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Options for Improving Conservation Programs: Insights From Auction Theory and Economic Experiments

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What Is the Issue?

The U.S. Department of Agriculture spends over \$5 billion per year on conservation programs, mostly on voluntary programs that give financial assistance to farmers and landowners to provide environmental services. Most programs cannot fund all interested parties and some use auctions to select from among competing applicants. Auctions are an appealing competitive enrollment mechanism for USDA's conservation programs—they can be cost effective and relatively easy to administer. While well-designed Government auctions can achieve program objectives while utilizing tax dollars efficiently, auctions can also have unintended consequences stemming from the manner in which they are implemented. Auction theory, lessons learned from existing Government auctions, and the results of economic laboratory experiments can all be used to better understand the impacts that auction design can have on outcomes.

What Did the Study Find?

Using the current design of USDA's Conservation Reserve Program (CRP) auction as an example, this report explores how alternative auction designs might provide a bigger “environmental bang for the buck.”

Auctions are especially useful when:

- (1) The buyer (e.g., USDA) can leverage available information about participants to keep costs down;
- (2) No well-established market exists; and
- (3) The Government needs a fair and transparent way of selecting participants when budgets are constrained. In reverse auctions, such as the CRP (where there is one buyer and many sellers), competition between participants can improve cost-effectiveness and set a market-clearing price for ecosystem services when private markets do not exist.

Auctions may be less useful when:

- (1) The buyer has very good information on the sellers' costs and can make efficient purchase decisions by simply making take-it-or-leave-it offers to targeted parcels;
- (2) Costs and benefits of environmental services vary little across potential participants, so a fixed price could be set and offered to anyone providing the environmental service;
- (3) The market has too few buyers and sellers for effective competition within an auction environment (e.g., when only a handful of landowners meet program qualifications);

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- (4) Cost-effectiveness is one of several potentially conflicting design criteria; considerations such as income support or broad geographic distribution of participants may be as important.

In these cases, auctions may be no better than administratively simpler approaches, such as offering a single price to anyone wishing to sell or negotiating a seller-specific price. Furthermore, if farmers would have adopted good stewardship practices without financial assistance, any payment mechanism that deters voluntary action can be counterproductive.

When designing a conservation auction, the details matter. Decisions on how to elicit offers, the choice of criteria used for ranking and selecting offers, and the amount of information that will be provided—all of these can affect the auction's performance. Such design elements can also affect who chooses to participate in the auction, how competitive their submitted bids will be, and whether their offers are accepted. All of these outcomes will also influence an auction's cost-effectiveness.

The auction mechanism used in the CRP's general signups, responsible for most of the land enrolled in the program, is a good example. The CRP uses a parcel-specific *Soil Rental Rate* (SRR)—an estimate of the parcel's agricultural rental value—to determine the parcel's maximum acceptable bid, or *bid cap*. While intended to prevent excessive landowner profits, bid caps can have negative consequences. The bid cap is essentially an estimate of the minimum price a seller would accept and still participate in an auction. If the bid cap is less than a seller's true cost of program participation, however, the seller will not make an offer. If dissuaded landowners have eligible parcels with low agricultural value and high environmental benefits, an under-estimated bid cap can lead to higher overall program costs. Bid caps can also discourage landowners from incorporating conservation practices that improve the quality of their offers—even though such improvements are valued highly by the conservation program.

Other types of auctions could do more to limit costs and improve performance. For example, both *quota auctions* and *reference-price auctions* could be implemented with the information currently used by the CRP (the SRR), but neither imposes a bid cap. Quota auctions group similar participants together, and a fraction of the least competitive offers from each group is rejected to induce competition among low-cost participants. This approach requires accepting some higher cost participants into the program, but may be worthwhile if it increases participation and competition among low-cost participants, improving the overall cost-effectiveness of the program. Reference-price auctions assign an estimate of value—a reference price—to each parcel of land. Bids are ranked relative to the reference price—in the CRP example, the reference price could be the SRR. Sellers are penalized if their bids exceed USDA's expectations, but they are not prevented from submitting any bid they wish. Since all bids are considered relative to their SRR, offers with exceptionally high environmental benefits could be accepted even if their bid exceeds their SRR. This could result in improved program cost-effectiveness by both increasing competition among low-cost sellers and increasing the program's overall environmental benefits. While improved performance is not guaranteed, laboratory experiments show that these alternatives can reduce costs up to 18 percent using a reference-price auction, and up to 14 percent using a quota auction.

How Was the Study Conducted?

A literature review highlights the basics of auction theory and design, the advantages and disadvantages of auctions, the different kinds of auction mechanisms that conservation programs could use, and factors to consider when designing an auction. The auction mechanism used by the CRP is examined in some detail, focusing on the impacts of the bid cap. Using actual offers in the CRP's general signup, the limitations and drawbacks of the imposition of bid caps are explored, focusing on how bid caps can dissuade potential participants or the installation of conservation practices that improve the environmental quality of offers. Alternative auction mechanisms are investigated via economic experiments performed in classroom laboratories. These experiments mimic the design of conservation programs to test the potential impacts of alternative auction mechanisms. Regression analyses of experimental results, as well as a numerical simulation model, demonstrate the size of potential gains.