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Foreword: Special Issue on Experimental Methods
in Environmental, Natural Resource
and Agricultural Economics

Kent D. Messer
University of Delaware

James J. Murphy
University of Alaska Anchorage

UAA DEPARTMENT OF ECONOMICS
3211 Providence Drive
Rasmuson Hall 302
Anchorage, AK 99508

<http://econpapers.uaa.alaska.edu>

Nearly 20 years ago, Jason Shogren spoke at the Northeast Agricultural and Resource Economics Association (NAREA) annual meeting about how the burgeoning field of experimental economics might be useful in addressing questions of interest to environmental and resource economists (Shogren 1993). When he spoke in 1992, experimental economics was a niche field that primarily focused on nonmarket valuation techniques, social dilemma games, bargaining experiments, and testing game-theoretic models. As demonstrated in this special issue of the *Agriculture and Resource Economic Review* (ARER), things have certainly changed in ways that would have been hard to predict two decades earlier, including the 2002 Nobel Prize awarded to Vernon Smith, the 2009 Nobel Prize award to Elinor Ostrom, publication of a field journal dedicated to experimental economics, and significant expansion in the range of topics and methodological approaches.

The changes that have occurred during the field's rapid growth, which started in the mid-90s and continues today, are evident in this issue's 14 papers that were written by 40 researchers from 27 institutions located in 9 countries on 5 continents. This special issue of ARER features primarily the papers presented at a methods workshop that sought to introduce young scholars to experimental economics techniques and to showcase examples of high quality research that addressed environmental, natural resource and agricultural policy issues. Tim Cason and Shogren, two leaders in the field, delivered invited presentations. This workshop followed the NAREA annual conference and was held in Burlington, Vermont, on June 9-10, 2009. Financial support for the workshop and for publication of these papers in ARER was provided by the US Environmental Protection Agency, the Farm Foundation, and the US Department of Agriculture's Economic Research Service.

The papers in this special issue not only contribute to the classic experimental economics literature on nonmarket techniques and social dilemmas, but also illustrate how far the field has grown since the early 1990s. The papers cover a wide range of topics from emissions auctions under the Regional Greenhouse Gas Initiative (Shobe *et al.* 2010) to managing a multispecies fishery (Anderson 2010), and use a variety of methods including traditional laboratory experiments, field experiments, and hybrid approaches, such as Knapp and Murphy's (2010) field-in-the-lab approach and Bernard and He's (2010) examination of how field prices impact bidding behavior for real items in a lab environment. What is common in these studies is the use of what Shogren, Parkhurst, and Hudson (2010) refer to as an experimental "mindset" which seeks to better understand the behavior of individuals, businesses, and organizations within the context of various institutional settings.

Shogren, invited to return as a keynote speaker for this workshop, noted how experimental methods have expanded from controlled laboratory settings with undergraduate students to include field experiments, neuroeconomics and virtual reality. He discussed how behavioral economics has grown as a field and is now not only challenging parts of the traditional rational choice framework, but is also influencing economic policy makers at the highest levels. In addition to this methodological growth, the application of experimental methods to environmental and natural resource issues also underwent significant expansion in the mid- to late-1990's. Shogren's 1992 talk roughly coincided with two significant events in environmental policy that helped broaden experimental research to include more applied policy issues. The 1989 Exxon Valdez spill substantially expanded the existing literature on nonmarket valuation techniques, particularly regarding hypothetical bias and the development of calibration techniques to mitigate its effects. A key component of the 1990 Clean Air Act Amendments was

the implementation of the US Environmental Protection Agency's sulfur dioxide emissions trading program, one of the world's first successful large-scale cap-and-trade programs, leading to a surge in experimental research related to the design of emissions trading programs and more broadly, on laboratory "testbedding" of new environmental policy initiatives. Testbedding of policies using experimental economics has been compared to using wind tunnels to test airplane design (Shogren 2004).

