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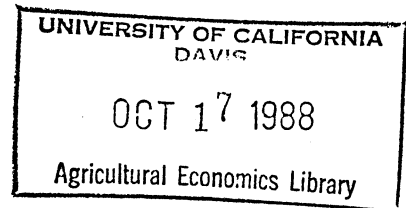
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*The Conservation Reserve Program,  
Land Values,  
and  
Asymmetric Information*

by

Robbin Shoemaker

Resource and Technology Division  
Economic Research Service  
U.S. Department of Agriculture  
Washington, D.C.

September 12, 1988

*Paper to be presented at the American Agricultural Economics Association  
Meetings, Knoxville, Tennessee, 1988*

Land

*The Conservation Reserve Program, Land Values,  
and Asymmetric Information*

*Abstract*

*Asymmetric information and learning contribute a significant impact on the value of enrolled land. In some regions values may have increased as much as \$130 per acre with nationwide averages of \$65 per acre. For the average value of all U.S. farmland the program may have offset an 8.5% decline in land values for 1986-87 by 0.5 percentage resulting in a measured decline of 8% for the year.*

## *Introduction*

*The Conservation Reserve Program's (CRP) primary objective is to reduce the erosion of fragile land. The CRP may also increase farm income by providing contract rents that induce participation and by reducing acreage thus contributing to supply control. The direct net impact on net income is the CRP payment less the farmer share of establishing cover on the land and the lost returns from taking the acreage out of production.*

*It has long been recognized that farm program payments tied to production are capitalized into land values (for example, Herdt and Cochrane; Floyd). Traditional price support programs designed to increase income have this effect because they increase returns to land due to its relative inelasticity of supply. Alternatively, with presumed inelastic demand for agricultural products, limiting production will also tend to increase farm income. With the existing target price program, however, supply control need not increase income because increases in the market price for crops is partially offset by reductions in deficiency payments. But, because existing supply control programs are voluntary, for producers to participate in the program, the payment must be more economically attractive than producing on the acreage, then programs will increase income and the gains will tend to be capitalized into land values.*

*As with target price and acreage reduction programs, the impact of the CRP on land values depends on the net effect on expected farm income and returns to land. That is, how big is the increase in land returns over the next best alternative and how long will it persist? While the effect of the CRP on land values can be viewed solely through the impact on returns to land, decomposing the effect into two components provides an empirical*

approach to determining the effects of the CRP on land values in general and the effects on the new classes of land created by the program, eligible and enrolled acres. The first, direct effect of the CRP on eligible and enrolled acres occurs if CRP rents paid to induce participation significantly exceed private market rents. The second, indirect effects are due to the supply control aspects of the CRP and affects all land values and the impact on local (county) land markets that enroll a high proportion of cropland. The emphasis of this paper is on the direct effect with a brief discussion of the others. The approach taken to evaluate the direct effect uses available data on bids to determine the extent excess CRP rent payments are capitalized into the price of land. We then decompose the actual change in all land values to indicate what role the CRP has played.

#### **The CRP, Program Implementation, and Agricultural land Markets**

The CRP offers farmers who agree to retire their highly erodible cropland for ten years, an annual rental payment and one-half the cost of establishing a permanent cover. Congress established enrollment goals of 5, 15, 25, 35, and 40-45 million acres for the fiscal years, 1986 through 1990 respectively. To participate in the CRP, producers must submit an offer during a designated sign-up period. The offer contains the amount of eligible cropland the producer wishes to enroll and the annual rental rate he requires for this purpose. Grazing or harvesting of forage or any other commercial activity is not permitted for the duration of the CRP contract unless specifically allowed by the Secretary of Agriculture. Also, the cropland base and allotment history for the farm will be reduced by the ratio of the land retired to total cropland acreage (Dicks, et. al., 1986).

Five sign-up periods during 1986 and 1987 have enrolled some 22 million acres. Approximately 2 million were enrolled in the 1986 crop year, 13 million more were enrolled during the 1987 crop year and roughly 7 million have been enrolled for the 1988 crop year.

