Full text available at: http://dx.doi.org/10.1561/1700000017

Internet Auctions

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Boston – Delft

Foundations and Trends $^{\ensuremath{\mathbb{R}}}$ in Marketing

Published, sold and distributed by: now Publishers Inc. PO Box 1024 Hanover, MA 02339 USA Tel. +1-781-985-4510 www.nowpublishers.com sales@nowpublishers.com

Outside North America: now Publishers Inc. PO Box 179 2600 AD Delft The Netherlands Tel. +31-6-51115274

The preferred citation for this publication is E. Haruvy and P. T. L. Popkowski Leszczyc, Internet Auctions, Foundations and Trends^{\mathbb{R}} in Marketing, vol 4, no 1, pp 1–75, 2009

ISBN: 978-1-60198-332-9 © 2010 E. Haruvy and P. T. L. Popkowski Leszczyc

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Foundations and Trends[®] in Marketing, 2009, Volume 4, 4 issues. ISSN paper version 1555-0753. ISSN online version 1555-0761. Also available as a combined paper and online subscription.

Foundations and Trends[®] in Marketing
Vol. 4, No. 1 (2009) 1–75
© 2010 E. Haruvy and P. T. L. Popkowski Leszczyc DOI: 10.1561/1700000017



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Abstract

Internet auctions are common in nearly all consumer categories. Hence, it is not surprising that a great deal of research has emerged on the topic in recent years. New design and format considerations and a wealth of available data from various platforms provide new questions and promising research opportunities for marketing researchers. This monograph begins with the introduction of the basic settings, concepts, and processes that are the building blocks of auction research. It then focuses on the transition from pre-Internet auction research to more recent topics. Special attention is given to research opportunities as well as to experimental methods that can provide both laboratory and field data to answer important questions. The survey reviews recent empirical and theoretical works on Internet auctions with a focus on Internet auction design, formats, and features that are currently debated in the marketing literature. Some of these issues are extensions of general auction topics, but the findings can be quite different in Internet environments. We touch on new design features that are particularly relevant

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to Internet auctions such as feedback ratings, buy-it-now options, and different closing rules. We also look at strategic and behavioral models that are shaping marketing research on Internet auctions. Particular emphasis is given to behaviors that are relevant in offline environments but take on new meanings and forms in Internet auction environments.

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Online consumer auctions represent hundreds of thousands of retailers, over half a million storefronts, millions of individual sellers, tens of millions of active buyers, hundreds of millions of items sold weekly, and tens of billions of dollars in annual sales (see Park and Wang, 2009, for some of the eBay figures). In addition to their spectacular reach into all consumer segments, online auctions have greatly increased the variety of goods and services that can be bought and sold using auctions, expanded the ways in which auctions can be conducted, and created altogether new uses for auctions (Pinker et al., 2003). As a result, there has been hectic research activity devoted to analyzing data from online auctions and building theoretical models of their design and use. It is not surprising that online auctions garner a great deal of attention in many academic fields, including marketing.

What may be surprising, however, is how many puzzles remain unresolved in this area. The field of auctions has been an active field for nearly half a century and yet the wealth of knowledge it has generated does not begin to scratch the surface of questions being asked. Online auctions have led to the creation of many new auction design features relative to traditional auctions, such as proxy bidding machines, feedback mechanisms, and buy-now prices. Given

2 Introduction

the increased importance of Internet auctions for retailers, there is an increased need to study these new features (Cheema et al., 2005; Haruvy et al., 2008). In addition to numerous new features, online auctions operate in a unique environment that allows bidders easy search and access to information and at the same time requires unparalleled levels of trust (and mistrust).

Hence many of the questions we ask relate to search and trust. Here is a sample of questions we touch on in this monograph: Why do buyers often pay a price in an online auction that exceeds the listed price by other popular online retailers (like Amazon) or in another concurrent auction on the same site? What motivates buyers to provide feedback on sellers for the benefit of other buyers, to trust feedback by other buyers, and to trust the seller based on such feedback? Why do sellers, who are allowed to list their items for up to seven days on eBay and are not being charged for the duration of the auction, often choose durations shorter than seven days? Why do sellers often provide a buyit-now option which caps the maximum possible price they can obtain?

Before addressing these interesting questions and others, it is worthwhile addressing perhaps the biggest puzzle relating to online auctions. Specifically, how did we get to the point where online auctions are a major component of the online retail sector? How did a platform, seemingly intended for collectors, come to dominate online retailing?

