COMPETITIVE BIDDING FOR CONSERVATION ASSISTANCE

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Federal conservation programs provide technical and financial assistance to farmers who install eligible soil and water conservation practices. The current program has been criticized for not directing federal assistance to areas of greatest need and for being socially inefficient. Critics point out that from 1975 to 1978, about one-half of the conservation practices receiving cost-sharing funds from ASCS were used on lands where sheet and rill erosion was less than 5 TAY (USDA). Tice and Epplin found that cost-sharing payments for conservation tillage in Oklahoma resulted in a windfall gain to farmers (loss to society) of $10.73 per acre. Prato found that cost sharing of eligible conservation pratices in an eastern Washington watershed would reduce social benefits between $4.26 and $9.92 per ton of erosion reduction.1

In an effort to improve the cost effectiveness of conservation programs, federal agencies have targeted conservation

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1. Social benefits equal the net social returns per acre with the conservation practice minus the net social returns per acre without the conservation practice, plus the offsite benefits of erosion control. Net social returns per acre in the Prato study were calculated using a real public discount rate of 4% and a planning horizon of 20 years.

assistance to critical watersheds and have experimented with variable cost sharing. Nielson and Park and Sawyer (1985) found that targeted areas have experienced greater erosion reduction at lower cost than non-targeted areas. Park and Sawyer (1984) concluded that variable cost sharing was 30% more cost effective than uniform cost sharing. With reduced federal support for soil conservation, there is a need to improve the efficiency of federal assistance programs. One possibility is to require farmers to bid competitively for financial and technical assistance.

This paper explores the use of competitive bidding to allocate federal conservation assistance to farmers. It is divided into four sections. Section I examines competitive bidding for energy mineral leases and identifies major factors that should be considered in designing a competitive bidding system for conservation assistance. Section II explains the economic rationale for providing federal conservation assistance to farmers and the selection of a bid variable and bid acceptance procedure. Section III discusses several factors affecting bid levels. Section IV contains conclusions.

I. Insights From Energy Mineral Leasing

Competitive bidding is used to lease the exploration and development rights on federal energy lands and more recently to determine the annual rental payments to farmers who participate in the Conservation Reserve Program (CRP). There are several important physical and economic differences between competitive bidding for energy minerals and conservation assistance.

First, energy companies have the exploration and development capital, but lack sufficient land for exploration. A competitive bidding system is used to insure that the public receives a fair market value for mineral leases (Kalter and Tyner). Competitive bidding for conservation assistance would involve a very different set of circumstances. Farmers own the land but either lack the capital needed to invest in conservation practices or are unwilling to invest in these practices because they yield lower rates of return than other investments. The government is willing to pay farmers to adopt soil conservation practices and can minimize the public cost of achieving an increase in social benefits due to erosion reduction by requiring farmers to bid for financial assistance.

Second, since energy companies generally bid against one another for the exploration and development rights on a particular tract of land, the bids can be directly compared to one another when determining which bids to accept. Since farmers would be bidding on parcels having different soil, climatic and cropping characteristics, the same practices on different parcels could have different social benefits. To account for these differences, bids should be evaluated in terms of the increase in social benefits achieved by the conservation practices associated with the bid.

Third, most energy companies have a staff which is responsible for energy exploration and lease bidding. In contrast, farmers have very limited experience with competitive bidding for conservation assistance. In order to formulate intelligent bids, farmers would have to know ahead of time how much erosion reduction can be achieved with various conservation practices, the cost of these practices and the procedure used to accept bids.

II. Public Involvement in Erosion Control and Bid Acceptance

The choice of a bid variable and bid acceptance procedure should be based on the socially optimal amount of erosion reduction. This optimum is illustrated in Figure 1. The top curve depicts the social benefits per ton of erosion reduction. Social benefits rise faster than private benefits and reach a maximum at a higher level of erosion reduction (B) for two reasons. First, social benefits are usually calculated using a lower discount rate and a longer planning horizon than for private benefits. Second, social benefits include the offsite benefits of erosion reduction which farmers do not consider in deciding which conservation practices to apply. Offsite benefits of erosion reduction can exceed on-farm benefits (Clark et al., Thomas).

