

FTC Bureau of Economics
Roundtable on the Economics of Internet Auctions:
An Executive Summary

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Abstract

On October 27, 2005, the Bureau of Economics at the Federal Trade Commission hosted a non-public roundtable on the Economics of Internet Auctions. This one-day roundtable brought together academic experts, industry professionals and government economists to discuss and learn about Internet auctions. This paper is a brief summary of the papers presented and panel discussions at the roundtable. The roundtable covered three main issues: (1) fraud and information problems on consumer-to-consumer Internet auction sites like eBay, (2) competition between auction sites and amongst auction site users, and (3) the data generated from auction sites and what inferences may be drawn from such data. The keynote address was given by Prof. Hal Varian. Varian discussed the auctions used by Google to sell “keyword” searches.

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Introduction

In October 2005 the FTC's Bureau of Economics hosted a roundtable on the economics of Internet auctions.¹ This roundtable brought together academics, industry professionals and government economists to discuss a number of important issues related to Internet auctions. The roundtable had three main themes; fraud and information problems, competition and competition policy, and inference from Internet auction data. These three themes correspond to concerns deriving from the FTC's consumer protection, antitrust and research roles.

Internet auctions have become an important way to sell and exchange everything from Beanie Babies to cars and keyword searches.² E-commerce's largest companies, including eBay, Amazon, Yahoo!, and Google, derive a substantial proportion of their revenue from Internet auctions. Internet auctions are increasingly used to sell expensive items such as cars and houses.³ Google and Yahoo! both use Internet auctions to sell keyword searches and these companies are expanding their use of these mechanisms to sell other advertising including television spots.⁴

Fraud in Internet auctions, however, is consistently the second largest consumer complaint (behind identity theft) received by the FTC. Further, among fraud complaints, Internet auctions account for the largest proportion in the FTC complaint database, Consumer Sentinel.⁵ However, according to eBay only 1% of transactions result in complaints from users (Dellarocas and Wood (2005)). eBay and other firms use feedback mechanisms to help reduce fraud. Do these mechanisms work? How safe are these trading platforms? Could fraud be reduced?

Internet auctions also raise a number of competition issues including competition among users of a particular site and competition between sites. The New York Attorney

¹ For more information on the roundtable including a transcript, speaker biographies and related research papers please go to <http://www.ftc.gov/be/workshops/internetauction/internetauction.htm>.

² Google and Yahoo! use auction mechanisms to sell the right to advertise on webpages that show the results from particular searches. These are called "keyword searches" because the advertising is based on the keywords used by the searcher. For example, someone searching for information on Disneyland resorts may view advertising from companies that have bought the right to advertise on any page that shows the results for "Disneyland" or for "resorts" (Varian (2006)).

³ See Adams et al. (2006) for a discussion of new and used Corvette sales on eBay.

⁴ Kenneth Li, "Time Warner Mulls TV Ad Auctioning System," Reuters (4/10/06) at <http://today.reuters.com/business/newsArticle.aspx?type=media&storyID=nN10286316>.

⁵ For more information go to <http://www.consumer.gov/sentinel/>.

General, Eliot Spitzer, has prosecuted a number of cases in which eBay users have been accused of shill bidding, an antitrust violation in New York State.⁶ eBay is one of the most popular Internet sites and the most popular Internet auction site. Does eBay compete with other Internet sites such as Google, Amazon and Yahoo!? Are there network externalities in Internet auction sites and what are the implications for pricing and competition?

As Internet auctions become more popular as a means of selling and exchanging goods and services, they also become more useful for estimating demand for those goods and services. Agencies such as the Federal Trade Commission may be interested in using such information to estimate the impact of mergers or the cost of fraud. Agencies such as the Bureau of Economic Analysis or the Bureau of Labor Statistics may be interested in using such information for estimating price changes and productivity effects. According to Nobel Laureate William Vickrey's seminal work, eBay's auction mechanism suggests that bidders will bid their true value for the item (Vickrey (1961)). Given this result, it may be possible to estimate demand from simply observing bids for a particular item. Of course, things are never so simple. Do Internet auction prices and bids provide useful information about how much things are worth?

Fraud and Information Problems

The roundtable included presentations on fraud and information problems in Internet auctions from a number of academics, including Pai-Ling Yin (Harvard Business School), Ginger Jin (University of Maryland), Ali Hortacsu (University of Chicago) and Luis Cabral (NYU Stern School of Business). The academic presentations were followed by two presentations by staff from the FTC, one on how the FTC works to combat fraud on the Internet and the other on the reliability of data from the FTC's Consumer Sentinel database.