The rapid growth of online consumer auctions is often attributed to the ability of the Internet to bring together buyers and sellers from geographically dispersed markets as well as to the relatively low cost of search on the Internet (Bajari and Hortaçsu, 2004; Klein and O'Keefe, 1999; Pinker et al., 2003). This has enabled active markets whose existence, scope, and size would be limited without the ability of buyers and sellers to find each other and easily transact. Collectibles, used items, and novelties are some examples of such markets, but even traditional consumer goods such as books, CDs, toys, baby products, and appliances can be found in Internet auctions due to the ease of search and easy access.

An equally important factor in the success of Internet auctions is the efficiency they bring to markets, allowing buyers and sellers to bypass a number of intermediaries that might otherwise be crucial. Bajari and Hortaçsu (2004) argue that online auction sites substitute for more traditional market intermediaries such as specialty dealers. According to Pinker et al. (2003), the easy access to information on electronic auction sites allows sellers to base pricing decisions on past data and to choose design attributes.

One should also not dismiss the role that promotion played in the dissemination of online consumer auctions in a short span of a few years to about one-third of online users. In the early days of online auctions, eBay spent a great deal of resources on identifying heavily searched products (e.g., Furby) and ensuring that search keywords would direct the searcher to the eBay site. eBay also entered into expensive yet critical alliances, such as a key alliance with America Online, that directed traffic to its site. These efforts involved a great deal of resources, and should not be ignored in any analysis on the diffusion of online consumer auctions.

Research in the field of Internet auctions moves at a lightning speed compared to other empirical and theoretical research. Some reasons include data availability that is truly unparalleled, a nearly infinite number of possible format and design choices, and the rapid evolution of the auction platforms themselves. Moreover, some of the questions that were of greatest interest a few years ago are of lesser interest and importance today and some of the questions that are of importance today were not yet conceived then. Auction platforms popular when many past articles were written (Amazon, Yahoo, Freemarkets) no longer operate, or are much more limited in scope. The closing rules employed by these auction platforms are likewise no longer of interest. Feedback systems have changed. Fraud detection systems are far more evolved and effective. And the list goes on.

Our expertise is on auction field experiments, where we believe a great deal of insight lies. Hence, the focus and organization of the present survey is markedly different from previous reviews and is more suitable as a comprehensive guide of the type of research that is pursued in field experiments, with a somewhat different focus and set of tools. Accordingly, the background assumed here is very different, with somewhat less focus on economic theory and greater focus on managerial questions.

- Adams, W. and J. Yellen (1976), 'Commodity bundling and the burden of monopoly'. Quarterly Journal of Economics 90, 475–498.
- Ahlee, H. and U. Malmendier (2005), 'Do consumers know their willingness to pay? Evidence from eBay auctions'. Working Paper, Stanford University.
- Allen, F. and D. Gale (1999), 'Innovations in financial services, relationships, and risk sharing'. *Management Science* 45(9), 1239–1253.
- Anwar, S., R. McMillan, and M. Zheng (2006), 'Bidding behavior at competing auctions: Evidence from eBay'. *European Economic Review* 50(2), 307–322.
- Ariely, D., A. Ockenfels, and A. E. Roth (2005), 'An experimental analysis of ending rules in Internet auctions'. *RAND Journal of Economics* 36(4), 890–907.
- Ariely, D. and I. Simonson (2003), 'Buying, bidding, playing, or competing? Value assessment and decision dynamics in Internet auctions'. *Journal of Consumer Psychology* 13(2), 113–123.
- Bailey, J. P. (1998), 'Intermediation and electronic markets: Aggregation and pricing in Internet commerce'. Ph.D. Thesis, Technology, Management and Policy, Massachusetts Institute of Technology, Cambridge, MA.