The bottom curve shows the annual net returns per acre to the farmer as erosion is reduced. When conservation practices are not used, there is zero erosion reduction. As conservation practices are applied to a parcel of land, net returns per acre often increase because the decrease in production costs exceeds the decrease in gross returns per acre. This is quite common with minimum tillage practices. Beyond some level of practice application (point A), net returns per acre decrease because more expensive conservation practices such as terracing have to be utilized. A rational farmer would reduce erosion to A provided capital is available and risk is not a major consideration.

What are the socially optimal levels of erosion control and financial assistance? Figure 1 shows that the optimal level of erosion control for society exceeds the optimal level for the farmer (B > A). Therefore, it is in the public interest to provide farmers with financial incentives to attain point B. Since it is profitable for a farmer to reduce erosion up to A, subsidizing farmers to adopt conservation practices is not justified below A. This viewpoint is somewhat simplistic because it ignores financial limitations and risk considerations that could prevent or discourage a farmer from reaching A.

When public funds are limited, it may not be possible to achieve point B. In this case, the appropriate criterion is to maximize the social benefits per dollar of federal assistance or social efficiency. To maximize social efficiency, federal financial assistance for conservation should not exceed the minimum subsidy required by farmers for adoption. This minimum equals the present value loss in net returns per acre for erosion reduction beyond A.

An example consisting of three cases is used to illustrate how alternative assumptions regarding social benefits per ton of erosion reduction affect the bid acceptance decision. For simplicity, the example considers two bids for different parcels of land. Bid 1 is for $10/acre and bid 2 is for $15/acre. The conservation practices associated with bid 1 reduce erosion by 2 tons per acre per year (TAY) and those associated with bid 2 reduce erosion by 5 TAY.

In the first case, the per acre differences in erosion reduction are ignored. Under these conditions, social efficiency would be maximized by accepting bid 1 and rejecting bid 2, or more generally, by accepting bids from lowest to highest.

In the second case, the information regarding erosion reduction is used in evaluating bids. Social benefits per ton of erosion reduction are assumed to be the same for both bids. Public cost per ton of erosion reduction is $5 for bid 1 and $3 for bid 2. Social efficiency would be maximized by accepting bid 2 and rejecting bid 1. This decision is the opposite of the one made for case 1.

Cases 1 and 2 illustrate a potential deficiency in the bid evaluation procedure used in the first round of the CRP program. Specifically, bids having the lowest annual rental per acre were accepted instead of bids having the lowest rental payment per ton of erosion reduction. Hopefully, this deficiency of the CRP program will be rectified in future bidding sessions.

In the third case, there is known to be a significant and measurable difference in social benefits per ton of erosion reduction for the two bids. Social benefits per ton of erosion reduction are $12 per ton for bid 1 and $5 per ton for bid 2. Differences in social benefits can occur for several reasons. For example, the land associated with bid 1 may have less topsoil than the land associated with bid 2.

Based on this new information, bid 1 should be accepted because it results in greater social efficiency than bid 2

($2.40/acre vs. $1.67/acre). Therefore, if social benefits per ton of erosion reduction are different (case 3), then accepting bids having the lowest cost per ton of erosion reduction (case 2) can be socially inefficient. Since social benefits are likely to vary from one bid to another, differences in social benefits should be considered when evaluating bids.

If the curves in Figure 1 could be measured for all conservation practices and soil-climatic conditions, it would be possible to determine both the socially optimal levels of erosion reduction and the bids which maximize social efficiency. Unfortunately, social benefits, which are used to determine social efficiency, are difficult to measure because they depend on the relationship between yield and topsoil erosion as well as the offsite impacts of soil erosion. While significant progress has been made in estimating erosion-related soil productivity losses with models such as EPIC, it is not pratical to use these models in bid evaluation. Even less is known about the offsite economic benefits of reducing soil erosion in specific watersheds.

Since there is insufficient information to estimate the social benefits of erosion reduction, it is proposed that these benefits be represented by an index which approximates the increase in social benefits from erosion reduction. This index would vary with soil, climatic and cropping conditions at each location and the offsite benefits of erosion reduction. It can be established by a panel of experts using a Delphi approach. The bid is then divided by the index to obtain the per acre cost of erosion reduction per unit increase in social benefits.

