

# Auction Theory and its Applications to Economics

## Reading List, 1999

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Sections 2-14 of this list correspond to sections of Klemperer (1999) (see Section 1).

Articles marked (\*) and (\*\*) are reproduced in *The Economic Theory of Auctions* (see Section 18), with the exceptions of Klemperer (forthcoming a,b), and are particularly recommended.

Core material for this course is marked (\*\*).

My articles can be found on my website [www.paulklemperer.org](http://www.paulklemperer.org)

### 1. Introductions

- \*\* Klemperer, P. D. (1999) Auction Theory: A Guide to the Literature. *Journal of Economic Surveys*, 13. (Also reprinted in *The Current State of Economic Science*, 2, 711-66. S. Dahiya (ed.)), 1999 and on my website [www.paulklemperer.org](http://www.paulklemperer.org)
- \*\* Klemperer, P. D. (forthcoming a) What Really Matters in Auction Design. Forthcoming *Journal of Economic Perspectives*, 2002 and on my website [www.paulklemperer.org](http://www.paulklemperer.org).
- \*\*Klemperer, P.D. (forthcoming b) *Why Every Economist Should Learn Some Auction Theory*. In Mathias Dewatripont, Lars Hansen and Stephen Turnovsky (eds.) *Advances in Economics and Econometrics: Theory and Applications*. Eighth World Congress of the Econometric Society; and on my website [www.paulklemperer.org](http://www.paulklemperer.org).

### 2. Early Literature

- \*\* Vickrey, W. (1961) Counterspeculation, Auctions, and Competitive Sealed Tenders. *Journal of Finance*, 16, 8-37.
- \* Vickrey, W. (1962) Auction and Bidding Games. In *Recent Advances in Game Theory* (pp. 15-27). Princeton, New Jersey: The Princeton University Conference.
- \* Griesmer, J. H., Levitan, R. E., and Shubik, M. (1967) Toward a Study of Bidding Processes Part IV: Games with Unknown Costs. *Naval Research Logistics Quarterly*, 14, 415-33.
- \* Ortega-Reichert, A. (1968) A Sequential Game with Information Flow. Chapter 8 in *Models for Competitive Bidding Under Uncertainty*, Stanford University PhD thesis (and Technical Report No. 8, Department of Operations Research, Stanford University) (pp. 232-54). \**Introductory Note* by Board, S. and Klemperer, P., available on my website [www.paulklemperer.org](http://www.paulklemperer.org).

\* Wilson, R. (1969) Competitive Bidding with Disparate Information. *Management Science*, 15, 446-48.

Friedman, L. (1956) A Competitive Bidding Strategy. *Operations Research*, 4, 104-12.

Wilson, R. (1967) Competitive Bidding with Asymmetric Information. *Management Science*, 13, A816-20.

Rothkopf, M. H. (1969) A Model of Rational Competitive Bidding. *Management Science*, 15, 362-73. (See also Rothkopf, M. H. (1980) On Multiplicative Bidding Strategies. *Operations Research*, 25, 570-75.)

Capen, E. C., Clapp, R. V., and Campbell, W. M. (1971) Competitive Bidding in High-Risk Situations. *Journal of Petroleum Technology*, 23, 641-53.

Vickrey, W. (1976) Auctions Markets and Optimum Allocations. In Y. Amihud (ed.), *Bidding and Auctioning for Procurement and Allocation* (pp. 13-20). Studies in Game Theory and Mathematical Economics. New York: New York University Press.

### **3. Introduction to the Recent Literature**

\* McAfee, R. P. and McMillan, J. (1987a) Auctions and Bidding. *Journal of Economic Literature*, 25, 699-738.

\* Maskin, E. S. and Riley, J. G. (1985) Auction Theory with Private Values. *American Economic Review*, 75, 150-55.

Riley, J. G. (1989) Expected Revenue from Open and Sealed Bid Auctions. *Journal of Economic Perspectives*, 3, 41-50.

### **4. The Basic Analysis of Optimal Auctions, and Revenue Equivalence**

\*\* Myerson, R. B. (1981) Optimal Auction Design. *Mathematics of Operations Research*, 6, 58-73.

\* Riley, J. G. and Samuelson, W. F. (1981) Optimal Auctions. *American Economic Review*, 71, 381-92.