Pat Bajari (University of Michigan) provided an introduction and overview of Internet auctions.⁷ Bajari highlighted two important results from the academic research. First, as shown by Pai-Ling Yin, auction prices fall in direct proportion to the amount of

⁶ Shilling is said to occur when a seller secretly bids in her own auction. She may do this in order to increase the price she receives for an item and convince unsuspecting bidders that her item is legitimate and highly valuable.

⁷ Much of this presentation was based on Bajari and Hortacsu (2004).

information dispersion in the auction. That is, the less information provided by the seller the lower the price the seller receives. Second, sellers lie, at least according to Ginger Jin, about the quality of the baseball cards that they are selling. It is not clear how eBay's feedback system helps solve information and fraud problems, and how such problems impact trade on the site.

In their seminal work on the theory of auctions, Milgrom and Weber (1982) show that sellers have an incentive to commit to provide buyers with the most complete information about the value of the item that they are selling. Is there a trade-off between information and price? Pat Bajari and Pai-Ling Yin presented recent work of Yin's which shows that there is such a trade off (Yin (2005)). Yin collected statements by sellers about the product – a used computer, and then surveyed friends and friends of friends to ask them how much they would value the item (how much would they suggest a friend pay for the item) given the information provided by the seller. Yin argues that if there is considerable dispersion in the answer to this question, the seller is probably not providing very accurate information. Further she shows that as the amount of dispersion increases, the actual price paid in the auction falls. Yin also finds that information and seller reputation are complementary. In particular, if a seller with a good reputation does not provide good information, the price is much lower than if a seller with a poor reputation fails to provide good information.

Is it worse than being a little vague? Is there fraud on eBay? Ginger Jin presented some results from her analysis of baseball cards (Jin and Kato (2002)). Jin and Kato bought ungraded baseball cards, collected information on what the seller stated the card was worth, and then sent the card to be independently graded. Jin and Kato consistently found that sellers overstate the actual grade of the card. In particular, sellers that state the card is of a very high quality are almost always lying. Jin and Kato found that sellers that claim high grades are much more likely to fail to deliver the card or to deliver a fake card. The Federal Trade Commission collects data on consumer complaints, and fraud in Internet auctions is the Consumer Sentinel's second largest complaint behind identity theft. However, that statistic may be misleading. This database is not a random sample of the population. Companies such as eBay actively encourage consumers to register their complaints on the database. The FTC's Keith Anderson showed that in a random sample of such complaints, most complainants first learned of the firm or the product on the Internet (57%) (Anderson

(2005)). Comparing this to data from a random survey of consumers, Anderson found that only 14% first learn about the product from the Internet.

What are the consequences of fraud and information problems? The existence of fraud makes buyers more cautious and lowers the prices received by legitimate sellers. This is the classic Akerlof-lemons problem (Akerlof (1970)). As buyers can't tell which sellers are legitimate and which are hucksters, the price received by all sellers falls. That is, bidders lower their bid to account for the probability that the auction is fraudulent. Fraud and information problems may also lead to an inefficient allocation of products. For example there may be a same-city bias for buyers.⁸ Ali Hortacsu discussed some preliminary research on the geography of trade on eBay. Hortacsu does find evidence of a same-city bias, even after accounting for measured transportation costs. Hortacsu points out that the existence of information problems on the site is only one explanation for same-city bias and others include similarity in tastes (Hortacsu et al (2005)).

What is being done about fraud and information problems on the Internet? In theory, feedback systems such as eBay's should be able to help reduce fraud and provide incentives for sellers to be truthful. Yin (2005) suggests there is a relationship between feedback and information: the better a seller's reputation the greater the incentive for the seller to provide accurate information. Jin also finds that reputation matters. Sellers with high feedback scores do not make incredible claims and were much more likely to deliver the card. Luis Cabral and Ali Hortacsu look at eBay's feedback scores over time (Cabral and Hortacsu (2006)). Cabral and Hortacsu find that a first negative report has a big effect on price and that negatives beget negatives. Cabral and Hortacsu argue that sellers seem to change their behavior and perform worse after receiving negatives. One explanation is that sellers set up high feedback scores and then "milk" those scores by defrauding people and then finally abandoning the eBay ID and creating a new eBay identity.⁹ According to Jin, they observed this behavior on a number of occasions. Chris Dellarocas (Maryland's Smith

⁸ Same city bias refers to the tendency for bidders to only bid on items sold by sellers in the same city, even if they could get the product at lower prices from sellers located in different cities (Hortacsu et al (2005)). This may occur because they have greater trust in sellers that are local or it may be because local buyers and sellers have similar preferences.