- Bajari, P. and A. Hortaçsu (2003), 'The winner's curse, reserve prices, and endogenous entry: Empirical insights from eBay auctions'. *RAND Journal of Economics* 34(2), 329–355.
- Bajari, P. and A. Hortaçsu (2004), 'Economic insights from Internet auctions'. Journal of Economic Literature XLII, 457–486.
- Bakos, J. Y. (1997), 'Reducing buyer search costs: Implications for electronic marketplaces'. Management Science 43(12), 1613–1630.
- Bakos, J. Y. (1998), 'Towards friction-free markets: The emerging role of electronic marketplaces on the Internet'. *Communications of the* ACM 41(8), 35–42.
- Bapna, R., P. Goes, A. Gupta, and Y. Jin (2004), 'User heterogeneity and its impact on electronic auction market design: An empirical exploration'. *MIS Quarterly* 28(1), 21–43.
- Bapna, R., R. W. Jank, and G. Shmueli (2008a), 'Consumer surplus in online auctions'. *Information Systems Research* 19(4), 400–416.
- Bapna, R., W. Jank, and G. Shmueli (2008b), 'Price formation and its dynamics in online auctions'. *Decision Support Systems* 44, 641–656.
- Bolton, G., E. Katok, and A. Ockenfels (2004), 'How effective are electronic reputation mechanisms? An experimental investigation'. *Man-agement Science* 50(11), 1587–1602.
- Bradley, S. P. (2001). eBay, Inc. Harvard Business School Case Report 9-700-007.
- Bradlow, E. and Y.-H. Park (2007), 'Bayesian estimation of bid sequences in Internet auctions using a generalized record breaking model'. *Marketing Science* **26**(2), 218–229.
- Brint, A. T. (2003), 'Investigating buyer and seller strategies in online auctions'. The Journal of the Operational Research Society 54, 1177– 1188.
- Bruce, N., E. Haruvy, and R. Rao (2004), 'Seller rating, price and default in online auctions'. *Journal of Interactive Marketing* **18**(4), 37–50.
- Brynjolfsson, E. and M. Smith (2000), 'Frictionless commerce? A comparison of Internet and conventional retailers'. *Management Science* 46, 563–585.

- Buddish, E. B. and L. N. Takeyaman (2001), 'Buy prices in online auctions: Irationality on the Internet?'. *Economics Letters* 72(3), 325–333.
- Bulow, J. and P. Klemperer (1996), 'Auctions versus negotiations'. The American Economic Review 86(1), 180–194.
- Bykowsky, M. M., R. J. Cull, and J. O. Ledyard (2000), 'Mutually destructive bidding: The FCC auction design problem'. *Journal of Regulatory Economics* 17(3), 205–228.
- Carare, O. and M. Rothkopf (2005), 'Slow Dutch auctions'. Management Science 51(3), 365–373.
- Chakraborty, I. (1999), 'Bundling decisions for selling multiple objects'. Economic Theory 13, 723–733.
- Chakraborty, I. (2004), 'Multi-unit auctions with synergy'. *Economics* Bulletin 4(8), 1–14.
- Chan, T. Y., V. Kadivali, and Y.-H. Park (2007), 'Willingness to pay and competition in online auctions'. *Journal of Marketing Research* 44(2), 324–333.
- Chan, T. Y., V. Kadiyali, and Y.-H. Park (2006), 'The exercise of buy-it-now pricing in auctions: Seller revenue implications'. Working Paper, Cornell University.
- Che, Y.-K. (1993), 'Design competition through multidimensional auctions'. RAND Journal of Economics 24, 668–680.
- Cheema, A., P. T. L. Popkowski Leszczyc, R. Bagchi, R. Bagozzi, J. Cox, U. Dholakia, E. Greenleaf, A. Pazgal, M. Rothkopf, M. Shen, S. Sunder, and R. Zeithammer (2005), 'Economics, psychology, and social dynamics of consumer bidding in auctions'. *Marketing Letters* 16(3–4), 401–413.
- Chen, X., J. Makio, and C. Weinhardt (2005), 'Agent-based simulation on competition of e-auction marketplaces'. In: Proceedings of the 205 International Conference on Computational Intelligence for Modeling Control and Automation (CIMCA 2005), vol. 2. pp. 910–915.
- Chen, Y., G. Iyer, and V. Padmanabhan (2002), 'Referral infomediaries and retail competition'. *Marketing Science* **21**(4), 412–434.
- Chwelos, P. and T. Dhar (2006), 'Caveat emptor: Differences in online reputation mechanisms'. Working Paper, Sauder School of Busines, University of British Columbia.