Using the earlier example, suppose that the index increases 70% for bid 1 and 30% for bid 2. The adjusted bids are $14.29 per acre for bid 1 ($10/0.7) and $50 per acre for bid 2 ($15/0.3). Since the adjusted bids are essentially a cost-benefit ratio, the bid acceptance criterion is to accept the lowest adjusted bid. Hence bid 1 is accepted and bid 2 is rejected. The amount of financial assistance given to farmers is simply the raw bid.

III. Bid Determination

Since farmers attempt to maximize profits, the higher the bid, the greater their profit, provided the bid is accepted. The minimum bid the farmer can make equals the present value loss in net returns per acre from adopting conservation practices. Since the proposed bid acceptance procedure accepts adjusted bids from lowest to highest, submitting too high a bid lowers the probability that a farmer's bid is accepted.

Overbidding can occur for several reasons. First, if the use of conservation practices increases production risk, then a farmer might add a risk premium to the minimum bid to offset the higher risk. One way to reduce overbidding due to risk is for the Soil Conservation Service to provide farmers with technical assistance in applying conservation practices.

Second, if farmers are unable to finance the capital required to install conservation practices, then bids may exceed the minimum level. Third, inexperience with bidding for conservation assistance can cause farmers to inflate their bids. This factor was amply demonstrated in the first-round bidding for the CRP.

Bidding competition is another factor which affects the bid levels as well as the public cost of reducing erosion. When bidding competition is low, bids tend to be higher and the public cost of erosion control increases. For this reason, it is important to maintain adequate bidding competition.

IV. Conclusions

Competitive bidding has been successfully used to lease the mineral exploration and development rights on public lands and more recently to determine annual rental payments for lands in the CRP. Use of a competitive bidding system to allocate federal conservation assistance to farmers has certain advantages and disadvantages.

There are two major advantages. First, federal conservation assistance is allocated to farmers in a manner that maximizes social efficiency. Second, the allocation of conservation assistance is not based on cost-sharing schemes which have been shown to be socially inefficient.

There are three major disadvantages. First, the government has to develop an index that measures the increase in social benefits from erosion reduction. Second, initial administrative costs for establishing a conservation bidding system could be substantial, although some of this cost has already been incurred with the CRP. Third, bidding participation may be low at the outset, particularly if farmers can obtain financial assistance for conservation practices through non-bidding programs such as cost sharing.

Since competitive bidding for conservation assistance is considerably different from the current cost-sharing system and there are many ways of implementing a competitive bidding system, it would be worthwile to initiate a pilot program to test its feasibility and effectiveness. Results from this test would be useful in evaluating the efficacy of competitive bidding for conservation assistance.

References

Clark, Edwin H., Jennifer A. Havercamp and William Chapman. Eroding Soils: The Off-Farm Impacts. The Conservation Foundation. Washington, D.C. 1985.

Kalter, Robert J. and Wallace E. Tyner. "Energy Policy for Energy Resources in the Public Domain." In Supply and Government Policy, Robert J. Kalter and William Vogeley (eds.). Cornell University Press, Ithaca, 1976.

Nielson, James. "Conservation Targeting, Success or Failure." Journal of Soil and Water Conservation. 40(March-April 1986):70-76.

Park, William M. and David G. Sawyer. "Cost Sharing and Cost-Effective Soil Erosion Control Policy." Paper presented at the AAEA Conference, Cornell University, Ithaca, New York. July 1984.

Park, William M. and David G. Sawyer. "Targeting Soil Erosion Control Efforts in a Critical Watershed." ERS Staff Report No. AGES850801. Natural Resource Economics Division, U.S. Department of Agriculture. Washington, D.C. December 1985.

Prato, Anthony A. "Efficient Allocation of Federal Assistance to Soil Conservation Practices." Paper presented at the Southwestern Economic Association meetings, San Antonio, Texas. March 19-22, 1986.

Thomas, Howard R. "Off-site Values: An Economic Perspective." Paper presented at: Off-site Impacts of Eroding Soils: A Regional Perspective on a National Problem. Conference sponsored by The American Water Resources Association (Washington section) and the State of Washington Water Resources Center, Pullman, WA., May 30, 1986.