The workshop's other keynote speaker, Cason (2010), highlighted the growth in the use of experiments as testbeds for policy. Economics experiments are now providing valuable input into a wide variety of environmental, natural resource, and agricultural policy questions. Cason has been a major contributor to the emissions trading experimental literature, and his paper in this issue provides an excellent overview. Emission trading institutions, in particular, have received renewed research focus as a result of interest in the development of markets for a variety of environmental services, such as greenhouse gas emissions.

Both Cason's and Shogren's talks touched upon a theme that frequently emerged throughout the workshop and is still a hot topic of discussion within the field of experimental economics: the relative merits of laboratory and field experiments. Around the late 1990's the landscape of experimental economics underwent a significant expansion with respect to both the range to topics studied and the experimental methods used. Until this time, the overwhelming majority of experiments were conducted in laboratory settings with university students in the United States and Europe. There was a natural progression with a significant surge in field studies using non-student subject pools.¹ Joe Henrich (2000) was conducting field experiments with indigenous communities in Peru that laid the foundation for the 15 societies study which

¹ Our point is not that these studies are the first of their kind; rather we note that around the late 1990's is when these lines of research underwent significant growth. Peter Bohm is generally credited as one of the early pioneers in field experiments (Dufwenberg and Harrison, 2008).

integrated ethnographic and experimental research in a cross-cultural comparison (Henrich *et al.* 2004). John List was concurrently working with sportscard dealers and found that experience matters in market exchange environments (List 2000, 2001, and 2003).

The participants in Juan Camilo Cardenas' field experiments were rural villagers in Colombia whose livelihood depended upon successful management of a common pool resource. At the time, most experiments used neutral, context-free language to provide more experiment control. As Cason notes in this issue, the rationale for neutral framing was to reduce the likelihood that providing a context might unintentionally invoke certain preferences that the experimenter cannot observe. However, Cardenas was concerned that, in the absence of a context, subjects would introduce their own unobservable context leading to *less* control. He argued that these villagers might bring a set of experiences and information about the context in a social dilemma that was quite different from that of university students (e.g., Cardenas, Stanlund, and Willis 2000, Cardenas and Ostrom 2004).

This special issue features two field experiments conducted in developing nations. Alevy, Cristi, and Melo (2010) worked with Chilean farmers to test the properties of a right-to-choose auction. Prior to the experiment, the research team acquired actual water volumes that were then offered for sale to farmers in two different auctions. Similar to Cardenas' experiments, the commodity being auctioned (water) is essential for the subjects' livelihoods and the experiments were framed using a context that was already familiar to the subjects. Their results suggest that the right-to-choose auction raises more revenue than a sequential auction and that varying risk attitudes can explain much of the difference in bidding behaviors observed in the two auctions. The paper by Lybbert *et al.* (2010) has a development focus. The authors note that their framed field experiments in Morocco, Peru and Kenya offer benefits not only to researchers seeking to

understand how the poor respond to risk and to complex products, such as index insurance, but also the experiments provide an educational benefit by helping low-income farmers understand complex stochastic, dynamic processes.

Cason's (2010) paper discusses the merits of lab experiments, including the testbedding of proposed new rules and institutions, which is a focus of several papers in this special issue. For instance, Anderson (2010) tests a points-based system for managing the Northeast Multispecies Fishery that was proposed by an industry group. The experimental results show that harvesters are broadly responsive to this system of point prices, especially those with experience. Anderson concludes by suggesting that this type of system could be used to effectively manage a multispecies fishery to ensure acceptable economic and biological outcomes, assuming that the point prices can be readily adjusted over time. Doyon, Rondeau, and Mbala (2010) test new auction mechanisms for tradable egg production quotas in Quebec. They show that in thin markets, such as those common in highly concentrated agricultural industries, that the Truncated k-Double Auction can help decrease equilibrium prices with only moderate efficiency losses, thereby helping counter potential market power from oligopolies. Shobe *et al.* (2010) focus their use of experimental auctions to examine issues related to the direct sale of carbon emissions in the Regional Greenhouse Gas Initiative. Their paper tests the effects of "loose" and "strict" caps on the allocated allowances based on recent emission history. Their results suggest that auction revenue is lower compared to competitive benchmarks when a loose cap is used, but that these differences in revenue dissipate after a series of auctions.

