Chapter XV
An Empirical Study of Collusion Potential Metrics and their Impact on Online Reverse Auction Success

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ABSTRACT
This chapter studies the effect of bidder conduct on auction success by examining a business to business (B2B) online procurement auction market. In particular, it investigates whether collaborative bidding is more likely when suppliers compete with each other on multiple auctions and/or over a longer period of time. Multiple regression analysis confirms that in online reverse auctions, winning bids are higher or auction success is lower when the same set of suppliers bid against each other regularly. In a supply chain framework, existence of such collaborative bidder behavior would reduce the cost savings for the buyer. It is therefore important for the practitioners to be alert to such activities and introduce measures that curtail the resulting costly outcomes.

INTRODUCTION
Auctions are market mechanisms that have played a crucial role in determining the price of a variety of goods and services for thousands of years. Recent growth in Internet technology has spilled over to auction markets; businesses, consumers, and government organizations are buying and selling goods and services via auctions conducted over the Internet. Popular Internet auction houses such as
eBay and Yahoo! sell consumer products using a standard or forward auction format. In a forward auction, there is one seller and multiple buyers with the highest bidder winning the object at the end of the designated time period. In contrast, when businesses and government procure goods and services, they use what are known as reverse auctions. An online reverse auction is defined as an online, real-time dynamic auction between a buyer organization and a group of prequalified suppliers who compete against each other to win the business to supply goods or services that have clearly defined specifications for design, quantity, quality, delivery, and related terms and conditions (Beall, Carter, Carter, Germer, Hendrick, Jap, et al., 2003). Regardless of the format of the auction, the ultimate goal is the same: obtaining the best possible price for the auctioned item, also known as auction success. In a forward auction, auction success refers to the organization securing the highest possible price for the traded article, whereas in a reverse auction, auction success entails the organization procuring an item at the lowest possible price.

Theoretical and empirical literature in traditional auctions have established that auction success depends on a variety of factors, such as type of product, number of bidders, auction format, bidder behavior, and so forth. In an online reverse auction, while the buyer firm can control the auction format, the type of product, and to some extent the number of bidders, they have no control over bidder conduct. One of the crucial concerns pertaining to bidder behavior is the inefficient market outcome arising from the possibility of collusion among the suppliers.

Collusion refers to an agreement among competing firms that lowers the degree of competition and distorts the price in the market to benefit the member firms. In a forward auction market it would amount to a lower winning bid price, and in a procurement or reverse auction market it would result in an artificial high bid price. Any profit-motivated collaborative conduct reduces the efficiency in the market, and is deemed illegal in many countries, including the United States.

In a supply chain framework, existence of collusion would reduce the cost savings for the buyer, or would equivalently depress the auction success. It is therefore important for the practitioners to be alert to such activities and introduce measures that curtail the resulting costly outcomes. Economic literature has documented a variety of exogenous and endogenous factors that can facilitate noncompetitive behaviors among the firms. It has been established that cooperation among rivals is easier to sustain in a long-term relationship than in a one-time encounter. We examine whether collaborative bidding is more likely when bidders compete with each other on multiple auctions and/or over a longer period of time by studying 10,573 business to business (B2B) online procurement auctions carried out by a large multinational firm between 2000 and 2002. We apply two different metrics representing recurring contacts among firms to investigate whether repeated interaction among suppliers has an effect on online reverse auction success. The repeated interaction metrics in our analysis are based on all logged-in bidders, instead of those that actually submitted bids. This allows the possibility of no-bid behavior by certain participants as a strategy to collude, adding a new dimension to the existing research in this area. Multiple regression analysis confirms that winning bids are higher in online reverse auctions, or auction success is lower when the same set of suppliers bid against each other regularly.

The rest of the chapter is organized as follows: The next section lays out the conceptual background of our work and offers a brief account of the pertinent literature. It is followed by a discussion of why B2B online reverse auctions are particularly susceptible to possible bidder cartel that lowers the auction success. Next, we specify the empirical model and illustrate the construction of the metrics representing repeated interaction among the firms. A description of the