Implementation of the program utilizes three instruments, eligibility criteria, pool size, and bid-caps<sup>1</sup>. Eligibility is determined by an erodibility index (EI) which indicates the inherent erodibility characteristics of a soil relative to its natural rate of regeneration and a level of soil loss tolerance. Pools are collections of counties with homogeneous characteristics which determines the amount of land eligible for a specific geographic area. CRP participation within a county is limited to 25 percent of cropland unless specific exception is made by the Secretary. This provision is designed to prevent adverse effects on the local community and land markets. The bid-caps are the maximum acceptable bids which are determined by the Agricultural Stabilization and Conservation Service (ASCS), the administering agency, based on average cash rents for cropland (including dryland and irrigated acres) within a pool. Because rental rates for irrigated land are understandably higher than for dryland, averages across these land types produce higher bid-caps and large incentives for dryland farmers in the pool to enroll. ASCS has decided to exclude irrigated land rents from future bid-cap calculations to avoid this problem.

The CRP has created distinct land market segments based on whether the land is eligible or ineligible for participation in the CRP. The CRP is not

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<sup>1</sup> Various criteria for each of these instruments have been discussed which effect the total amount of land eligible for the program and the extent and rate of participation. See Dicks, Reichelderfer, and Boggess (1987).

the only program to create such a distinction. Base acreage for program crops are similarly reflected in land values.

#### **Direct Effect: CRP Contract Rents vs. Market Rents**

The direct effect of the CRP on eligible land depends on the excess beyond the minimum incentive required to induce participation in the program. If ASCS knew the minimum rent necessary to induce enrollment the direct effect would approach zero. ASCS could then accept or reject bids based solely on the desired level of enrollment. If the government is willing to pay a rent in excess of the market rental value of land, (for example to induce participation or provide a transfer) that excess will be capitalized into the value of land.

#### **Learning the Bid-caps and Asymmetric Information**

The CRP can increase land values if producers learn the bid-caps and there is asymmetry of information regarding land quality between producers and the government. Since program participation is voluntary, eligible farmers must receive a bid which is higher than what he could earn by keeping the land in production. Paying program rents in excess of the amount necessary for one to participate in the program results in surpluses, i.e., paying true "economic rents"<sup>2</sup>. Minimizing these surpluses would require the government to have all the relevant information regarding land quality and the degree of risk aversion of each participant. Having all this information is not possible, and in fact there is a certain asymmetry of information

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<sup>2</sup> It is worth noting that since bid-caps are set on a local level, they may provide a greater degree of price discrimination than do other farm programs. For example, if marginal costs of production vary more around target prices than do the local cash rents vary around local bid-caps then producers receive more surpluses from commodity support programs than from the CRP.

regarding land quality in that producers will know more about their land than will the government. Given this asymmetry, there is a potential for producers to gain economic rents if they can learn the bid-caps. For example, if farmers are unaware of the bid cap their bids should reflect the "true" productive value of the land enrolled. For the farmers who wait, by observing bids made over several sign-ups, they can learn the level of the bid cap. When this occurs the average bids should approach or equal the bid caps as farmers will have no incentive to offer a bid for less than the bid cap.

Results from the first four sign-up periods illustrate this behavior. During the initial sign-up the average rental rates were lower than the bid caps in all regions (table 1). By the fourth sign-up, average contract rates approached or equaled the bid caps for all regions. Boggess (1987) documents actual individual bidding behavior which also bares this out.

Due to the learning process, bidders in latter sign-ups with less than average productivity land, (or land of equal quality and worth as in the initial sign-up) are able to obtain CRP rents that are available for cropland of average productivity. For these farmers a windfall is obtained. This windfall increases the farmers incentive to participate and contributes to changes in land values.

We can calculate the contribution to the change in land values resulting from the above windfall. This change is calculated by discounting over the ten years the land is enrolled in the program the difference between the final and the initial bid value (where the initial bid represents the actual rental value they are willing to receive). We calculate this change in land



value for a variety of discount rates. Using a simple discounting formula the change in land values is expressed as,

$$dLV = \int_0^{10} (R_f - R_0)e^{-rt} dt,$$

where dLV is the change in land values,  $R_f$  is the final bid,  $R_0$  is the initial bid (the actual rental value they are willing to receive), and  $r$  is the discount rate. Table 2. presents the estimated change in land values.

The interesting aspect of this approach is that it shows the regional difference in the CRP impact on land values. For example, the expected change in land values are greatest in the Southeast where the divergence between initial and final bids were most significant. Thus while we have seen an actual decline in the average value per acre of U.S. farm land from 1986 to 1987, these results suggest that the CRP may have contributed to slowing that trend at least temporarily for CRP eligible land in some regions.