\*\* Bulow, J. I. and Roberts, D. J. (1989) The Simple Economics of Optimal Auctions. *Journal of Political Economy*, 97, 1060-90.

\* Vickrey 1961, 1962 (see under 2).

\*\* Bulow and Klemperer 1996 (see under 8.2).

Harris, M. and Raviv, A. (1981) Allocation Mechanisms and the Design of Auctions.

*Econometrica*, 49, 1477-99.

## 5. Risk Aversion

\* Maskin, E. S. and Riley, J. G. (1984) Optimal Auctions with Risk Averse Buyers. *Econometrica*, 52, 1473-1518.

\* Matthews, S. A. (1987) Comparing Auctions for Risk-Averse Buyers: A Buyer's Point of View. *Econometrica*, 55, 633-46.

Matthews, S. A. (1983) Selling to Risk Averse Buyers with Unobservable Tastes. *Journal of Economic Theory*, 3, 370-400.

Waehrer, K., Harstad, R. M. and Rothkopf, M. H. (1998) Auction Form Preferences of Risk-Averse Bidders. *Rand Journal of Economics*, 29, 179-192.

## 6. Correlation and Affiliation

\*\* Milgrom, P. R. and Weber, R. J. (1982a) A Theory of Auctions and Competitive Bidding. *Econometrica*, 50, 1089-1122.

\* Cremer, J. and McLean, R. P. (1985) Optimal Selling Strategies under Uncertainty for a Discriminatory Monopolist when Demands Are Interdependent. *Econometrica*, 53, 345-61.

\* Levin, D. and Smith, J. L. (1996a) Optimal Reservation Prices in Auctions. *Economic Journal*, 106, 1271-83.

Cremer, J. and McLean, R. P. (1988) Full Extraction of the Surplus in Bayesian and Dominant Strategy Auctions. *Econometrica*, 56, 1247-57.

McAfee, R. P., McMillan, J., and Reny, P. J. (1989) Extracting the Surplus in the Common Value Auction. *Econometrica*, 57, 1451-60.

McAfee, R. P. and Reny, P. J. (1992) Correlated Information and Mechanism Design. *Econometrica*, 60, 395-421.

Perry, M. and Reny, P. J. (forthcoming) On the Failure of the Linkage Principle in Multi-Unit Auctions. *Econometrica*.

## 7. Asymmetries

### 7.1 Private Value Differences

\* McAfee, R. P. and McMillan, J. (1989) Government Procurement and International

Trade. *Journal of International Economics*, 26, 291-308.

\* Maskin, E. S. and Riley, J. G. (1999) Asymmetric Auctions. *Review of Economic Studies*, forthcoming.

\* Maskin and Riley, 1985 (see under 3).

\* Griesmer et al, 1967 (see under 2.).

Marshall, R. C., Meurer, M. J., Richard, J-F., and Stromquist, W. (1994) Numerical Analysis of Asymmetric First Price Auctions. *Games and Economic Behaviour*, 7, 193-220.

Rothkopf, M. H., Harstad, R. M., and Fu, Y. (1997) Is Subsidizing Inefficient Bidders Actually Costly? Mimeo, Rutgers University.

## 7.2 Almost Common Values

\* Bikhchandani, S. (1988) Reputation in Repeated Second-Price Auctions. *Journal of Economic Theory*, 46, 97-119.

\*\* Klemperer, P. D. (1998) Auctions with Almost Common Values. *European Economic Review*, 42, 757-69.

Bulow, J. I., Huang, M., and Klemperer, P. D. (1999) Toeholds and Takeovers. *Journal of Political Economy*, 107, forthcoming

Bulow, J. I., and Klemperer, P. D (forthcoming) (see under 1.5.2.).

## 7.3 Information Advantages

\* Milgrom, P. R. and Weber, R. J. (1982b) The Value of Information in a Sealed-Bid Auction. *Journal of Mathematical Economics*, 10, 105-14.

\* Milgrom, 1981 (see under 8.3).

Engelbrecht-Wiggans, R., Milgrom, P. R., and Weber, R. J. (1983) Competitive Bidding and Proprietary Information. *Journal of Mathematical Economics*, 11, 161-69.

# 8. Entry Costs and the Number of Bidders

## 8.1 Endogenous Entry of Bidders

\* Klemperer, forthcoming a (see under 1).