Tice, Thomas and Francis M. Epplin. "Cost-sharing to Promote Conservation Tillage." Journal of Soil and Water Conservation. 39(Nov.-Dec 1984):395-397

U.S. Department of Agriculture, Agricultural Stabilization and Conservation Service. National Summary Evaluation of the Agricultural Conservation Program, Phase I. Washington, D.C. 1981.

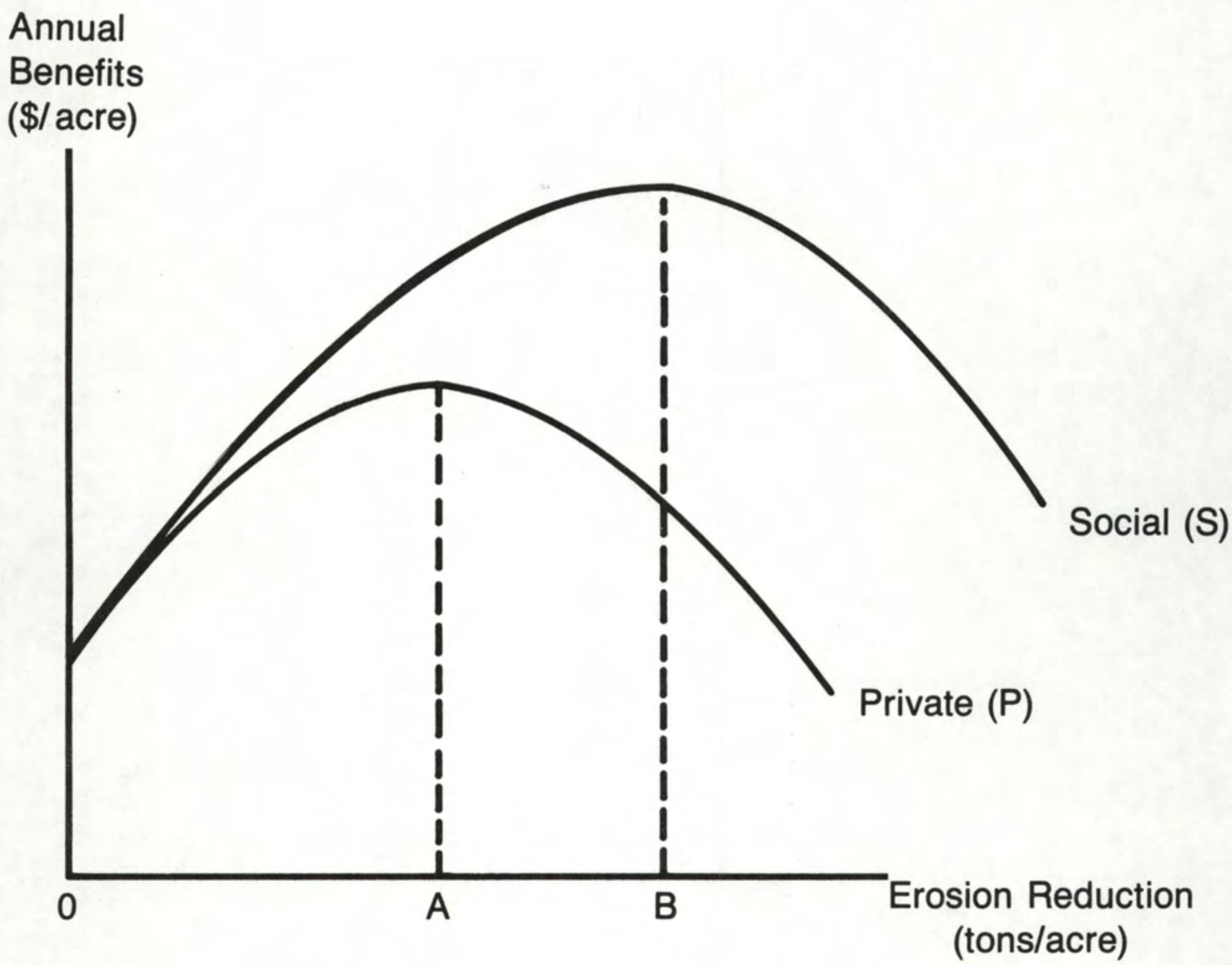

Figure 1. Private and Social Benefits of Erosion Reduction.