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Bias and Pricing in Vertically Integrated Platform

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Vertically integrated platforms such as Netflix, Amazon, and leading digital marketplaces have become pivotal in modern economies by simultaneously producing, distributing, and retailing products. This research addresses the problem of algorithmic bias and its impact on pricing strategies in these platforms. Given the platform's ability to influence consumer behavior through self-preferencing mechanisms, understanding the interplay between its pricing decisions and the responses of independent sellers is critical for both competitive policy and market efficiency.

Building on the established literature on two-sided markets and competitive bottlenecks, this study develops a sequential model that distinguishes between two key consumer groups. Loyal consumers, who are willing to pay any price for their preferred seller, are contrasted with price-sensitive “shoppers” who choose the lowest available price. The model rigorously formalizes the interaction in which sellers, after observing the platform's introduced recommendation bias, select mixed pricing strategies within a defined support. Notably, the analysis reveals that the platform never sets a price lower than one, a finding that mirrors real-world phenomena such as those observed in Yandex.Market, and that the optimal level of bias depends on the proportion of loyal consumers in the market.

The core contributions of this work are threefold. First, by capturing the sequential interaction between the platform and its sellers, the model identifies the conditions under which introducing bias in the ranking mechanism is beneficial. It demonstrates that when the platform commands a sufficiently high share of loyal consumers, a moderate bias can convert a portion of price-sensitive shoppers into loyal buyers, thereby increasing overall profit. In contrast, when the share of loyal consumers is low, remaining neutral proves more advantageous. Second, the analysis shows that the platform's role as a price aggregator renders its profit largely insensitive to the number of sellers, which suggests strategic stability in dynamic market environments. Finally, the study provides insight into how price dispersion among sellers arises as they adopt mixed pricing strategies, ultimately affecting consumer welfare and market competition.

Methodologically, the results are derived through a combination of analytical derivations and numerical simulations. The model employs a mixed-strategy framework for sellers in which the equilibrium pricing distribution is determined by equating the expected profit from capturing shoppers with the guaranteed profit from serving loyal customers. This approach elucidates the underlying mechanisms of price competition and highlights the trade-offs involved in setting the optimal level of bias. The decision is influenced by parameters such as the rate of consumer exit and the effectiveness of converting shoppers into loyal customers.

The findings have significant implications for regulatory policies and strategic market planning. They suggest that platforms with higher inherent product quality and greater consumer loyalty might deliberately introduce recommendation bias to reinforce their market position. In markets where loyal consumers are scarce, however, a neutral algorithm may be preferable in order to maximize revenue from a broader shopper base. Furthermore, the results indicate promising avenues for further research, including the exploration of multi-homing dynamics, inter-platform competition, and the effects of demand fluctuations on platform strategies.

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