\* Levin, D. and Smith, J. L. (1994) Equilibrium in Auctions with Entry. *American Economic Review*, 84, 585-99.

\* Engelbrecht-Wiggans, R. (1993) Optimal Auctions Revisited. *Games and Economic Behaviour*, 5, 227-39.

\* Matthews, S. A. (1984) Information Acquisition in Discriminatory Auctions. In M. Boyer and R. E. Kihlstrom (eds.), *Bayesian Models in Economic Theory* (pp. 181-207). New York: North Holland.

\* Fishman, M. J. (1988) A Theory of Pre-emptive Takeover Bidding. *Rand Journal of Economics*, 19, 88-101.

Engelbrecht-Wiggans, R. (1987) Optimal Reservation Prices in Auctions. *Management Science*, 33, 763-70.

McAfee, R. P. and McMillan, J. (1987c) Auctions with Entry. *Economics Letters*, 23, 343-47.

McAfee, R. P. and McMillan, J. (1988) Search Mechanisms. *Journal of Economic Theory*, 44, 99-123.

Harstad, R. M. (1990) Alternative Common Values Auction Procedures: Revenue Comparisons with Free Entry. *Journal of Political Economy*, 98, 421-29.

Menezes, F. M. and Monteiro, P. K. (1997) Auctions with Endogenous Participation. Mimeo, Australian National University and IMPA.

Persico, N. (1997) Information Acquisition in Auctions. Working Paper, U.C.L.A.

Gilbert, R. and Klemperer, P. D. (2000) An Equilibrium Theory of Rationing. *Rand Journal of Economics*, 31, 1-21.

## 8.2 The Value of Additional Bidders

\* Bulow, J. I. and Klemperer, P. D. (1996) Auctions vs. Negotiations. *American Economic Review*, 86, 180-94.

## 8.3 Information Aggregation with Large Numbers of Bidders

\* Wilson, R. (1977) A Bidding Model of Perfect Competition. *Review of Economic Studies*, 44, 511-18.

\* Milgrom, P. R. (1981) Rational Expectations, Information Acquisition, and Competitive Bidding. *Econometrica*, 49, 921-43.

Milgrom, P. R. (1979) A Convergence Theorem for Competitive Bidding with Differential Information. *Econometrica*, 47, 679-88.

Pesendorfer, W. and Swinkels, J. M. (1997) The Loser's Curse and Information Ag-

gregation in Common Value Auctions. *Econometrica*, 65, 1247-81.

#### 8.4 Unknown Number of Bidders

\* Matthews, 1987 (see under 5).

McAfee, R. P. and McMillan, J. (1987b) Auctions with a Stochastic Number of Bidders. *Journal of Economic Theory*, 43, 1-19.

Harstad, R.M., Kagel, J., and Levin, D. (1990) Equilibrium Bid Functions for Auctions with an Uncertain Number of Bidders. *Economic Letters*, 33, 35-40.

Levin, D. and Smith, J. L. (1996b) Ranking Auctions with Risk Averse Bidders. *Journal of Economic Theory*, 68, 549-61.

Piccione, M. and Tan, G. (1996) A Simple Model of Expert and Non Expert Bidding in First Price Auctions. *Journal of Economic Theory*, 70, 501-15.

### 9. Collusion

\* Klemperer, forthcoming a (see under 1).

\* Robinson, M. S. (1985) Collusion and the Choice of Auction. *Rand Journal of Economics*, 16, 141-45.

\* McAfee, R. P and McMillan, J. (1992) Bidding Rings. *American Economic Review*, 82, 579-99.

\* Hendricks, K. and Porter, R. H. (1989) Collusion in Auctions. *Annales D' Economie et de Statistique*, 15/16, 217-30.

Graham, D. A. and Marshall, R. C. (1987) Collusive Bidder Behavior at Single-Object Second-Price and English Auctions. *Journal of Political Economy*, 95, 1217-39.

Graham, D. A., Marshall, R. C., and Richard, J-F. (1990) Differential Payments within a Bidder Coalition and the Shapley Value. *American Economic Review*, 80, 493-510.

Mailath, G. J. and Zemsky, P. (1991) Collusion in Second Price Auctions with Heterogeneous Bidders. *Games and Economic Behavior*, 3, 467-86.

