Pro's and Con's of a reverse-auction to evaluate conservation easements.

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Introduction: Governmental and non-governmental conservation entities (easement purchasers) and private landowners (easement sellers) are challenged to determine "just compensation" in conservation easement markets. Easement purchasers desire to minimize costs while ensuring that selected parcels yield high environmental and other amenity values into the future. Easement sellers need an expected value of compensation for planning purposes to decide if the compensation off-sets the expected losses from restrictions on land use (possible impacts on direct-uses and on lower resale land values). Taking the difference in the parcel's current fair market value (FMV) of land and its' FMV post-easement (encumbered) gives some idea of an appropriate level of "just compensation". Uncertainty in the future makes estimation of the post-easement value difficult at the time of easement purchase and necessitates an alternative means to arrive at a level of "just compensation".

A Program Example from NRCS: Legislative statue instructs the Natural Resources Conservation Service (NRCS) of the United States Department of Agriculture (USDA) to accept the lowest of three different compensation options provided to landowners interested in enrolling in the Grassland Reserve Program (GRP) and Wetlands Reserve Program (WRP). These three options are: (1) an area-wide market analysis (AWMA) -- or in the case where there is insufficient number of sales to conduct an AWMA, a land appraisal of the actual property being considered for the easement; (2) a geographic area rate cap (GARC) calculated by NRCS; or (3) an offer by the landowner. The GARC is usually below the FMV and higher than the landowner offer and thus is the transaction value in most easement acquisitions in these programs.

An alternative cost-effective option: One possible solution to the easement selection and valuation problem is the use of a reverse-auction (RA) mechanism. RAs act much the same as a regular English auction, but in the case of a RA, bids decline with bidding, as opposed to bidding ascending. Current legislation restricts RA mechanisms in many commodity and conservation programs, but future Farm Bill could authorize their use in easement purchases and, possibly, in working land programs as well. Past experience in USDA with using a bid-down mechanism in the Conservation Reserve Program (CRP) and in application ranking in NRCS' Environmental Quality Incentives Program (EQIP) suggests the program savings could be significant (1). There are other agricultural and non-agricultural-related examples of bidding mechanisms in the United States and outside its borders, including Australia and Canada (4, 5). Recently and directly related to the WRP, NRCS employed a RA mechanism in a WRP pilot program in 2006 and 2007 to select applicants and easements and determine final easement compensation (2). In the pilot, the easement compensation was based on a second – and final - bid offering by each applicant expressed as an environmental benefit index (EBI). First, an initial EBI was calculated by dividing the applicant's initial bid by their points scored on an environmental self assessment (ESA) of the parcel being considered for enrollment ($ bid/ESA Points). All applicants' initial EBIs were calculated and ranked from lowest to highest. Each applicant is given general information on their relative EBI ranking (while not divulging their own or others' actual ESA or initial bid information) and were

allowed to resubmit a second bid to improve their relative ranking to be considered for program participation. Offering a *lower* second bid was the only way that applicants could improve their initial EBI ranking. Results of the pilot showed that the lower second bids as compared with the initial bids multiplied by the associated easement acreage reduced program costs by over $820,000. This program cost reduction represented a 14 percent "savings" for the pilot in FY 2006 (3).

Objectives of this paper: This paper explores some of the advantages and disadvantages of using a RA mechanism in an easement program. The first part of this paper explores some of its advantages: the main one being the RA's ability to self-select the most advantageous parcels for program consideration. Significant effort is devoted to discuss this core advantage because, if constructed and implemented properly, this advantage can produce two "by-products": it can, both, lower administrative costs and easement acquisition costs. If realized, this could produce "program savings" that could be used for other purposes, such as bringing more easements into the program, increasing monitoring, management and evaluation of existing easements, enabling greater outreach efforts and personnel training and expanding a host of other easement-related activities. The advantages brought about by a RA mechanism in easement valuation come at a cost associated with its potential disadvantages. The next section discusses some of these potential disadvantages, including: perceived equity problems across applicants; less certain information on likely easement compensation payment levels for prospective easement sellers (compared to present methods); and perceived higher transaction costs (compared to present methods); the need to develop environmental assessment tools to estimate the expected environmental outcomes from placing an easement on the prospective parcel. The paper concludes by offering some possible solutions to these disadvantages and offering some insights into policy issues that may arise if a RA mechanism is incorporated into conservation programs, whether they are easement or working lands programs.

