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Measuring the Performance of Large-Scale Combinatorial Auctions: A Structural Estimation Approach
(joint work with Marcelo Olivares and Gabriel Weintraub)

Abstract: The main advantage of a procurement combinatorial auction (CA) is that it allows suppliers to express cost synergies through package bids. However, bidders can also strategically take advantage of this flexibility, reducing the performance of the auction. In this work, we develop a structural estimation approach for large-scale first-price CAs. We use bidding data to estimate the firms' cost structure and evaluate the performance of the auction in terms of the cost efficiency of the allocation and payments to the bidders. To overcome the computational difficulties arising from the large number of bids observed in large-scale CAs, we propose a novel simplified model of bidders' behavior where markups of each package bid are chosen based on a reduced set of package characteristics. We apply our method to the Chilean school meals auction, in which the government procures half a billion dollar worth of meal services every year and bidders submit thousands of package bids. Our estimates suggest that bidders' cost synergies are economically significant in this application, and the current CA mechanism achieves high allocative efficiency and a reasonable procurement cost. We also perform counterfactuals to compare the performance of the current CA with alternative mechanisms such as VCG.