Hendricks, K., Porter, R. H., and Tan, G. (1999) Joint Bidding in Federal Offshore Oil and Gas Lease Auctions. Working Paper, University of British Columbia.

### 10. Multiple Units

#### 10.1 Optimal Auctions

\* Maskin, E. S. and Riley, J. G. (1989) Optimal Multi-Unit Auctions. In Frank Hahn (ed.), *The Economics of Missing Markets, Information, and Games* (pp. 312-335). Oxford: Oxford University Press, Clarendon Press.

\* Palfrey, T. R. (1983) Bundling Decisions by a Multiproduct Monopolist with Incomplete Information. *Econometrica*, 51, 463-84.

Avery, C. and Hendershott, T. (1997) Bundling and Optimal Auctions of Multiple Goods. Mimeo, School of Government, Harvard University and Graduate School of Business, Stanford University.

Armstrong, M. (1998) Optimal Multi-Object Auctions. Mimeo, Oxford University.

Rothkopf, M. H., Pekeč, A., and Harstad, R. M. (1998) Computationally Manageable Auctions. Working Paper, Faculty of Management and Rutgers Center for Operations Research, Rutgers University.

## 10.2 Simultaneous Auctions

\* Wilson, R. (1979) Auctions of Shares. *Quarterly Journal of Economics*, 93, 675-89.

\* Back, K. and Zender, J. F. (1993) Auctions of Divisible Goods. *Review of Financial Studies*, 6, 733-64.

\* Anton, J. J. and Yao, D. A. (1992) Coordination in Split Award Auctions. *Quarterly Journal of Economics*, 107, 681-701.

\* Klemperer, P. D. and Meyer, M. A. (1989) Supply Function Equilibria in Oligopoly Under Uncertainty. *Econometrica*, 57, 1243-77.

\* Hansen, R. G. (1988) Auctions with Endogenous Quantity. *Rand Journal of Economics*, 19, 44-58.

Maxwell, C. (1983) Auctioning Divisible Commodities: A Study of Price Determination. Dissertation, Harvard University.

Bernheim, B. D. and Whinston, M. D. (1986) Menu Auctions, Resource Allocation, and Economic Influence. *Quarterly Journal of Economics*, 101, 1-32.

Anton, J. J. and Yao, D. A. (1989) Split Awards, Procurement, and Innovation. *Rand Journal of Economics*, 20, 538-52.

Daripa, A. (1996a) Quantities Rather Than Prices: Market Allocation, Informational Free-Rides and the Value of Inside Information. Mimeo, Birkbeck College, London.

Daripa, A. (1996b) A Theory of Treasury Auctions. Mimeo, Birkbeck College, London.

Nyborg, K. G. (1997) On Complicity in Share Auctions. Mimeo, London Business School.

Engelbrecht-Wiggans, R. and Kahn, C. M. (1998) Multi-unit Auctions with Uniform Prices. *Economic Theory*, 12, 227-58.

Engelbrecht-Wiggans, R. and Kahn, C. M. (1998) Multi-Unit Pay-Your-Bid Auctions with Variable Awards. *Games and Economic Behavior*, 23, 25-42.

Wang, J. J. D. and Zender, J. F. (1998) Auctioning Divisible Goods. Working Paper, Duke University and University of Utah.

### 10.3 Sequential Auctions

(i) *Bidders demand only a single unit each*

\* Milgrom, P. R. and Weber, R. J. (1982c) A Theory of Auctions and Competitive Bidding II. Mimeo, Stanford University and Northwestern University.

\* Bulow, J. I. and Klemperer, P. D. (1994) Rational Frenzies and Crashes. *Journal of Political Economy*, 102, 1-23.

\* McAfee, R. P. and Vincent, D. (1993) The Declining Price Anomaly. *Journal of Economic Theory*, 60, 191-212.

Bernhardt, D. and Scoones, D. (1994) A Note on Sequential Auctions. *American Economic Review*, 84, 653-57.

Engelbrecht-Wiggans, R. (1994) Sequential Auctions of Stochastically Equivalent Objects. *Economics Letters*, 44, 87-90.

von der Fehr, N-H. M. (1994) Predatory Bidding in Sequential Auctions. *Oxford Economic Papers*, 46, 345-56.