- Clark, J. M. and S. G. Ward (2008), 'Consumer behavior in online auctions: An examination of partitioned prices on eBay'. *Journal of Marketing Theory and Practice* 16(1), 57–66.
- Clay, K., R. Krishnan, and E. Wolff (2003), 'Retail strategies on the web: Price and non-price competition in the online book industry'. *Journal of Industrial Economics* 49(4), 521–539.
- Cox, R. G. (2005), 'Optimal reservation prices and superior information in auctions with common-value elements: Evidence from field data'. *Ekonomia* 8(2), 142–167.
- Daniel, K. and D. Hirshleifer (1998), 'A theory of costly sequential bidding'. Technical Report, Kellog School of Management.
- Dass, M., W. Jank, and G. Shmueli (2009), 'Dynamic price forecasting in simultaneous online art auctions'. Working Paper, Texas Tech University, Rawls College of Business, Lubbock, TX.
- Degeratu, A., A. Rangaswamy, and J. Wu (2000), 'Consumer choice behavior in online and traditional supermarkets: The effects of brand name, price, and other search attributes'. *International Journal of Research in Marketing* 17(1), 55–78.
- Dellarocas, C., M. Fan, and C. Wood (2004), 'Self-interest, reciprocity, and participation in online reputation systems'. Working Paper No. 205, MIT Sloan School of Economics, Seattle, WA.
- Dellarocas, C. and C. A. Wood (2008), 'The sound of silence in online feedback: Estimating trading risks in the presence of reporting bias'. *Management Science* 54(3), 460–476.
- Dholakia, U. M., S. Basuroy, and K. Soltysinski (2002), 'Auction or agent (or Both)? A study of moderators of the herding bias in digital auctions'. *International Journal of Research in Marketing* 19(2), 115–130.
- Diamond, P. A. (1971), 'A model of price adjustment'. Journal of Economic Theory 3, 156–168.
- Dini, F. and G. Spagnolo (2007), 'Buying reputation on eBay'. Working Paper.
- Easly, R. and R. Tenorino (2004), 'Jump bidding strategies in Internet auctions'. *Management Science* 50, 1407–1419.
- Eaton, D. H. (2002), 'Valuing information: Evidence from guitar auctions on eBay'. Journal of Applied Economics and Policy 24(1), 1–19.

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- Ely, J. C. and T. Hossain (2009), 'Sniping and squatting in auction markets'. American Economic Journal: Microeconomics 1(2), 68–94.
- Elyakime, B., J. J. Laffont, P. Loisel, and Q. Vuong (1994), 'Firstprice sealed-bid auctions with secret reservation prices'. Annales D'Economie Et De Statistique 34, 115–141.
- Engelbrecht-Wiggans, R. (1987), 'On optimal reservation prices in auctions'. Management Science 33(6), 763–770.
- Engelbrecht-Wiggans, R., E. Haruvy, and E. Katok (2007), 'A comparison of buyer-determined and price-based multi-attribute mechanisms'. *Marketing Science* 26(5), 629–641.
- Engelbrecht-Wiggans, R. and E. Katok (2006), 'e-Sourcing in procurement: Theory and behavior in reverse auctions with non-competitive contracts'. *Management Science* 52(4), 581–596.
- Engelbrecht-Wiggans, R. and T. Nonnenmacher (1999), 'A theoretical basis for 19th-century changes to the Port of New York imported goods auction'. *Explorations in Economic History* 36(3), 232–245.
- Engers, M. and B. P. McManus (2007), 'Charity auctions'. International Economic Review 48(3), 953–994.
- Gallien, J. and S. Gupta (2007), 'Temporary and permanent buyout prices in online auctions'. *Management Science* **53**(5), 814–833.
- Gilkeson, J. and K. Reynolds (2003), 'Determinants of Internet auction success and closing price: An exploration study'. *Psychology and Marketing* 20(6), 537–566.
- Goeree, J., E. Maasland, S. Onderstal, and J. L. Turner (2005), 'How (not) to raise money'. *Journal of Political Economy* **113**(4), 897–926.
- Gönül, F. and P. T. L. Popkowski Leszczyc (2010), 'Sniping behavior in eBay auctions'. International Journal of Electronic Marketing and Retailing, 3(2), in press.
- Greenleaf, E. (2004), 'Reserves, regret, and rejoicing in open English auctions'. *Journal of Consumer Research* **31**(2), 264–273.
- Greenleaf, E. and A. R. Sinha (1996), 'Combining buy-in penalties with commissions at auction houses'. *Management Science* **42**(4), 529–40.
- Guiltinan, J. P. (1987), 'The price bundling of services: A normative framework'. *Journal of Marketing* 51(April), 74–85.
- Haile, P. and E. Tamer (2003), 'Inference with an incomplete model of English auctions'. Journal of Political Economy 111(1), 1–51.

