

MARKETING COLLOQUIA

SPRING 2014

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DESIGNING LARGE ADVERTISING MARKETS WHERE AGENTS HAVE HETEROGENEOUS OBJECTIVES: A STRUCTURAL EMPIRICAL APPROACH

(JOINT WITH DENIS NEKIPELOV)

ABSTRACT: This paper uses a large, micro-level dataset of internet search advertising auctions and bidder behavior to empirically estimate the objectives of the advertisers. We begin by documenting the large amount of heterogeneity in advertiser behavior, both in terms of activity levels and in terms of how they manage their campaigns. We then develop an empirical model that allows advertisers to have a range of different objective functions, including values for having their ads appear in front of consumers as well as value for clicks and conversions. We also allow advertisers to have budget constraints as well as heterogeneous costs of maintaining their campaigns. We use a Bayesian approach to estimate a posterior distribution over which objective function is the best fit as well as the parameters of the objective function. We apply this approach at large scale, for millions of ads participating in hundreds of millions of auctions. With this model in place, we can more accurately forecast advertiser responses to market design changes instituted by the search engine. We develop an approach to calculating counterfactual responses in this large marketplace.