Gale, I. L. and Hausch, D. B. (1994) Bottom-Fishing and Declining Prices in Sequential Auctions. *Games and Economic Behavior*, 7, 318-31.

Robert, J., Laffont, J-J., and Loisel, P. (1994) Repeated Descending-Price Auctions I: Theory. Mimeo, Université de Montreal, Université de Toulouse, and INRA.

Beggs, A. W. and Graddy, K. (1997) Declining Values and the Afternoon Effect: Evidence from Art Auctions. *Rand Journal of Economics*, 28, 544-65.

McAfee, R. P. and Vincent, D. (1997) Sequentially Optimal Auctions. *Games and Economic Behaviour*, 18, 246-76.

(ii) *Bidders with multi-unit demand*



\* Weber, R. J. (1983) Multi-Object Auctions. In Richard Engelbrecht-Wiggans, Martin Shubik, and Robert M. Stark (eds), *Auctions, Bidding, and Contracting* (pp. 165-91). New York: New York University Press.

\* Ortega-Reichert, 1968 (see under 2).

Hausch, D. B. (1986) Multi-Object Auctions: Sequential vs. Simultaneous Sales. *Management Science*, 32, 1599-1610.

Pitchik, C. and Schotter, A. (1988) Perfect Equilibria in Budget Constrained Sequential Auctions: An Experimental Study. *Rand Journal of Economics*, 19, 363-88.

Black, J. and de Meza, D. (1992) Systematic Price Divergences Between Successive Auctions Are No Anomaly. *Journal of Economics and Management Strategy*, 1, 607-28.

Krishna, K. (1993) Auctions with Endogenous Valuations: The Persistence of Monopoly Revisited. *American Economic Review*, 83, 147-60.

Robert, J. (undated,  $\approx$  1995) Sequential Descending-Price Auctions with Multi-Unit Demand. Mimeo, Université de Montreal.

Gale, I. L. and Stegeman, M. (1995) Sequential Auctions of Endogenously Valued Objects. Mimeo, Georgetown University and Virginia Polytechnic Institute.

Pitchik, C. (1995) Budget-Constrained Sequential Auctions with Incomplete Information. Mimeo, University of Toronto.

Gale, I. L., Hausch, D. B., and Stegeman, M. (1998) Sequential Procurement Auctions with Subcontracting. Mimeo, Georgetown University, University of Wisconsin and Virginia Polytechnic Institute.

von der Fehr, N-H. M. and Riis, C. (1999) Option Values in Sequential Markets. Mimeo, University of Oslo and Norwegian School of Management.

#### 10.4 Efficient Auctions

Ausubel, L. (1998) An Efficient Ascending-Bid Auction for Multiple Objects. Working Papers, University of Maryland.

Ausubel, L. and Cramton, P. (1998) Demand Reduction and Inefficiency in Multi-Unit Auctions. Mimeo, University of Maryland.

Dasgupta, P. S. and Maskin, D. (1998) Efficient Auctions. Working Paper, Cambridge University and Harvard University.

Jehiel, P. and Moldovanu, B. (1998) Efficient Design with Interdependent Valuations. Working Paper, University College London and University of Mannheim.

Perry, M. and Reny, P. J. (1998) Ex-Post Efficient Auctions for Agents with Interdependent Values. Working Paper, Hebrew University of Jerusalem and University of Pittsburgh.

Bikhchandani, S. (1999) Auctions of Heterogeneous Objects. *Games and Economic Behaviour*.

## 11. Royalties, Incentive Contracts, and Payments for Quality

\* Riley, J. G. (1988), Ex Post Information in Auctions. *Review of Economic Studies*, 55, 409-30.

\* Laffont, J-J. and Tirole, J. (1987) Auctioning Incentive Contracts. *Journal of Political Economy*, 95, 921-37.

\* Che, Y-K. (1993) Design Competition through Multidimensional Auctions. *Rand Journal of Economics*, 24, 668-80.

McAfee, R. P. and McMillan, J. (1986) Bidding for Contracts: A Principal-Agent Analysis. *Rand Journal of Economics*, 17, 326-38.

McAfee, R. P. and McMillan, J. (1987d) Competition for Agency Contracts. *Rand Journal of Economics*, 18, 296-307.