- Haruvy, E. and E. Katok (2007), 'An experimental investigation of buyer determined procurement auctions'. Working Paper.
- Haruvy, E. and P. T. L. Popkowski Leszczyc (2009), 'Bidder motives in cause related auctions'. *International Journal of Research in Marketing* 26(4), 324–331.
- Haruvy, E. and P. T. L. Popkowski Leszczyc (2010a), 'The impact of online auction duration'. *Decision Analysis* 7(1), in press.
- Haruvy, E. and P. T. L. Popkowski Leszczyc (2010b), 'Search and choice in online auctions'. Working Paper.
- Haruvy, E., P. T. L. Popkowski Leszczyc, O. Carare, J. C. Cox, E. A. Greenleaf, W. Jank, S. Jap, Y.-H. Park, and M. H. Rothkopf (2008), 'Competition between Auctions'. *Marketing Letters* 19(3–4), 431–448.
- Haruvy, E. and U. Unver (2007), 'Equilibrium selection in repeated B2B matching markets'. *Economic Letters* 94, 284–289.
- Häubl, G. and P. T. L. Popkowski Leszczyc (2003), 'Minimum prices and product valuations in auctions'. *Marketing Science Institute Report* 3(03–117), 115–141.
- Hidvégi, Z., W. Wang, and A. B. Whinston (2006), 'Buy-price English auction'. Journal of Economic Theory 129(1), 31–52.
- Hortacsu, A., F. Asis Martinez-Jerez, and J. Douglas (2009), 'The geography of trade in online transactions: Evidence from eBay and mercadolibre'. American Economic Journal: Microeconomics 1(1), 53-74.
- Hossain, T. and J. Morgan (2006), '... Plus shipping and handling: Revenue (Non) equivalence in field experiments on eBay'. Advances in Economic Analysis & Policypp. 6:2:3.
- Houser, D. and J. Wooders (2000), 'Reputation in intrenet auctions: Theory and evidence from eBay'. Working Paper, The University of Arizona.
- Hyde, V., W. Jank, and G. Shmueli (2006), 'Investigating concurrency in online auctions through visualization'. *The American Statistician* **60**(3), 241–250.
- Isaac, R. M., T. C. Salmon, and A. Zillante (2007), 'A theory of jump bidding in ascending auctions'. Journal of Economic Behavior & Organization 62(1), 144–164.

- Jank, W. and G. Shmueli (2007), 'Modeling concurrency of events in online auctions via spatio-temporal semiparametric models'. *Journal of the Royal Statistical Society Series C* 56(1), 1–27.
- Jank, W., G. Shmueli, M. Dass, I. Yahav, and S. Zhang (2008), 'Statistical challenges in eCommerce: Modeling dynamic and networked data'. *INFORMS Tutorials in Operations Research* pp. 31–54.
- Jank, W. and I. Yahav (2010), 'E-loyalty networks in online auctions'. Annals of Applied Statistics, forthcoming.
- Jank, W. and S. Zhang (2007), 'An automated and data-driven bidding strategy for online auctions'. Working Paper, Smith School, University of Maryland.
- Jap, S. D. (2002), 'Online, reverse auctions: Issues, themes, and prospects for the future'. Journal of the Academy of Marketing Science 30(4), 506-525.
- Jap, S. D. (2003), 'An exploratory study of the introduction of online reverse auctions'. *Journal of Marketing* **67**(3), 96–107.
- Jap, S. D. (2007), 'The impact of online reverse auction design on buyer-supplier relationships'. *Journal of Marketing* **71**(1), 146–159.
- Jap, S. D. and E. Haruvy (2007), 'Inter-organizational relationships and bidding behavior in industrial online reverse auctions'. Working Paper.
- Jap, S. D. and P. Naik (2008), 'BidAnalyzer: A method for estimation and selection of dynamic bidding models'. *Marketing Science* 27(6), 949–969.
- Kalyanam, K. and S. McIntyre (2001), 'Return on reputation in online auction markets'. Working Paper, Santa Clara University.
- Kamins, M., A. Xavier Drèze, and V. S. Folkes (2004), 'A field study of the effects of minimum and reserve prices on Internet auctions'. *Journal of Consumer Research* **30**(4), 622–628.
- Katkar, R. and D. H. Reiley (2006), 'Public versus secret reserve prices in eBay auctions: Results from a pokémon field experiment'. Advances in Economic Analysis and Policy 6(2), Article 7.
- Katok, E. and A. M. Kwasnica (2008), 'Time is money: The effect of clock speed on seller's revenue in Dutch auctions'. *Experimental Economics* 11(4), 344–357.