Two important caveats must be noted regarding this approach. The changes in land value are overestimated because the full effect of this program may not be capitalized as quickly as this formula implies. Also, the true bidding process likely reflects a pattern of enrollment in which lower quality land with the lowest opportunity cost went into the program first followed by higher quality land. This calculation assumes the land going into each sign-up is of equal quality as the initial sign-up and as a result underestimates the average quality of land going into all sign-ups.

We should also point out that high erodibility and low productivity lands do not necessarily overlap. Heimlich (1988) has shown that in many areas they in fact do not overlap. This implies that in situations in which land

is both highly erodible and highly productive the opportunity cost of enrolling in the CRP may be quite high thus requiring a significant CRP rental rate to induce enrollment.

#### The Effect of the CRP on Eligible and Ineligible Land

We can use the above results to isolate the effect of the CRP on all land values from all other influences. While our approach is not definitive, it demonstrates the necessary magnitude the CRP must have to effect all land values. For exposition we assume that land values are a function of CRP effects and all other effects. All other would be, for example returns to assets, real interest rates etc. This relationship implies we can decompose the actual change in land values into the change in values calculated above and all other effects. We do this by assuming land values are a simple linear combination of CRP determined land prices and other expressed as,

$$P = a_c P_c + a_o P_o.$$

The weights are the proportion of land enrolled in CRP,  $a_c$ , and all other land,  $a_o$ . Totally differentiating this expression and converting it to rates of change yields,

$$\hat{P} = a_c \hat{P}_c + a_o \hat{P}_o,$$

where " ^ " denotes rates of change. We calculate this expression by subtracting our calculated values of the first term on the right hand side for 1986-87 from the actual rate of change in values for all land during the same period. The residual is the second term on the right hand side. These results are presented in table 8. Again these results are subject to the same caveats discussed above. Also we used the lowest discount rate (4%) which results in the largest impact of the three rates giving the CRP the

benefit of the doubt and providing an upper limit of the effect the CRP can have on land values given the current enrollment.

As table 3. demonstrates, for the U.S., the CRP has had only a minor offsetting effect on the overall decline in land values, 0.5%, from 1986 to 1987 implying the "all other" effect has a more dominant negative impact. Regionally the CRP has a differential effect on land values. For example, the CRP contributes nothing to land values in the Northeast because enrollment is very low there and the opportunity cost of tying land up in a ten year program may be very high due to development opportunities. On the other hand, in the Mountain region the CRP has been a more significant contributor due to the large enrollment weight. There is a similar result in the Southeast. In the Corn Belt the CRP has had little effect because that land is more valuable in production. These results must be viewed with extreme caution since during this period only about a third of the 45 million acres have been enrolled and in fact probably less when these land values were estimated.

#### **Indirect Effects: Commodity market, Expectation, Investors and Other**

The CRP may have a neutral effect on land values with respect to supply control and its interactions with other farm programs. That is, the CRP contract rents received may just offset the payments lost from ARP participation. But the CRP may reduce aggregate production sufficiently to increase market prices above support levels which could then have a positive impact on land values. This is an empirical issue yet to be determined.

Its not unreasonable to think that reductions in the local supply of rental land might have an impact on local land markets. For example, if there were an increase in the demand for rental land in response to an

increase in market prices, with a significant amount of rental land tied up in the CRP there would be upward pressure on the rental values of the remaining land. If that were to occur, the effect would likely be transitory and last as long as the demand pressure persisted.

The role of expectations is clearly important in determining land values. With the CRP, individuals may form expectations as to the effect the CRP may have on commodity prices and thus land values. Or more directly, they may form expectations regarding the behavior of the program itself. For example, if individuals see that CRP bids have approached the bid-caps and only half of the targeted 45 million acres are enrolled in the program; then one could expect the government to raise the bid-caps in order to induce further enrollment. If that is the case, waiting to enroll would be the optimal strategy, then one would benefit from higher CRP rents than if he had enrolled earlier. This would explain why if the CRP offers rents in excess of cash rents why some eligible acres are not enrolled.

For enrolled acres, the CRP provides a guaranteed income or annuity which has resulted in an increased demand for eligible land by farmers and outside investors. Combining the CRP contract rents as guaranteed annuities with the bid-cap learning described above makes eligible land a desirable income earning instrument. Depending on the supply of eligible land, increased demand should result in bidding up the price of eligible land. There is anecdotal evidence (Brown 1987) of both farmers and investors bidding up the price of eligible land. The article quotes one Missouri bank as saying the selling of eligible land for the 10-year program is like selling a government bond.

