $x$  as the part of valuation determined by digital attributes and  $y$  as the part of valuation determined by non-digital attributes. We assume that a consumer's valuation of the product is  $x + ry$ , where  $r$  represents the relative importance between the two types of attributes.

Consumers are generally heterogeneous in their valuation. We assume that before purchase consumers learn their own digital-attribute valuation  $x$ , where  $x$  is drawn from a uniform distribution over  $[0,1]$ . In contrast, before purchase consumers do not know their non-digital attribute valuation  $y$  or its distribution, although they may have some expectation of it based on available information such as online reviews. For ease of exposition, we assume that ex post  $y$  can be either high or low—consumers derive a high value if the product can fit their needs well; otherwise, they derive a low value. We normalize the low value to 0 and high value to be 1.

As a result, consumers are either satisfied or unsatisfied after their purchase. We assume consumers are equally likely to be satisfied or unsatisfied; in other word, they are equally likely to derive high or low value from the non-digital attributes. Satisfied consumers may post positive reviews about the product, and unsatisfied consumers may post negative reviews, depending on the review-posting benefit and cost. Note that one reason for leaving reviews is that consumers have the desire to help others. We assume that, on the one hand, consumers derive value  $v$  from sharing their true opinions, where  $v$  satisfies a uniform distribution over  $[0,1]$ . On the other hand, posting a review takes time and effort, which incurs some cost, denoted as  $c$ . Without additional incentive, whether a consumer posts reviews depends on this sharing value and posting cost. We assume that  $c < 1$  to ensure that at least some consumers post reviews.

To motivate more consumers to post reviews, the seller may provide monetary incentive. As a common practice on Taobao.com, the seller may offer a mail-in rebate  $s$  to each purchased consumer who posts positive reviews online. Note that the rebate is conditional on a consumer posting positive reviews. While the monetary incentive naturally motivates more satisfied consumers to share their opinion (i.e., providing positive reviews), the effect of this incentive on unsatisfied consumers is more nuanced. When unsatisfied consumers post positive reviews, not only do they fail to derive the value  $v$  resulting from sharing their true opinions, but also they suffer from lying. We assume that the unsatisfied consumers incur a moral cost  $m$  if they post positive reviews.

We denote  $p$  as the product price charged by the seller. Because product price  $p$  affects the total number of buyers and the rebate  $s$  affects the review-posting behavior of the purchased consumers, the numbers of consumers who post positive reviews, negative

reviews, and no reviews are functions of  $p$  and  $s$ , denote as  $n \times g(p, s)$ ,  $n \times b(p, s)$  and  $n \times o(p, s)$ , respectively. Since online reviews affect consumers' perceived nondigital-attribute value, we denote it as  $E(y | p, s)$ . Consumers whose expected utility  $U(p, s) = x + rE(y | p, s) - p \geq 0$  purchase the product. The seller's expected profit is thus

$$\Pi(p, s) = (p - s)ng(p, s) + p[nb(p, s) + no(p, s)].$$

Because the rebate affects the reviews and the reviews in turn influence consumers' purchase decisions, we focus on the stationary equilibrium where the outcome of the consumers' review posting decisions is consistent with that when formulating consumers' expected valuation. The timing is as follows. First, the seller chooses its product price  $p$  and mail-in rebate  $s$ , and announces the price  $p$  (but not  $s$ , since  $s$  is unobservable at the time of purchase). Then, consumers make purchase decisions based on the perceived expected valuation. Finally, consumers make their review posting decisions, based on the rebate  $s$  and the realized value from the non-digital attributes.

## Discussion and Conclusions

In general, the “rebate-for-positive-reviews” strategy results in manipulated ratings and biased online reviews, which may mislead consumers and significantly undermine the trust that consumers and the vast majority of sellers place on the retail platform. Our analysis shows that such a strategy does seem attractive for strategic sellers, at the expense of harming consumers and reducing social welfare, especially when the cost of posting review is high. Strategic sellers may purposely make it tedious and hard to post online reviews, discouraging consumers to share with others. Our finding helps explain the reason why some e-commerce platforms ban such practice. It is also worthwhile to fight against this practice using legal tools (e.g., Amazon has fought fakes with lawsuits).

However, our results also show that it is not always beneficial for the seller to pursue such a strategy. When the review-posting cost is low but the moral cost is high, the seller would be better off by offering a low product price. Since the review-posting cost is already low in the Internet era, the moral cost becomes an important factor influencing the health of the online community. The higher the moral standard of the consumers, the harder and less profitable the strategic seller would pursue such a strategy. Overall, this study helps e-commerce platforms, as well as government regulators, to better understand the business impact of the strategic online review manipulation.

## ACKNOWLEDGMENT

This work is partially supported by grant NSFC No. 71371089, 71771114.

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