- Kaufmann, R. J. and C. Wood (2006), 'Doing their bidding: An empirical examination of factors that affect a buyer's utility in Internet auctions'. *Information Technology and Management* 7(3), 171–190.
- Kirkegaard, R. and P. B. Overgaard (2003), Buy-out Prices in Online Auctions: Multi-unit Demand. Mimeo, University of Aarhus.
- Klein, S. and R. O'Keefe (1999), 'The impact of the Web on auctions: Some empirical evidence and theoretical considerations'. *Interna*tional Journal of Electronic Commerce 3(3), 7–20.
- Klein, T. J., C. Lambertz, G. Spagnolo, and K. O. Stahl (2006), 'Last minute feedback'. CEPR Discussion Paper No. 5693.
- Klemperer, P. (1999), 'Auction theory: A guide to the literature'. Journal of Economic Surveys 13(3), 227–86.
- Kollock, P. (1999), 'The production of trust in online markets'. In: E. J. Lawler, M. Macy, S. Thyne, and H. A. Walker (eds.): Advances in Group Processes, vol. 16. Greenwich, CT: JAI Press.
- Krishna, V. and R. W. Rosenthal (1996), 'Simultaneous auctions with synergies'. *Games and Economic Behavior*, Elsevier **17**(1), 1–31.
- Ku, G., A. D. Galinsky, and J. K. Murnighan (2006), 'Starting low but ending high: A reversal of the anchoring effect in auctions'. *Journal* of Personality and Social Psychology **90**, 975–986.
- Kwasnica, A. and E. Katok (2007), 'The effect of timing on bid increments in ascending auctions'. Production and Operations Management 16(4), 483–494.
- Lee, H. G. (1998), 'Do electronic marketplaces lower the price of goods'. Communications of the ACM 41(1), 73–80.
- Lee, Z., I. Im, and S. Lee (2000), 'The effect of negative buyer feedback on prices in Internet auction markets'. In: 21st International Conference on Information Systems, 2000.
- Levin, D. and J. L. Smith (1996), 'Optimal reservation prices in auctions'. *Economic Journal* **106**(438), 1271–1283.
- Li, H. and G. Tan (2000), 'Hidden reserve prices with risk-averse bidders'. Working Paper.
- Li, S., E. Haruvy, and K. Dogan (2007), 'Group Identity in Markets'. working Paper.
- List, J. and D. Lucking-Reiley (2000), 'Demand reduction in multi-unit auctions: Evidence from a sportscard field experiment'. American Economic Review 90(4), 961–972.

- Lucking-Reiley, D., D. Bryan, N. Prasad, and D. Reeves (2007), 'Pennies from eBay: The determinants of price in online auctions'. *Journal* of Industrial Economics **55**(2), 223–233.
- Lynch, J. G. and D. Ariely (2000), 'Wine online: Search costs and competition on price, quality, and distribution'. *Marketing Science* 19(1), 83–103.
- MacMinn, R. D. (1980), 'Search and market equilibrium'. Journal of Political Economy 88, 308–327.
- Matthews, T. (2004), 'The impact of discounting on an auction with a buyout option: A theoretical analysis motivated by eBay's buy-itnow feature'. *Journal of Economics* **81**(1), 25–52.
- Matthews, T. and B. Katzman (2006), 'The role of varying risk attitudes in an auction with a buyout option'. *Economic Theory* **27**(3), 597–613.
- McAfee, R. P. and J. McMillan (1987), 'Auctions and bidding'. *Journal* of *Economic Literatrue* **25**(2), 699–738.
- Melnick, M. I. and J. Alms (2002), 'Does a seller's ecommerce reputation matter? Evidence from eBay auctions'. The Journal of Industrial Economics L(3), 337–349.
- Milgrom, P. (1989), 'Auctions and bidding: A primer'. The Journal of Economic Perspectives 3(3), 3–22.
- Milgrom, P. and R. Weber (2000), 'A theory of auctions and competitive bidding II'. In: P. Klemperer (ed.): *The Economic The*ory of Auctions. Cheltenham, UK: Paul, Edward Elgar Publishing, pp. 179–194.
- Morwitz, V., E. Greenleaf, and E. J. Johnson (1998), 'Divide and prosper: Consumers' reactions to partitioned prices'. *Journal of Market*ing Research 35(4), 453–463.
- Overby, E. and S. D. Jap (2009), 'Electronic and physical market channels: A multi-year investigation in a market for products of uncertain quality'. *Management Science* **55**(6), 940–957.
- Palfrey, T. (1983), 'Bundling decisions by a multiproduct monopolist with incomplete information'. *Econometrica* 51(2), 463–484.
- Pan, X., B. Ratchford, and V. Shankar (2004), 'Price dispersion on the Internet: A review and directions for future research'. *Journal of Interactive Marketing* 18(4), 116–135.

