Managed Campaigns and Data-Augmented Auctions for Digital Advertising

DIRK BERGEMANN, Yale University, USA

ALESSANDRO BONATTI, MIT Sloan School of Management, USA

NICHOLAS WU, Yale University, USA

Digital advertising facilitates the matching of consumers and advertisers online. Large platforms leverage their extensive consumer data to offer access to qualified online shoppers, helping them find their preferred brands. In turn, advertisers join these platforms to target a wider range of potential consumers beyond their existing customer base.

In this paper, we take into account three fundamental aspects of digital advertising. First, advertisers can reach a portion of their customers outside the platform. Second, platforms possess valuable data that can enhance matching efficiency. Third, on-platform matching between viewers and advertisers is governed by bidding mechanisms. Our model considers a scenario where a monopoly platform sells access to shoppers. Advertisers jointly determine their pricing strategy both on and off the platform, as well as their bidding strategies for advertising on the platform. On-platform consumers compare the advertised offers to all firms' off-platform prices. Each advertiser also maintains a group of loyal off-platform consumers. Consequently, advertisers face a trade-off between setting optimal prices for their loyal customers off-platform and charging higher personalized prices to on-platform shoppers.

We begin by examining data-augmented auctions, where advertisers base their bids on the platform's data regarding match values. While these auctions result in a socially efficient allocation on the platform, advertisers increase their product prices off the platform to extract more revenue on the platform. As a result, the off-platform consumer and social welfare decrease due to excessively high prices.

Next, we explore managed campaigns, where advertisers submit budgets that an autobidding algorithm converts into matches and price offers to consumers. The welfare implications of managed campaigns compared to data-augmented auctions depend on whether a statistic of the match value distribution is convex or concave. When this statistic is convex, an independent managed campaign leads to lower off-platform prices and higher consumer welfare. Intuitively, when an on-platform consumer is likely to have a high value for at least one competitor's product, all advertisers lower their prices to avoid having consumers poached away.

By contrast, the platform's revenue-optimal mechanism consists of a sophisticated campaign that conditions on-platform prices for sponsored products on *all* advertisers' off-platform posted prices. The optimal sophisticated managed campaign increases the product prices off the platform and unambiguously decreases the consumer surplus relative to data-augmented auctions. By reducing incentives for price undercutting, the platform weakens competition between advertisers. Therefore, we find that the welfare implications of managed campaigns depend critically on the platform's ability to manage advertiser competition.

A full version of this paper can be found at https://arxiv.org/abs/2304.08432.