Advantages: Past experiences with a RA mechanism suggest that they can act in an analogous way as competitive bidding does for construction projects – if the outcome can be well defined, bidders can inform others on their respective ability to perform the needed tasks most cost-effectively and be selected accordingly. As discussed above for conservation easements, the RA mechanism can assist program managers select, rank, and compensate prospective program participants by their ability to provide the most environmental benefits per dollar of easement funding expended. This outcome does not necessarily produce the *lowest total cost outcome* for the most enrolled acreage, but does guarantee that the *highest total environmental outcome for the amount of program funding available*. The bidding process, in conjunction with EBI rankings, should reject projects that fail to yield adequate environmental outcomes to offset their costs – regardless if costs are high or low – because each bid takes into account its' associated expected environmental outcome. Thus, the most important advantage of a RA mechanism, in implemented properly, is that it self-selects the most advantageous easements with respect to maximizing environmental benefits per dollar of program outlay. The attributes of a RA that produce these results are described in Appendix A.

The first advantage is tremendously powerful and can yield two important co-benefits: First, the efficiency of the RA mechanism to select, rank, and compensate program applicants can lead to administrative costs reductions. Secondly, the RA mechanism, through its selection process to detect the most cost-effective parcels, can lower easement acquisition costs as compared to traditional approaches (such as the current administered pricing model or simple offer prices by landowners). Program "savings" generated through lower administrative costs and lower financial assistance costs associated with easement purchases (assuming that competitive bids are lower on average than administrative purchase prices) effectively produces additional financial resources to purchase additional easements or be directed towards other easement-related activities[1]. For example, any resulting reduced program "savings" could be used to develop improved easement assessment tools to monitor and evaluate prospective easement parcels or to manage existing enrolled easement acreage. As will be discussed below, program funding "savings" could be viewed as a "disadvantage" if program funding to area offices are based on the monetary size of easement acquisition costs and not actual easement acreage workloads.

A third advantage of a RA mechanism is that results related to applicants' eventual EBI can provide valuable insight into the transaction value where landowners' willingness-to-accept (WTA) financial compensation to provide environmental goods and services to society equates with society's willingness-to-pay (WTP)[2]. Such WTA and WTP values give policy makers some idea of the value that producers and society place on these easement programs and their expected outcomes.

In summary, the main advantage of incorporating a RA mechanism in an easement valuation process is greater price discovery (relative to the current method of administered pricing and offers) which should lead to higher quality easements, lower easement program administration and acquisition costs, and greater insights into a monetary estimate of the easement's value to society (Table 1). These advantages, if realized, should address serious concerns sometimes raised with easement payments, including: (1) is the easement purchaser paying too much for easements? and (2) is the easement purchaser attaining the highest level of benefits possible while keeping within its funding budget as outlined in program objectives?

Table 1. Possible Advantages of Reverse Auction Mechanism in Easement Valuation Process.	
Advantage	Evident when:
I. Potential to self-select highest environmental producing parcels	
Parcels offered and enrolled in the program are superior environmental performing parcels.	Compare the environmental scores of parcels selected into the program with scores of parcels that were not selected (total, per

[1] RA mechanisms in easement programs could possibly work more smoothly than with working lands programs because producers' EBIs in working lands programs could be much more difficult to measure given the range of proposed suites of practices per applicant. In effect, each prospective participant in a working lands program could submit multiple "bids" for each type of conservation activity that they would like program personnel to consider.

[2] CES would need to be adjusted for the land's underlying agricultural production capability and other factors particular to the parcel of land being offered as a candidate for program participation.

	acre, and per program dollar).
II. Potential to lower program costs	
Lower program delivery costs.	Compare average total program cost per acre in previous years with program cost using RA (on a similar quality and program cost basis).
Lower financial assistance per easement.	Compare initial and second bid levels on enrolled acreage and their FA costs.
III. Information on participants WTA and society's WTP for easement activities	
Easement compensation rates indicate the value that participants are willing to accept to place easements on their land and society is willing to pay for easement activities.	Compare implied WTA and WTP estimates with programs with a RA mechanism with estimates from past studies (should support the claim that program results suggest that environmental benefits to society at-large have been cost-effective and produce valuable environmental outcomes).

Disadvantages (and possible remedies): There are several potential problems of RA mechanisms, including those related to perception and successful program operation. The use of RAs can be perceived by some individuals as raising significant equity concerns. These individuals acknowledge that RA's could be a viable means to increase program efficiency and cost, but at the expense of excluding applicants who may be unable to "bid down" in such a program. This result would be evident if RAs cause program participation to be dominated by individuals with the "financial where-with-all" to lower their bids. Related to this concern, some individuals fear that RAs could create "bidding wars" between neighbors competing for entry into the program. One possible solution to these potential problems is to set up a number of applicant pools depending on their wealth status so as not to discriminate against "limited means applicants" to compete by bidding down. Also, program managers could allocate additional points to "limited means applicants" to raise their scores (and be justified on the grounds that social objectives need to be included along with environmental benefits). The possibility of "bidding wars" could be relieved through educational outreach to convince applicants that the bidding system is "not about them", but about their parcels' ability to generate expected environmental outcomes. It should be kept in mind that "financial where-with-all" may not be a dominant factor in cases where "limited means applicants" can offset any financial disadvantages with high environmental benefits.