The guaranteed annuity from CRP enrolled land is also being used as collateral to buy better quality land (Landowner). Producers are in effect converting the future income stream to current cash and are using that to purchase better quality land. The collateral value of CRP land puts further upward pressure on the value of eligible land.

### Conclusion

We conclude that the CRP can have a positive impact on the value of eligible land. The current trend in land values and rents in general are still downward though they appear to leveling off. The potential bottoming out of land values in general is largely a result of the leveling off of net returns to farming and substantial government payments. But, for the reasons cited above in some regions it is possible that the CRP has contributed to this leveling off. We show how the CRP can raise the value of eligible land. The primary reason we have found for a positive effect of the CRP on land values is the asymmetry of information regarding land quality. Because of the groping process whereby farmers can learn the bid-caps, then to the extent that they know that their land would earn less than the cap in a private market the caps represent a surplus which is capitalized into the value of their land. Using a discounting technique we presented the upper limit of the effect of the CRP on land values<sup>3</sup>. For the CRP to succeed in increasing the market price above support levels more land may need to be retired by the program. Regardless of whether the program is successful with affecting commodity prices or not, the benefits of the program will again

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<sup>3</sup> The lower limit is probably zero. It is unlikely that land values would fall as a result of the CRP simply because the program at a minimum represents an additional (government) demander for land.

accrue to landowners as with other land diversion programs. To the extent the program increases cash rents it will increase costs to land renters.

Table 1--Comparison of regional averages of contract rents and bid caps by sign-up

Region	Sign-up	Contract Rent (dollars)	Bid Cap (dollars)	:	Region	Sign-up	Contract Rent (dollars)	Bid Cap (dollars)
NORTHEAST	1	45	59	:	LAKE STATES	1	50	57
	2	53	58	:		2	55	57
	3	55	58	:		3	57	57
	4	57	58	:		4	57	57
APPALACHIA	1	45	52	:	NORTHERN PLAINS	1	40	42
	2	50	52	:		2	44	48
	3	51	52	:		3	46	48
	4	52	52	:		4	47	49
SOUTHEAST	1	29	44	:	SOUTHERN PLAINS	1	36	41
	2	41	46	:		2	40	43
	3	44	46	:		3	42	43
	4	45	46	:		4	42	43
DELTA STATES	1	36	45	:	MOUNTAIN	1	34	39
	2	43	47	:		2	40	43
	3	45	47	:		3	42	43
	4	45	47	:		4	43	45
CORN BELT	1	60	68	:	PACIFIC	1	46	57
	2	65	71	:		2	47	55
	3	69	71	:		3	49	55
	4	69	71	:		4	50	55

Table 2--Change in land values of CRP eligible land

Regions	Discount rates		
	4%	6%	8%
Northeast	99	90	83
Appalachian	58	53	48
Southeast	132	120	110
Delta States	74	68	62
Corn Belt	74	68	62
Lake States	58	53	48
Northern Plains	58	53	48
Southern Plains	49	45	41
Mountain	74	68	62
Pacific	33	30	28
U.S.	71	65	59

Table 3--Decomposition of actual land value growth into CRP effects and all other, 1986-87.

Region	: Percentage : change in : actual price : dP	=	CRP effect on price change $a_c dP_c$	+	All other effect on price $a_o dP_o$
			Percent		
Northeast	14.0		0.0		14.0
Appalachian	-3.0		0.2		-3.2
Southeast	0.0		0.6		-0.6
Delta States	-16.0		0.2		-16.2
Corn Belt	-10.0		0.2		-10.2
Lake States	-15.0		0.3		-15.3
Northern Plains	-11.0		0.5		-11.5
Southern Plains	-11.0		0.5		-11.5
Mountain	-6.0		1.9		-7.9
Pacific	-12.0		0.2		-12.2
U.S.	-8.0		0.5		-8.5

$a_c$  = acres(CRP) total cropland

$a_o$  = (total cropland - acres CRP) total cropland

dP = percent change in total cropland price

$dP_c$  = actual percent change in CRP enrolled land total cropland price

$dP_o$  = percent change in residual land total cropland price



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