⁹ Sellers and buyers on eBay are identified by their handles, for example "ebayuser64" or "bigseller88". eBay users can click on someone's handle and find out more about them including their feedback rating, how long they have been a member of the site, and comments on recent transactions. eBay tries to make it difficult for people to abandon handles and create new ones (without the associated bad feedback and comment history) but it is certainly possible for users to do this.

School of Business) suggests that this explanation is not necessarily what is happening. Recent research finds that feedback in general slows down after the first negative and so the fact that a negative is a low probability event it may look “as if” negatives beget more negatives (Khopkar et al. (2005)).

What about law enforcement? Hampton Finer in the New York Attorney General’s office, described work of the office to go after fraud and shilling on eBay. According to Finer, New York considers shilling an antitrust violation, but for the most part the NYAG looks at cases where sellers are trying to defraud the customer by pretending to have legitimate buyers bidding on a fraudulent item. The FTC’s Debbie Matties discussed the FTC’s role. The FTC does not pursue criminal cases but it does coordinate with criminal authorities and it pursues civil remedies. The FTC also works with eBay to educate eBay’s customers and help them to detect and avoid fraud on the site.

The Biggest Auction in the World

Hal Varian (University of California – Berkeley) gave the keynote address at the roundtable. Varian argues that Google’s Adword auctions are the largest auctions in the world.¹⁰ Google has about 30 billion keyword auctions per year and is growing at 26% per year. Google began by pricing keywords “by hand”. However, this method became unworkable and they needed to automatically price the keywords. At first, Google used a “first-price” auction. That is, bidders paid the amount that they bid. Note that the “product” is a click through: a bidder pays so much money per thousand click-throughs for a position on the screen. Google found that the first price system led to considerable gaming. Bidders would reduce their bids and try to work out the lowest amount to bid and still keep their position. Google found that this behavior was wasting a substantial amount of computer time so they introduced a “second-price” auction. In such an auction, the winning bidder pays the amount of the second highest bidder.

Google’s auctions are quite different from an eBay auction or a standard English auction (Varian (2006)). Google sells multiple “positions” in a single auction. That is, the

¹⁰ “Adword” is the name that Google uses for its keyword search auctions. See Footnote 2.

winner gets the best position on the page, the second highest bidder gets the second best position, the third highest bidder gets the third position, etc. Each bidder pays the price equal to the winner of the position below them and the value of the position depends on the click-through rates which are different for each position. (Note: Google provides bidders with information on the expected click-through rate for each position.) The other difference is that these auctions are continuous. Bidders can enter at any time, bidders can change their bid at any time, and positions on the page change continuously with the bids.

How do bidders behave in such auctions? Varian discussed his analysis of these auctions and showed that the Nash equilibrium (i.e. each bidder chooses their optimal bid in response to the bids of all the other bidders) of such an auction will lead to a particular pattern of pricing. In particular, expenditures will be increasing with the click-through rate at an increasing rate. Looking at actual bids in actual keyword auctions, Varian finds that the theoretical prediction is born out in the data.

Competition

The competition segment of the roundtable was the most wide-ranging in its coverage. The segment included a presentation by George Deltas (University of Illinois) on competition between auction sites with the existence of network effects and a presentation by David Reiley (University of Arizona) on competition between bidders for a particular item. Other participants included Rana Kulpreet, Google's in-house competition counsel, Lorenzo Coppi from Charles River Associates, Hampton Finer from the NYAG's office, Robert Marshall from Penn State and Bates White, and Lawrence Coffin an eBay seller and trading assistant.

George Deltas presented recent work on pricing and competition between auction sites when there exist network externalities (Deltas and Jeitschko (2006)). In the model there is a feedback effect. Buyers want to be where the sellers are and sellers want to be where the buyers are. Importantly, the model assumes that more sellers make the marginal seller more likely to use the site. More sellers beget more sellers. This feedback has a number of implications. In particular, the owner of the site must be concerned about overcharging. If overcharging causes sellers to leave the market, the feedback effect will cause the market to collapse. According to Deltas, the pricing power of the site owner may be much less than in

a traditional market. However, predation may be a greater problem in such a market. A small change in price could cause a competitor's market to collapse and make it difficult for a competitor to restart or for another firm to enter the market.

