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Informative Role of Recommender Systems in Electronic Marketplaces: A Boon or a Bane for Competing Sellers?

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Abstract

Recommender systems have become the cornerstone of electronic marketplaces that sell products from competing sellers. Similar to traditional advertising, recommender systems can introduce consumers to new products and increase the market size which benefits sellers. This informative role of recommender systems in electronic marketplaces seems attractive to sellers because sellers do not pay the marketplaces for receiving recommendations. We show that in a marketplace that deploys a recommender system helping consumers discover the product that provides them the highest expected net utility, sellers do not necessarily benefit from the "free" exposure provided by the recommender system. The impacts of the recommender system are the result of a subtle interaction between *advertising effect* and *competition effect*. The advertising effect causes sellers to advertise less on their own and the competition effect causes them to decrease prices in the presence of a recommender system. Essentially, sellers "pay" in the form of more intense price competition because of the recommender system. Furthermore, the competition effect is exacerbated by the advertising effect because the recommender system alters a seller's own strategies related to advertising intensity and price from being strategic substitutes in the absence of the recommender system to being strategic complements in its presence. As a result of these two effects, we find that sellers are more likely to benefit from the recommender system only when it has a high precision. The results do not change qualitatively whether sellers use targeted advertising or uniform advertising. However, we find that a recommender system that benefits sellers when sellers do not employ targeted advertising may actually hurt sellers when sellers adopt targeted advertising with a high precision. On the other hand, in the presence of the recommender system, an increase in sellers' targeting precision beyond a threshold softens price competition, increases seller profits, and reduces consumer surplus. Finally, we find that when the recommender system assigns a greater weight to product fit than price, the adverse impacts of the recommender system on sellers are mitigated, thereby expanding the region in the parameter space where the recommender system is beneficial to sellers.

Keywords: Recommender system, electronic commerce, online advertising, analytical modeling, economics of IS