A second issue that could arise with a RA mechanism (as opposed to an administrative pricing system) is that program delivery could be perceived as too complicated and uncertain by prospective easement sellers[3]. This perception could be reduced through the use of transparent information technology along with out-reach efforts to educate landowners on the value of auctions. The uncertainty of the eventual transaction price for the easement by moving to a RA mechanism as opposed to the current system is a valid concern for prospective easement sellers and program implementers and seems to be an unavoidable product of a bidding system. Provision of historical easement purchase prices could relieve some of this easement compensation uncertainty.

Success of a RA program would depend heavily on the ability to assess the expected environmental outcomes of each prospective easement offering and a willing set of

[3] Actually, this problem could be a problem for easement purchasers (who have traditionally relied on administered pricing or an individual appraisal to assess the fair market value of the easement).

landowners competing for program acceptance. A key advantage of the RA discussed above is that it judges each easement by their marginal benefit per program dollar. Without a sound assessment tool (and representative environmental indicators), the RA mechanism could be rendered useless. One way to handle this potential problem is to arrange potential applicant pools that are in a fairly homogeneous habitat area. In a fairly homogeneous habitat area, the assessment tool would simply need to capture the main differences in parcels and inform program managers of "low-hanging fruit" to consider.

A potentially serious disadvantage could occur in cases where areas do not have a sufficiently high level of interest in the program. In these situations, it is possible that every prospective easement seller could enter into the program regardless of their bid. In such cases, they may perceive that they do not need to reveal their "true" WTA. However, it should be kept in mind that this problem would exist regardless of the pricing system – the current administrative pricing system or one with a RA. In any case, the use of a sound assessment tool could provide easement purchasers, such as NRCS, with a better idea of the magnitude of potential environmental benefits that they would be willing to pay, given comparisons from other regions or past easement acquisitions in the area.

The perception of RAs producing higher transaction costs could dissipate after some experience is gained through program implementation. Adopting electronic trading schemes and other information technology systems, as applied to other auction settings, have shown that RAs have the potential to lower – not raise – transaction costs in most markets.

A final issue is if program managers view lower easement administration and acquisition costs as a problem, and not an advantage. Many successful conservation programs are judged – to some extent – by how well they are received by landowners. Policy makers may view increasing funding levels over time as evidence of such acceptance. If programs allocate program administration funding as a percentage of the program's easement acquisition costs, RA could, in effect, lower the monies available to program managers to administer the program. If "program savings" are devoted to additional easement purchasers, this effect could mean lower program funding to service the same or greater amounts of easement transactions and acreage. In such cases, any cost savings penalize those interested in pursuing RAs by potentially reducing program administration funding – a perverse and undesirable result.

In summary, there are a range of potential disadvantages of incorporating a RA mechanism in an easement valuation process, including raising equity and participant concerns; creating uncertainty in compensation for applicants; increasing the need to better assess expected environmental outcomes; and, dealing with possible institutional rigidities (Table 2).

Table 2. Possible Disadvantages of Reverse Auction Mechanism in Easement Valuation Process.

Disadvantage	Evident when:	Possible remedy
I. Equity-Fairness Issues		
A. Are all applicants being treated	Transactions dominated by only	Establish individual ranking pools by

the same regardless of financial status?	high-wealth individuals.	wealth status.
B. Are applicants comfortable with bidding?	Complaints and conflicts are common in trading areas.	Education and provision of information on the functions of auctions.
II. Program Administration Issues		
A. Can the prospective easements be adequately assessed with respect to its potential environmental benefit?	Inconsistent and inaccurate environmental assessments across regions and with respect to expectations of technical judgment.	Development of environmental assessment tools that addresses regional-specific resource concerns and issues.
B. Does the RA provide easement compensation certainty to prospective participants?	Dissatisfaction and frustration of easement sellers with problems with planning and financing.	May not be possible to provide a remedy to this short-coming.
C. Does the RA mechanism add unnecessary costs to easement acquisitions?	High transaction costs are widespread.	Inquire about improved RA information platforms.
III. Issues related to easement purchaser internal program funding rigidities		
A. Do easement acquisition cost reductions due to the RA mechanism reduce monies available for technical assistance?	Lower program funding with the same or more easements strain program administration and management.	Allocate amount of technical assistance funding on a per-acre basis, rather than as a percent of easement acquisition costs.