- Park, Y.-H. and E. T. Bradlow (2005), 'An integrated model for bidding behavior in Internet auctions: Whether, who, when, and how much'. *Journal of Marketing Research* 42(4), 470–482.
- Park, Y.-H. and X. Wang (2009), 'Online and name-your-own-price auctions: A literature review'. In: V. R. Rao (ed.): Handbook of Pricing Research in Marketing. Cheltenham: Edward Elgar, pp. 419–434.
- Peters, M. and S. Severinov (2006), 'Internet auctions with many traders'. *Journal of Economic Theory* **130**(1), 220–46.
- Pinker, E., A. Seidmann, and Y. Vakrat (2003), 'Managing online auctions: Current business and research issues'. *Management Science* 49(11), 1457–1484.
- Popkowski Leszcyc, P. T. L., J. W. Pracejus, and M. Shen (2008), 'Why more can be less: An inference-based explanation for hypersubadditivity in product bundles'. Organizational Behavior and Human Decision Processes 105(2), 233–246.
- Popkowski Leszcyc, P. T. L., C. Qiu, and Y. He (2009), 'Empirical testing of the reference price effect of buy-now prices in Internet auctions'. *Journal of Retailing* 86, 211–221.
- Popkowski Leszcyc, P. T. L. and M. H. Rothkopf (2010), 'Charitable motives and bidding in charity auctions'. *Management Science* **56**(3), in press.
- Popkowski Leszczyc, P. T. L. and G. Häubl (2010), 'To bundle or not to bundle: Determinants of the profitability of multi-item auctions'. *Journal of Marketing*, forthcoming.
- Rangan, V. K. (1998), Freemarkets Online. Boston, MA: Harvard Business School Publishing, Case # 598109, 1–20.
- Reiley, D. (2006), 'Field experiments on the effects of reserve prices in auctions: More magic on the Internet'. RAND Journal of Economics 37(1), 195–211.
- Resnick, P. and R. Zeckhauser (2002), 'Trust among strangers in Internet transactions: Empirical analysis of eBay's reputation system'. In:
 M. R. Baye (ed.): *The Economics of the Internet and e-Commerce*. Amsterdam, Elsevier Science, p. 11.
- Resnick, P., R. Zeckhauser, J. Swanson, and K. Lockwood (2006), 'The value of reputation on eBay: A controlled experiment'. *Experimental Economics* 9(2), 79–101.

- Reynolds, S. and J. Wooders (2009), 'Auctions with a buy price'. *Economic Theory* **38**(1), 9–39.
- Riley, J. and W. F. Samuelson (1981), 'Optimal auctions'. American Economic Review 71(3), 381–392.
- Roth, A. and A. Ockenfels (2002), 'Last-minute bidding and the rules for ending second-price auctions: Evidence from eBay and amazon auctions on the Internet'. *American Economic Review* 92(4), 1093– 1103.
- Rothkopf, M. H., A. Pekec, and R. M. Harstad (1998), 'Computationally manageable combinatorial auctions'. *Management Science* 44(8), 1131–1147.
- Salmon, T. and R. M. Isaac (2006), 'Revenue from the saints, the showoffs, and the predators: Comparisons of auctions with pricepreference values'. In: R. M. Isaac and D. D. Davis (eds.): Research in Experimental Economics, Vol. 11, Experiments Investigating Fundraising and Charitable Contributions. Amsterdam: Elsevier, pp. 1–30.
- Salop, S. C. and J. E. Stiglitz (1977), 'Bargains and Ripoffs: A model of monopolistically competitive price dispersion'. *Review of Economic Studies* 44, 493–519.
- Shankar, V., A. Rangaswamy, and M. Pusateri (1998), 'The impact of Internet marketing on price sensitivity and price competition'. *Marketing Science and the Internet*, INFORM College on Marketing Mini-Conference. Cambridge, MA.
- Shmueli, G., R. P. Russo, and W. Jank (2007), 'The BARISTA: A model for Bid Arrivals in Online Auctions'. Annals of Applied Statistics pp. 412–441.
- Sinha, A. and E. Greenleaf (2000), 'The impact of discrete bidding and bidder aggressiveness on sellers' strategies in open English auctions: Reserves and covert shilling'. *Marketing Science* 19(Summer), 244–265.
- Sinha, A. and E. A. Greenleaf (2001), 'Valuing and attracting auction bidders as customers: Traditional auctions and the Internet'. Working Paper.
- Smith, M., J. Bailey, and E. Brynjolfsson (2000), 'Understanding digital markets: Review and assessment'. In: E. Brynjolfsson and