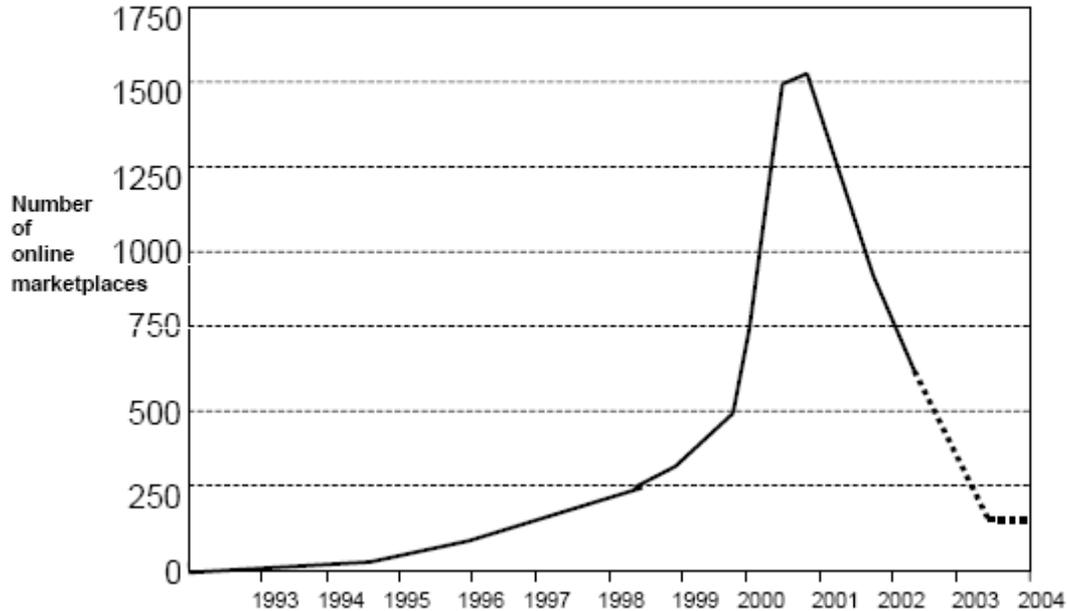
David Reiley looked at competition between bidders on a site (Gray and Reiley (2004)). Sniping, or last minute bidding, is very common in Internet auctions. Roth and Ockenfels (2002) argue that a possible explanation for sniping is tacit collusion between bidders.¹¹ Others suggest that sniping is a good strategy for winning auctions at lower prices. Reiley tests these explanations using a field experiment in which the researchers bid the same amount on identical items sold by the same seller with early and late bids. Early bids are placed three days before the end of the auction and late bids are placed within seconds of the auction close. The authors find no statistically or economically significant difference between prices paid in auctions won with differently timed bids. This result suggests that there is no advantage (in terms of price paid) to late bidding and seems to rule out some explanations for sniping.

The panelists discussed a number of issues in relation to competition in online auctions. Lawrence Coffin discussed and questioned recent moves by state governments and state licensing boards to require licensing and training programs for eBay trading assistants. Lorenzo Coppi presented an analysis of the B2B online auction market. Coppi showed that the market collapsed after initial excitement and entry (see Exhibit 1). Coppi argues that network externalities provide the explanation for the failure. Large purchasers had no incentive to help establish a market and give their competitors access to low cost suppliers. Suppliers had little incentive to establish a market which increased competition and lowered prices. Small purchasers did have an incentive to establish such a market but they were not large enough to attract enough suppliers. Bob Marshall ended the discussion with a presentation on the value of online auctions for government procurement and sales. In particular, Marshall argued that online auctions could reduce collusion by providing

¹¹ Sniping refers to bids that come into the auction at the very last second before the auction closes. eBay auctions have a "hard close", that is, these auctions end at an exact time no matter what is happening to the price or the bidding. Other auction sites use a "going, going, gone" format which automatically continues the auction until there has been no bid for a particular amount of time (say 10 minutes) (Roth and Ockenfels (2002))

competition authorities with a substantial amount of information about the behavior of bidders.¹²

Exhibit 1
The Shakeout in B2B Exchanges



Source: Day et al. (2002).

Inference From Bid Data

Vickrey (1961) suggests that bidders in an eBay-type auction will bid their value for the item. This result suggests that auctions sites like eBay could be very important in determining the value of items and thus useful in estimating productivity growth or the potential effects of mergers. This last session included presentations by Axel Ockenfels of the University of Cologne and Robert Zeithammer of the University of Chicago GSB. Both presentations looked at the question of whether bidders on eBay behave in a way that is consistent with Vickrey's model. Robin Sickles (Rice University) presented a method for estimating

¹² For more on Marshall's presentation see http://www.bateswhite.com/news/pdf/2005_Marshall_FTC_auctions.pdf.

consumer surplus (consumer welfare) from eBay data. The roundtable ended with panel presentations from Galit Shmueli of Maryland's Smith School of Business, Jeff Hermann of Nielsen Media, Sean Peoples of Edmunds.com, and Ana Aizcorbe of the Bureau of Economic Analysis.