Conclusions and Implications: Incorporating a RA into conservation programs may seem like a "no brainer" to most economists. The economic literature suggests that the greatest gain from moving to programs with a RA mechanism is its ability to select, rank, and valuate easements according to their ability to produce the highest environmental outcomes for any given level of program funding. However, policy makers and conservation easement program managers would be faced with significant implementation issues and legitimate concerns with respect to landowners' acceptance and legislative intent. Some legislative changes for many of these programs would probably be needed to more fully accept competitive bidding in program design. Much effort would be needed to construct a suitable design of a program to deal with: the type of assessment tool needed and selection of environmental indicators, geographic and equity considerations of applicant pools (should applicant pools be smaller or larger than 8-11 digit hydrologic units?), and possible landowners' dissatisfaction with a "new" easement valuation method. This discussion, whether RAs' advantages outweigh its disadvantages or not, brings into focus the need to better assess the expected environmental benefits of conservation programs regardless of the compensation method employed.

References:

(1) USDA, Economic Research Service, Economic Brief Number 3, “Participant Bidding Enhances Cost Effectiveness”, Robert Johansson, March 2006.
(2) USDA, NRCS News Release, “NRCS Announces Signup for Wetlands Reserve Program Reverse Auction”. ; announced June 30, 2006.
(3) USDA, NRCS News Release, “Reverse Auction Saves Wetlands and Money”. ; announced November 2, 2006.
(4) CSIRO Land and Water Client Report, “Catchment Care – Development an Auction Process for Biodiversity and Water Quality Gains, A Market-Based Instrument Pilot Project”, Brett Bryan, Steve Gatti, Jeff Connor, Michael Garrod and Darran King, July 2005.
(5) Canadian Pork Council, “Hog Farm Transition Program”, 2009.

Appendix A: Reverse Auctions in a Linear Programming Context

Consider a hypothetical situation where there are 100 landowners, each having 10 acres of land that they would like to enroll in WRP. The land parcels of 50 landowners have the potential to deliver 10 environmental benefits and the other 50 landowners with the potential to deliver 9 (10 percent less). The land in the first group of landowners is termed "high environmental potential" or "HEP" and the latter group will be termed "LEP" for "low environmental potential". In addition, 50 landowners plan to bid $10 per contract and the other 50 landowners, $9 per contract (10 percent less). The first set of these landowners are termed "high bidders" ("HB") and the latter group, termed "LB", "low bidders". Assuming two equal probability distributions for each characteristic, our group of landowners will break into the following groups and numbers: 25 landowners will be HEP/HB; 25 as HEP/LB; 25 as LEP/HB; and 25 as LEP/LB.

A simple linear programming model was created with the above specifications. The LP runs were made with three objective functions: (1) minimize total cost; (2) maximize environmental benefits by raw score; and, (3) minimize EBI score. When the acreage target is set at 500 acres (only one-half of the landowners) the model must exclude some landowners based on (1) cost, (2) benefits and (3) a combination of the two. Using criteria in (1), the model selects landowners that are low bidders, regardless of the quality of their land to provide environmental (Table 1). Likewise when the objective function searches to maximize the total number of environmental points, it selects the highest yielding parcels regardless of program cost. When the objective function is set to select parcels associated with lowest EBI scores, it considers both cost and environmental benefits (Table 3). All solutions have an EBI value close to $0.95 per environmental point. The results of this simple model seem obvious, but however the model is powerful when the objective function is constrained by a limited number of participants or when the distribution of characteristics vary greatly across potential participants. This will be discussed in the presentation, but just consider the results in Table 4 when the number of participants are constrained to 30 individuals (Table 4). In these scenarios, the over-all EBI value of the optimum solution varies from $0.97, $0.94, and $0.92 per environmental point, respectively for the minimization of cost, maximization of total environmental benefits, and select participants by lowest EBI score.

Table 3. Linear Programming Results of Equally Distributed Characteristics in Participants with non-binding total participant constraint in place.

Objective Function used in model	Program Costs	Enviro. Score	Types of Applicants 1/				Total Participants
			LEP/LB	HEP/LB	LEP/HB	HEP/HB	
	000s $	Points					
Minimize Cost	$450	475	25	25	0	0	50
Maximize by raw score	$475	500	0	25	0	25	50
Maximize by EBI score	$461.67	486.67	13.333	25	0	11.667	50
1/ Key: LEP/LB= low environmental potential and low bidder, respectively for HEP/LB. LEP/HB, LEP/HB.							

Table 4. Linear Programming Results of Equally Distributed Characteristics in Participants with a binding total participant constraint in place (30).

Objective Function used in model	Program Costs	Enviro. Score	Types of Applicants 1/				Total Participants
			LEP/LB	HEP/LB	LEP/HB	HEP/HB	
	000s $	Points					
Minimize Cost	$270	277.5	22.5	7.5	0	0	30
Maximize by raw score	$282	300	0	18.75	0	11.25	30
Maximize by EBI score	$275	300	0	25	0	5	30

1/ Key: LEP/LB= low environmental potential and low bidder, respectively for HEP/LB. LEP/HB, LEP/HB.