

Industrial and Systems Engineering

Special Seminar

The “Shadow of the Future” in IT Procurement Bids

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Mechanical Engineering Room 1130



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Xiaolin Li is a Ph.D. Candidate in the Marketing Department at the University of Minnesota, Carlson School of Management. She came to the Carlson School with a M.A. in Economics from Peking University in Beijing, China. Lis’ research interests include incentive design and incomplete contracting business-to-business settings. In her work, she has employed field experiments and structural models in the empirical industrial organization tradition to address these topics.

The procurement of complex goods and services involving large transactions between private firms, or between government and private firms, is very common, e.g., governments engaging construction firms to construct highways, and corporate firms outsourcing tasks to specialist vendors. These situations share a number of features: the tasks are complex and long drawn out; the agreements are governed by detailed contracts that describe the clients’ expectations about deliverables, the expected payments, and mechanisms for the resolution of disputes; and finally, the contractor is often selected via a competitive sealed bid auction.

One striking empirical fact is that these large transactions are almost always subject to modifications during the execution phase. It is reasonable to suppose that an anticipation of these modifications (i.e., the “shadow of the future”) would be an important part of the bidding calculus of contractors. Surprisingly, the prior literature has almost completely ignored this effect from modifications in examining these transactions.

This paper attempts to quantify how the optimal bidding strategy is affected by the expected modifications. The challenge is to set up a mathematical model of bidding behavior wherein far-sighted bidders recognize the possibility of future modifications and adjust their bids accordingly. I develop and apply such a model to a comprehensive dataset of IT procurement transactions, and overcome significant methodological hurdles to estimate the effect from expected modification. First, I find that expecting future modifications will significantly affect bidders’ optimal bidding strategy, more specifically, lower the latent costs of given contracts. Second, two types of contracts, lump-sum and per-unit price contracts, lead to significantly different bidding results. On average, per-unit price contracts will lead to lower winning bids than lump-sum price contracts. Third, contractors without a prior relationship with clients take in the future modifications more into their bidding strategy and bid more aggressively. Finally, I use counterfactuals to answer two additional questions of practical import. First, what would be the impact of forcing an auction even for executing modifications in the contract? I find that this has the effect of increasing the magnitude of the winning bid by 27%. Second, what would be the impact of switching all per-unit price contracts to lump-sum price contract? The answer here is that this would increase the winning bid by 16%.