Other papers are motivated by contemporary policy issues even if not directly testing alternative policy instruments. Hellerstein and Higgins (2010) use the US Department of Agriculture's Conservation Reserve Program as the basis for their land conservation auction

experiments. Their experimental results show that while capping the maximum amount a landowner can receive in environmental markets may have intuitive appeal as a way of reducing government expenditures, these caps actually can lead to increase in expenditures. The authors argue that relaxing restrictions on the maximum bids from landowners could yield better results, especially when the quality of the land enrolled in the program matters. Knapp and Murphy's (2010) study of rent dissipation in competitive fisheries is motivated by the challenges faced in the Bristol Bay Alaska salmon fishery. They use a novel, interactive experiment that "brings the field into the lab." The task for subjects in their lab experiment was comparable to the field task under investigation—actively harvesting from a limited resource stock. Subjects had to decide which harvesting device (measuring cups) to purchase, each of which had different harvesting capacities (cup size) and acquisition costs. The harvesting devices were then used to extract valuable items (dry beans) from a common pool resource (a large bowl). Bernard and He (2010) examine how bidding behavior in lab experiments involving the purchase of food might be influenced by field prices before and after a large increase in the prices for these goods in the field. Their results support the growing literature that suggests that researchers should be conscious of how field prices affect willingness-to-pay bids in experiments.

Other studies in this issue have policy implications, but the motivation is more general. For instance, Spraggon and Oxoby (2010) add to the nonpoint source pollution literature by evaluating how recommendations about choices and the presentation of payoff information might affect behavior. Their study suggests the ambient-based policy instruments can be significantly improved when decision errors are reduced by providing a more robust description of the decision environment. Giordana et al. (2010) investigate the relationship between static and dynamic externalities in a common pool resource, which is a critical issue in managing

groundwater extraction from coastal aquifers where overexploitation can lead to irreversible damage from seawater intrusion. The results of their experiments did not support their initial hypothesis that the existence of static externalities would lead subjects to exhibit more pro-social behavior. Kotani, Messer, and Schulze (2010) use experiments to examine how changes in the incentive structure of tax refund and matching grant mechanisms leads to different level of voluntary contributions to public goods. These authors argue that the “helping hand” that subjects provide through their contributions in settings that are not incentive compatible reflect a partial revelation of demand for the good in question and therefore should be accounted for in benefit-cost analyses related to environmental projects.

Two studies address issues related to nonmarket valuation. Shogren, Parkhurst, and Hudson (2010) note in their paper that for controversial goods individuals may have either positive or negative values and study this within the context of willingness-to-pay and willingness-to-accept auctions. The authors conclude by expressing concerns that for controversial goods, the existence of positive and negative values could result in an overstatement of the costs relative to the benefits. Finally, Caplan, Aadland, and Macharia’s (2010) research finds hypothetical bias in stated-preference public goods experiments in Botswana. Although there is an abundance of hypothetical bias studies, this study is one the few that investigates this issue in a developing nation.

In summary, this special issue illustrates the breadth of current application of experimental economics techniques to issues of importance to environmental, resource, and agricultural economics. As Shogren departed from the two-day workshop, he reported what a pleasure it was to see how the “seeds” that the early pioneers of experimental economics help plant have now “blossomed.”

References

Alevy JE, Cristi O, Melo O (2010) Right-to-choose Auctions: A Field Study with Farmers in the Limarí Valley of Chile *Agricultural and Resource Economics Review* 39(1):??

Anderson CM (2010) An Experimental Analysis of a Points-based System for Managing Multispecies Fisheries. *Agricultural and Resource Economics Review* 39(1):??

Bernard JC, He N (2010) Confounded by the Field: Bidding in Food Auctions when Field Prices are Increasing. *Agricultural and Resource Economics Review* 39(1):??

