

# The Hong Kong University of Science and Technology

Dept of Information Systems, Business Statistics  
and Operations Management  
Dept of Industrial Engineering & Logistics Management  
Joint Seminar Announcement

## Intermediation in Online Advertising

**Professor Ozan Candogan**  
**Booth School of Business**  
**University of Chicago**

**Date** : 22 December 2015 (Tuesday)  
**Time** : 11:00 - 12:15 pm  
**Venue** : Room 3003, LSK Business Building



**Abstract:** In online display advertising, the prevalent method advertisers employ to acquire impressions is to contract with an intermediary. These contracts involve upfront payments made by the advertisers to the intermediary, in exchange for running campaigns on their behalf. In this work, we study the optimal contract offered by the intermediary in a setting where advertisers' budgets and targeting criteria are private. This problem can naturally be formulated as a multi-dimensional dynamic mechanism design problem, which in general is hard to solve. We tackle this problem by employing a novel performance space characterization technique, which relies on delineating the expected cost and value achievable by any feasible (dynamic) bidding policy. This technique provides a convex optimization formulation of the optimal contract design problem. Using this formulation, we provide a duality-based approach, which reduces the optimal contract design problem to a simpler convex optimization problem. The intermediary's bid in the optimal contract is obtained by first using the optimal dual solution to compute a weighted average of the values associated with different types (to guarantee that the advertiser reports her type truthfully), and then shading this quantity (to account for budget constraints). Our results indicate that an intermediary can profitably provide bidding service to a budget-constrained advertiser, and at the same time increase the overall market efficiency.

We also extend our study to a setting where multiple intermediaries connect advertisers to a single ad exchange. In this multi-stage intermediation setting, we illustrate that the intermediation position and the intermediation network structure have a significant impact on the profits of the intermediaries, and the revenues of the ad exchange. This talk combines materials from joint work with Santiago Balseiro (Duke) and Huseyin Gurkan (Duke), also presented in the following papers:

[http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2546609](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2546609)

[http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2661459](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2661459)

**Bio:** Ozan Candogan is an assistant professor at the University of Chicago, Booth School of Business, where he is a member of the Operations Management area. Prior to joining Booth, he was an assistant professor at the Fuqua School of Business, Duke University. He received his Ph.D. and M.S. degrees in Electrical Engineering and Computer Science from the Massachusetts Institute of Technology.

Professor Candogan's research interests are in mechanism design, decision making in social and economic networks, and analysis of dynamic strategic interactions. His recent work on the design of iterative auction mechanisms for efficient allocation of resources was a finalist in the 2013 George Nicholson Student Paper Competition. Potential applications of his research include novel auction formats that can be employed for procurement, pricing and advertising mechanisms that optimally utilize available social network information, and pricing mechanisms for selling cloud-computing service. Ozan Candogan is also a winner of the 2015 LinkedIn Economic Graph Challenge, and a recipient of the 2012 Microsoft Research Ph.D. fellowship, and 2009 Siebel Scholarship.