Axel Ockenfels presented recent work from field experiments and laboratory experiments. In the field experiment they contacted potential participants and told them to bid in an actual eBay auction in which the researchers were the seller. The participants were told how much money they would receive if they won the auction. By telling different participants how much they would receive they could test whether eBay bidders actually bid their value for the item. They found bidders tended to bid their value. Ockenfels also presented preliminary results analyzing behavior in eBay's multi-unit auctions.

Robert Zeithammer looked at how eBay bidders bid when they face a sequence of auctions for similar or identical items (Zeithammer (2005)). Recent theory suggests that if bidders face a sequence of auctions, these bidders should shade their bids downwards in order to account for the "option value" of losing the current auction and being able to bid in a future auction (Adams (2004)). While Zeithammer does not test this explicitly he does look at how behavior changes when bidders find out about a new auction. On eBay, bidders may know that there is some possibility of there being a future auction for their preferred product, or they may know that there actually is a future auction for their preferred product. Zeithammer argues that if bidders know about the existence of a future auction for certain, their bids will decrease relative to knowing about the possibility of a future auction. Looking at data on DVDs, Zeithammer finds that bids drop 3 – 7% when the bidder finds out there is going to be a future auction for their preferred DVD title.

Robin Sickles uses eBay data to estimate the consumer surplus generated by eBay (Giray et al. (2006)). While it is simple to estimate the revenue generated by eBay, it is not obvious how to estimate how much buyers value using the site. Sickles looks at bidding on computer monitors and estimates how much the winner of the auction values the item. Consumer surplus is then equal to the difference between the value and the price. The authors don't observe the highest bid, so they make distributional assumptions to estimate the item's value and test how estimates change under different assumptions. The authors' preliminary work suggests that the consumer's share of total consumer and producer surplus is between 30% and 61%. Ravi Bapna of the University of Connecticut reviewed the paper

and discussed his own work to estimate consumer surplus for the whole of eBay. Bapna estimates that eBay consumers generate at least 18% of total surplus or \$6.5 billion (Bapna et al. (2005)).

The roundtable ended with a number of presentations on the value of eBay data. Jeff Hermann of Nielsen Media presented results from Nielsen's survey of Internet behavior. The data show that eBay is one of the most visited sites on the Internet and the eBay Motors site is the most important in terms of expenditure.¹³ One cautionary note in using eBay data is the result that people who spend more on the site tend to be people using high speed connections and high speed connections tend to be available to higher income people. Another cautionary note on eBay data was raised by Galit Shmueli, who suggested that "spiders" that collect data off a site like eBay may not be providing the researcher with a random sample of auctions.¹⁴ The particular mechanisms that spiders use to search through webpages may lead to biases in the data. Sean Peoples of Edmunds.com presented research analyzing the relative depreciation of used cars sold on eBay. Peoples found that cars with a lot more options tend to depreciate faster and suggested that buyers may have difficulty determining which options are actually available on a particular model. Peoples also noted that eBay prices tend to track prices in the wholesale auction market, suggesting that the reason people like eBay motors is that they get a good deal. Ana Aizcorbe ended the session with a suggestion that data from Internet auctions may be useful for estimating price indexes and quality change (Aizcorbe (2002)). Aizcorbe described a problem with identifying quality change using traditional transactions data. The standard assumption is that there is a representative consumer that purchases the same product in every period. In this model a price reduction leads to a large increase in consumer welfare. However, if later purchasers of a product have a lower value for the item, the estimated change in consumer welfare is much lower.

¹³ eBay Motors is a separate site that sells motorized items, particularly cars (Adams et al. (2006)).

¹⁴ A "spider" refers to a computer program that automatically searches websites and downloads webpages.

Conclusion

In organizing this roundtable I hoped to bring together academic researchers and industry professionals to start a dialog that would lead to improvements in our understanding of online auction design and how these auctions work in practice. EBay, Google and other successful Internet businesses rely on online auctions and attribute their success to the value of these market mechanisms. This roundtable with its associated papers, presentations and discussions greatly increases our understanding of these important market mechanisms.

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