

# Chapter V

## Network Effects and the Evolution of Internet Auctions

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### ABSTRACT

*Based on the weekly data of listings and Web site usage of eBay and Yahoo!Auctions, as well as fee schedules and available auction mechanisms, this chapter provides empirical support of the network effect in Internet auctions: A seller's expected auction revenue increases with page views per listing on one hand and increased listings raise page views per listing on the other hand. The existence of the network effect between Web site usage and listings explains the first mover's advantage and the dominance of eBay even with higher fees in the Internet auctions market. Our empirical findings also highlight unique features of Internet auctions, especially in the entry behavior of potential bidders into specific auctions, inviting more theoretical studies of the market microstructure of Internet auctions.*

### INTRODUCTION

E-commerce has been hailed as a frictionless competitive market (Bakos, 1991; Bakos, 1997). It is widely believed that the Internet drastically reduces buyers' search costs (for prices, product offerings and shop locations) and lowers barriers to entry and exit. The low search costs and barriers to entry and exit induce strong price competition, leading to low profit margins and low deadweight losses. Consistently, some case studies have found

that e-commerce has, on average, lower prices than the conventional retail market (Bailey, 1998; Brynjolfsson & Smith, 2000). However, as argued in Ellison and Ellison (2004), the overhead costs in e-commerce may not be as low as anticipated, and thus severe price competition may lead to the Bertrand paradox (with prices so low that firms cannot cover their overhead costs). Hence, the long-term viability of the e-commerce firms is often in question.

More recently, however, several empirical studies (Brynjolfsson & Smith, 2000; Clemons, et al., 2002; Johnson, et al., 2003; Loshe, et al., 2000) indicate some frictions in e-commerce: (i) compared to the conventional retail market, e-commerce has low prices on average but high market concentrations; (ii) an e-commerce firm with the highest market share does not charge the lowest price and often charges a price higher than the average; and (iii) the price dispersion is higher in e-commerce than in the conventional retail market. Hence, attentions have been directed to the possibility and sources of the first-mover's advantage which explains the reason that the pioneering firms, such as Amazon.com, Yahoo!, E\*Trade and eBay, have dominant market shares despite their higher prices.

The network effect is widely considered a source of this first-mover's advantage, especially in Internet auctions. As is well known, eBay, the pioneer of the Internet auctions, has been very profitable and dominated the Internet auctions market. It is speculated that the positive feedback effect (or network effect) between buyers' Web site usage and sellers' listing behavior might be the reason for eBay's profitability and dominance. The idea of this network effect seems quite straightforward: More potential buyers will visit an Internet auctions site if there are more listed items for auctions, and more sellers will list their items on that site if more (potential) buyers visit the site. However, there are several *non-trivial* issues when we connect this (naïve) idea to the data and the auction theories.

First of all, it is not straightforward whether more potential buyers will visit an Internet auctions site with more listed items. Whether a potential bidder will log on to an Internet auctions site may depend on not only the probability that the buyer will find an item she/he wants but also the expected sale price of the item and the probability of winning the item in the auction. The transaction cost (the search cost for a potential buyer to find a wanted item) decreases with more listings in

an Internet auctions site. However, the buyer's expected trade surplus, which is determined by expected sale price and the probability of winning the auction, may depend on the number of substitutable (listed) items as well as the market microstructure of the Internet auctions and the number of potential bidders.

Second, there is no theoretical guarantee that more sellers will list their items on an auction site with more potential buyers. The literature of auction theory predicts that a seller's expected auction revenue is either decreasing or increasing with the number of the potential bidders, depending on whether potential bidders' entries into a specific auction are endogenous or exogenous (Levin & Smith, 1994; Bulow & Klemperer, 1996). As will be detailed in Sections 2 and 4, the Internet auction model (including the entry behavior of potential bidders into a specific auction) may not be appropriately specified by the market microstructure of traditional auctions.

Lastly, the number of *potential bidders* faced by a specific seller on an Internet auctions site may not be exactly measured by the *Web site usage* of the site. The Web site usage data do not distinguish the buyers' visits from the sellers' visits, and is typically measured by "unique visitors" or "page views."

Moreover, different sellers may compete with each other because they list similar (or substitutable) items while some potential buyers may not be interested in bidding for some specific seller's items. Hence, it may not be possible to obtain the exact number of potential bidders faced by a specific seller from the usage data.

In the absence of an appropriate structural model of the market microstructure as well as the exact measurement of the number of potential bidders, this paper will study the significance of the network effect, using the (no) arbitrage condition of the seller's listing behavior between the competing Internet auctions sites, eBay and Yahoo!Auctions. Specifically, we will make some simplifying (reduced-form) assumptions based on

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