Riordan, M. H. and Sappington, D. E. M. (1987) Awarding Monopoly Franchises. *American Economic Review*, 77, 375-87.

Branco, F. (1997) The Design of Multidimensional Auctions. *Rand Journal of Economics*, 28, 63-81.

## 12. Double Auctions, etc

### 12.1 Double Auctions

\* Chatterjee, K. and Samuelson, W. (1983) Bargaining under Incomplete Information. *Operations Research*, 31, 835-51.

\* Wilson, R. (1985) Incentive Efficiency of Double Auctions. *Econometrica*, 53, 1101-15.

\* Rustichini, A., Satterthwaite, M. A., and Williams, S. R. (1994) Convergence to Efficiency in a Simple Market with Incomplete Information. *Econometrica*, 62, 1041-63.

\* McAfee, R. P. (1992) A Dominant Strategy Double Auction. *Journal of Economic Theory*, 56, 434-50.

Leininger, W., Linhart, P. B., and Radner, R. (1989) Equilibria of the Sealed Bid

Mechanism for Bargaining with Incomplete Information. *Journal of Economic Theory*, 48, 63-106.

Satterthwaite, M. A. and Williams, S. R. (1989a) The Rate of Convergence to Efficiency in the Buyer's Bid Double Auction as the Market Becomes Large. *Review of Economic Studies*, 56, 477-98.

Satterthwaite, M. A. and Williams, S. R. (1989b) Bilateral Trade with the Sealed Bid k-Double Auction: Existence and Efficiency. *Journal of Economic Theory*, 48, 107-33.

## 12.2 Related Two-Sided Trading Mechanisms

\* Myerson, R. B. and Satterthwaite, M. A. (1983) Efficient Mechanisms for Bilateral Trade. *Journal of Economic Theory*, 29, 265-81.

\* Cramton, P., Gibbons, R., and Klemperer, P. D. (1987) Dissolving a Partnership Efficiently. *Econometrica*, 55, 615-32.

## 13. Other Topics

### 13.1 Budget Constraints

\* Che, Y-K. and Gale, I. L. (1998) Standard Auctions with Financially Constrained Bidders. *Review of Economic Studies*, 65, 1-21.

Pitchik and Schotter, 1988 (see under 10.3(ii)).

Pitchik, 1995 (see under 10.3(ii)).

Che, Y-K. and Gale, I. L. (1996) Expected Revenue of All-Pay Auctions and First-Price Sealed-Bid Auctions with Budget Constraints. *Economics Letters*, 50, 367-71.

Benoît, J-P. and Krishna, V. (1998) Multi-Object Auctions with Budget Constrained Bidders. Working Paper, New York University and Pennsylvania State University.

### 13.2 Externalities between Bidders

\* Jehiel, P. and Moldovanu, B. (1996) Strategic Nonparticipation. *Rand Journal of Economics*, 27, 84-98.

Jehiel, P., Moldovanu, B., and Stacchetti, E. (1996) How (Not) to Sell Nuclear Weapons. *American Economic Review*, 86, 814-29.

Caillaud, B. and Jehiel, P. (1998) Collusion in Auctions with Externalities. *Rand Journal of Economics*, 29, 680-702.

### 13.3 Jump Bidding

\* Avery, C. (1998) Strategic Jump Bidding in English Auctions. *Review of Economic Studies*, 65, 185-210.

\* Fishman, 1988 (see under 8.1).

Daniel, K. and Hirshleifer, D. (1995) A Theory of Costly Sequential Bidding. Mimeo, Universities of Chicago and Michigan.

#### 13.4 War of Attrition

\* Bulow, J. I. and Klemperer, P. D. (1999a) The Generalized War of Attrition. *American Economic Review*, 89, forthcoming.

Riley, J. G. (1980) Strong Evolutionary Equilibrium and The War of Attrition. *Journal of Theoretical Biology*, 82, 383-400.

Bliss, C. and Nalebuff, B. (1984) Dragon-Slaying and Ballroom Dancing: The Private Supply of a Public Good. *Journal of Public Economics*, 25, 1-12.

Fudenberg, D. and Tirole, J. (1986) A Theory of Exit in Duopoly. *Econometrica*, 54, 943-60.