B. Kahin (eds.): Understanding the Digital Economy Data, Tools, and Research. Cambridge, MA: MIT Press.

- Song, U. (2004), 'Nonparametric estimation of an eBay auction model with an unknown number of bidders'. working Paper, UBC.
- Stigler, G. (1961), 'The economics of information'. Journal of Political Economy 69(3), 213–225.
- Strahilevitz, M. and J. G. Myers (1998), 'Donations to charity as purchase incentives: How well they work may depend on what you are trying to sell'. *Journal of Consumer Research* 24(4), 434–446.
- Stremersch, S., G. J. Tellis, P. H. Franses, and J. L. G. Binken (2007), 'Indirect network effects in new product growth'. *Journal of Market*ing **71**(3), 52–74.
- Subramanian, R. and R. Venkatesh (2009), 'Multi-object auctions of complements or substitutes: The optimality an implications of bundling vs. sequencing'. *Marketing Science* 28(2), 264–273.
- Suter, T. and D. Hardesty (2005), 'Maximizing earnings and price fairness perceptions in online consumer-to-consumer auctions'. *Journal* of Retailing 1(4), 307–17.
- Vakrat, Y. and A. Seidmann (1999), 'Can online auctions beat online catalogues?'. In: P. De and J. De Gross (eds.): Proceedings of the Twentieth International Conference on Information Systems. Charlotte, NC: Omnipress, pp. 132–143.
- Varian, H. (1980), 'A model of sales'. American Economic Review 70(4), 651–659.
- Venkatesh, R. and W. A. Kamakura (2003), 'Optimal bundling and pricing under a monopoly: Contrasting complements and substitutes from independently valued products'. *Journal of Business* 76(2), 211–231.
- Vickrey, W. (1961), 'Counterspeculation, auctions, and competitive sealed tenders'. *Journal of Finance* **16**(1), 8–37.
- Vincent, D. R. (1995), 'Bidding off the wall: Why reserve prices may be kept secret'. Journal of Economics Theory 65, 575–584.
- Walley, M. and D. Fortin (2005), 'Behavioral outcomes from Internet auctions: Reserve price, reserve disclosure, and initial bidding influences in the decision process'. *Journal of Business Research* 58(10), 1409–1418.

Full text available at: http://dx.doi.org/10.1561/1700000017

- Wang, R. (1993), 'Auctions versus posted-price selling'. The American Economic Review 83(4), 838–851.
- Wang, S., W. Jank, and G. Shmueli (2008a), 'Explaining and forecasting online auction prices and their dynamics using functional data analysis'. *Journal of Business and Economic Statistics* 26(2), 144–160.
- Wang, S., W. Jank, G. Shmueli, and P. Smith (2008b), 'Modeling price dynamics in eBay auctions using principal differential analysis'. *Jour*nal of the American Statistical Association **103**(483), 1100–1118.
- Wang, X., A. L. Montgomery, and K. Srinivasan (2008c), 'When auction meets fixed price: A theoretical and empirical examination of buy-it-now auctions'. *Quantitative Marketing and Economics* 6(4), 339–370.
- Wilcox, R. (2000), 'Experts and amateurs: The role of experience in Internet auctions'. *Marketing Letters* 11(4), 363–374.
- Xie, J., T. Elrod, and P. Popkowski Leszczyc (2007), 'The influence of competition on the effectiveness of seller strategy in online auctions'. Mimeo.
- Yao, S. and C. F. Mela (2008), 'Online auction demand'. Marketing Science 27(5), 861–885.
- Zeithammer, R. (2006), 'Forward-looking bidding in Internet auctions'. Journal of Marketing Research 43(3), 462–476.
- Zeithammer, R. (2007a), 'Optimal selling in dynamic auctions: Adaptation versus commitment'. *Marketing Science* 26(6), 859–867.
- Zeithammer, R. (2007b), 'Strategic bid-shading and sequential auctioning with learning from past prices'. Management Science 53(9), 1510–1519.
- Zeithammer, R. (2009), 'Commitment in sequential auctioning: Advance listings and threshold prices'. *Economic Theory* **38**(1), 187–216.
- Zeithammer, R. (2010), 'Sequential auctions with information about future goods'. Working paper.
- Zeithammer, R. and C. Adams (2010), 'The sealed bid abstraction in online auctions'. *Marketing Science*, forthcoming.
- Zeithammer, R. and P. Liu (2006), 'When is auctioning preferred to posting a fixed selling price?'. Working Paper, University of Chicago.