

Peter Cramton list of major publications and abstracts

Global Carbon Pricing—The Path to Climate Cooperation (with David JC MacKay, Axel Ockenfels and Steven Stoft), *MIT Press*, 2017.

After twenty-five years of failure, climate negotiations continue to use a pledge and review approach: countries pledge (almost anything), subject to (unenforced) review. This approach ignores everything we know about human cooperation. In this book, leading economists describe an alternate model for climate agreements, drawing on the work of the late Nobel laureate Elinor Ostrom and others. They show that a “common commitment” scheme is more effective than an “individual commitment” scheme; the latter depends on altruism while the former involves reciprocity (“we will if you will”). The contributors propose that global carbon pricing is the best candidate for a reciprocal common commitment in climate negotiations. Each country would commit to placing charges on carbon emissions sufficient to match an agreed global price formula. The contributors show that carbon pricing would facilitate negotiations and enforcement, improve efficiency and flexibility, and make other climate policies more effective. Additionally, they analyze the failings of the 2015 Paris climate conference.

“The High-Frequency Trading Arms Race: Frequent Batch Auctions as a Market Design Response” (with Eric Budish and John Shim), *Quarterly Journal of Economics*, 130:4, 1547–1621, November 2015.

The high-frequency trading arms race is a symptom of flawed market design. Instead of the continuous limit order book market design that is currently predominant, we argue that financial exchanges should use frequent batch auctions: uniform price double auctions conducted, e.g., every tenth of a second. That is, time should be treated as discrete instead of continuous, and orders should be processed in a batch auction instead of serially. Our argument has three parts. First, we use millisecond-level direct-feed data from exchanges to document a series of stylized facts about how the continuous market works at high-frequency time horizons: (i) correlations completely break down; which (ii) leads to obvious mechanical arbitrage opportunities; and (iii) competition has not affected the size or frequency of the arbitrage opportunities, it has only raised the bar for how fast one has to be to capture them. Second, we introduce a simple theory model which is motivated by, and helps explain, the empirical facts. The key insight is that obvious mechanical arbitrage opportunities, like those observed in the data, are built into the market design – continuous-time serial processing implies that even symmetrically observed public information creates arbitrage rents. These rents harm liquidity provision and induce a never-ending socially-wasteful arms race for speed. Last, we show that frequent batch auctions directly address the flaws of the continuous limit order book. Discrete time reduces the value of tiny speed advantages, and the auction transforms competition on speed into competition on price. Consequently, frequent batch auctions eliminate the mechanical arbitrage rents, enhance liquidity for investors, and stop the high-frequency trading arms race.

“Demand Reduction and Inefficiency in Multi-Unit Auctions,” (with Lawrence M. Ausubel, Marek Pycia, Marzena Rostek, and Marek Weretka) *Review of Economic Studies*, 81:4, 1366-1400, 2014.

Auctions often involve the sale of many related goods: Treasury, spectrum and electricity auctions are examples. In multi-unit auctions, a bid for one unit may affect payments for other units won, giving rise to an incentive to shade bids differently across units. We establish that such differential bid shading results generically in ex post inefficient allocations in the uniform-price and pay-as-bid auctions. We also show that, in general, the efficiency and revenue rankings for the two formats are ambiguous. However, in

settings with symmetric bidders, the pay-as-bid auction often outperforms. In particular, with diminishing marginal utility, symmetric information and linearity, it yields greater expected revenues. We explain the rankings through multi-unit effects, which have no counterparts in auctions with unit demands. We attribute the new incentives separately to multi-unit but constant marginal utility and diminishing marginal utility.

Combinatorial Auctions, (with Yoav Shoham and Richard Steinberg) MIT Press, 2006.

A comprehensive book on combinatorial auctions—auctions in which bidders can bid on packages of items. The book consists of original material intended for researchers, students, and practitioners of auction design. It includes a foreword by Vernon Smith, an introduction to combinatorial auctions, and twenty-three cross-referenced chapters in five parts. Part I covers mechanisms, such as the Vickrey auction and the ascending proxy auction. Part II is on bidding and efficiency issues. Part III examines computational issues and algorithmic considerations, especially the winner determination problem—how to identify the (tentative) winning set of bids that maximizes revenue. Part IV discusses implementation and methods of testing the performance of combinatorial auctions, including simulation and experiment. Part V considers four important applications: airport runway access, trucking, bus routes, and industrial procurement. The chapters develop and apply a unified language, integrating ideas from economics, operations research, and computer science. A glossary defines the central terms. The contributors are Lawrence Ausubel, Michael Ball, Martin Bichler, Sushil Bikhchandani, Craig Boutilier, Estelle Cantillon, Chris Caplice, Peter Cramton, Andrew Davenport, George Donohue, Karla Hoffman, Gail Hohner, Jayant Kalagnanam, Ailsa Land, Daniel Lehmann, Kevin Leyton-Brown, Dinesh Menon, Paul Milgrom, Rudolf Müller, Noam Nisan, Eugene Nudelman, Joseph Ostroy, David Parkes, Aleksandar Pekec, Martin Pesendorfer, Susan Powell, Amir Ronen, Michael Rothkopf, Tuomas Sandholm, Ilya Segal, Yossi Sheffi, Yoav Shoham, Richard Steinberg, Susara van den Heever, Thomas Wilson, and Makoto Yokoo.

“Strikes and Holdouts in Wage Bargaining: Theory and Data,” (with Joseph S. Tracy) *American Economic Review*, 82, 100–121, 1992.

We develop a private-information model of union contract negotiations in which disputes signal a firm’s willingness to pay. Previous models have assumed that all labor disputes take the form of a strike. Yet a prominent feature of U.S. collective bargaining is the holdout: negotiations often continue without a strike after the contract has expired. Production continues with workers paid according to the expired contract. We analyze the union’s decision to strike or hold out and highlight its importance to strike activity. Strikes are more likely to occur after a drop in the real wage or a decline in unemployment.

“Strategic Delay in Bargaining with Two-Sided Uncertainty,” *Review of Economic Studies*, 59, 205–225, 1992.

The role of strategic delay is analyzed in an infinite-horizon alternating-offer model of bargaining. A buyer and seller are engaged in the trade of a single object. Both bargainers have private information about their own preferences and are impatient in that delaying agreement is costly. An equilibrium is constructed in which the bargainers signal the strength of their bargaining positions by delaying prior to making an offer. A bargainer expecting large gains from trade is more impatient than one expecting small gains, and hence makes concessions earlier on. Trade occurs whenever gains from trade exist, but due to the private information, only after costly delay.

“Dissolving a Partnership Efficiently,” (with Robert Gibbons and Paul Klemperer) *Econometrica*, 55, 615–632, 1987.

Several partners jointly own an asset that may be traded among them. Each partner has a valuation for the asset; the valuations are known privately and drawn independently from a common probability distribution. We characterize the set of all incentive-compatible and interim-individually-rational trading mechanisms, and give a simple necessary and sufficient condition for such mechanisms to dissolve the partnership ex post efficiently. A bidding game is constructed that achieves such dissolution whenever it is possible. Despite incomplete information about the valuation of the asset, a partnership can be dissolved ex post efficiently provided no single partner owns too large a share; this contrasts with Myerson and Satterthwaite's result that ex post efficiency cannot be achieved when the asset is owned by a single party.