Caplan AJ, Aadland D, Macharia A (2010) Estimating Hypothetical Bias in Economically Emergent Africa: A Generic Public Good Experiment. *Agricultural and Resource Economics Review* 39(1):??

Cardenas J-C, Ostrom E (2004) What Do People Bring into the Game? Experiments in the Field about Cooperation in the Commons. *Agricultural Systems* 82(3): 307-326.

Cardenas J-C, Stranlund JK, Willis CE (2000) Local Environmental Control and Institutional Crowding-out. *World Development* 28(10): 1719-1733.

Cason TN (2010) What can Laboratory Experiments teach us about Emissions Permit Market Design? *Agricultural and Resource Economics Review* 39(1):??

Doyon M, Rondeau D, Mbala R, (2010) Keep it Down: An Experimental Test of the Truncated k -Double Auction. *Agricultural and Resource Economics Review* 39(1):??

Dufwenberg M, Harrison G (2008) Peter Bohm: Father of Field Experiments. *Experimental Economics* 11(3):213-220.

Giordana G, Montginoul M, Willinger M (2010) Do static externalities offset dynamic externalities? An experimental study of the exploitation of substitutable common-pool resources. *Agricultural and Resource Economics Review* 39(1):??

Hellerstein D, Higgins N (2010) The Effective Use of Limited Information: Do Bid Maximums Reduce Procurement Costs in Asymmetric Auctions? *Agricultural and Resource Economics Review* 39(1):??

Henrich J (2000) Does Culture Matter in Economic Behavior? Ultimatum Game Bargaining among the Machiguenga. *American Economic Review* 90(4): 973-979.

Henrich J, Boyd R, Bowles S, Gintis H, Fehr E, Camerer C, eds. (2004). *Foundations of Human Sociality: Economic Experiments and Ethnographic Evidence in Fifteen Small-Scale Societies*. New York: Oxford University Press.

Knapp G, Murphy JJ (2010) Voluntary approaches to transitioning from competitive fisheries to rights-based management: an experimental analysis. *Agricultural and Resource Economics Review* 39(1):??

Kotani K, Messer KD, Schulze WD (2010) Matching Grants and Charitable Giving: Why the Match Level Matters *Agricultural and Resource Economics Review* 39(1):??

List JA (2001) Do Explicit Warnings Eliminate the Hypothetical Bias in Elicitation Procedures? Evidence from Field Auctions for Sportscards. *American Economic Review* 91(5):1498-1507.

List JA (2003) Does Market Experience Eliminate Market Anomalies? *Quarterly Journal of Economics* 118(1): 41-71.

List JA, Lucking-Reiley D (2000) Demand Reduction in Multiunit Auctions: Evidence from a Sportscard Field Experiment. *American Economic Review* 90(4): 961-972.

Lybbert TJ, Galarza FB, McPeak J, Barrett CB, Boucher, SR, Carter MR, Chantarat S, Fadlaoui A, Mude A (2010) Dynamic Field Experiments in Development Economics: Risk Valuation in Morocco, Kenya and Peru. *Agricultural and Resource Economics Review* 39(1):??

Shobe W, Palmer K, Myers E, Holt C, Goeree J, Burtraw D (2010) An Experimental Analysis of Auctioning Emissions Allowances under a Loose Cap. *Agricultural and Resource Economics Review* 39(1):??

Shogren JF (1992) Experimental Markets and Environmental Policy. *Agricultural and Resource Economics Review* 22(2):117-129.

Shogren JF (2004) Incentive Mechanism Testbeds: Discussion. *American Journal of Agricultural Economics* 86:1218–1219.

Shogren JF, Parkhurst GM, Hudson D (2010) Experimental Economics & the Environment: Eliciting Values for Controversial Goods. *Agricultural and Resource Economics Review* 39(1):??

Spraggon J, Oxoby RJ (2010) Ambient-Based Policy Instruments: The Role of Recommendations and Presentation. *Agricultural and Resource Economics Review* 39(1):??