Krishna, V. and Morgan, J. (1997) An Analysis of the War of Attrition and the All-Pay Auction. *Journal of Economic Theory*, 72, 343-62.

#### 13.5 Competing Auctioneers

\* McAfee, R. P. (1993) Mechanism Design by Competing Sellers. *Econometrica*, 61, 1281-1312.

Peters, M. and Severinov, S. (1997) Competition Among Sellers Who Offer Auctions Instead of Prices. *Journal of Economic Theory*, 75, 141-79.

Burguet, R. and Sákovics, J. (1999) Imperfect Competition in Auction Design. *International Economic Review*, 40, forthcoming.

### **14. Testing the Theory**

#### 14.1 Empirical

\* Laffont, J-J. (1997). Game Theory and Empirical Economics: The Case of Auction Data. *European Economic Review*, 41, 1-35.

Hendricks, K. and Porter, R. H. (1988) An Empirical Study of an Auction with Asymmetric Information. *American Economic Review*, 78, 865-83.

Hendricks, K. and Paarsch, H. J. (1995) A Survey of Recent Empirical Work Concerning Auctions. *Canadian Journal of Economics*, 28, 403-26.

Laffont, J-J, Ossard, H. and Vuong, Q. (1995) Econometrics of First-Price Auctions. *Econometrica*, 63, 953-80.

Porter, R. H. (1995) The Role of Information in U.S. Offshore Oil and Gas Lease Auctions. *Econometrica*, 63, 1-27.

Laffont, J-J and Vuong, Q. (1996) Structural Analysis of Auction Data. *The American Economic Review*, 86, 414-20.

#### 14.2 Experimental

\* Kagel, J. H. (1995) Auctions: A Survey of Experimental Research. In John H. Kagel and Alvin E. Roth (eds.), *The Handbook of Experimental Economics* (pp. 501-86). New Jersey: Princeton University Press.

### **15. More on Specific Auction Forms**

#### 15.1 More on First Price Auctions

Lebrun, B. (1996) Existence of an Equilibrium in First Price Auctions. *Economic Theory*, 7, 421-43.

Maskin, E. S. and Riley, J. G. (1996a) Equilibrium in Sealed High Bid Auctions. Mimeo, Harvard University and University of California.

Maskin, E. S. and Riley, J. G. (1996b) Uniqueness in Sealed High Bid Auctions. Mimeo, Harvard University and University of California.

Athey, S. (1997) Single-Crossing Properties and the Existence of Pure-Strategy Equilibrium in Games of Incomplete Information. Mimeo, M.I.T.

Lizzeri, A. and Persico N. (1998) Uniqueness and Existence of Equilibrium in Auctions with a Reserve Price. Working Paper, Princeton University and University of Pennsylvania.

#### 15.2 More on Second Price Auctions

Rothkopf, M. H., Teisberg, T. J., and Kahn, E. P. (1990) Why are Vickrey Auctions Rare, *Journal of Political Economy*, 98, 94-109.

Bikhchandani, S. and Riley, J. G. (1991) Equilibria in Open Common Value Auctions. *Journal of Economic Theory*, 53, 101-30.

Bulow, J., Huang, M. and Klemperer, P. (1995) Toeholds and Takeovers: General

Characterization, Existence, and Uniqueness of Equilibrium. Mimeo, Stanford University and Nuffield College, Oxford University.

Lopomo, G. (1998) The English Auction is Optimal among Simple Sequential Auctions. *Journal of Economic Theory*, 82, 144-66.

Wilson, R. (1998) Sequential equilibria of asymmetric ascending auctions: The case of log-normal distributions. *Economic Theory*, 12, 433-40.

Bulow, J. I. and Klemperer, P. D. (forthcoming). Prices and the Winner's Curse. *Rand Journal of Economics*, 2002.

## 16. Miscellaneous

Cassady, R. Jr. (1967) *Auctions and Auctioneering*. University of California Press, Berkeley and Los Angeles.

Shubik, M. (1983) Auctions, Bidding, and Markets: An Historical Sketch. In R. Engelbrecht-Wiggans, M. Shubik, and J. Stark (eds), *Auctions, Bidding, and Contracting* (pp. 33-52). New York: New York University Press.

Ashenfelter, O. (1989) How Auctions Work for Wine and Art. *Journal of Economic Perspectives*, 3, 23-36.

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