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ASCS COMMODITY-CONSERVATION POLICY IMPACTS ON RISK AND RETURNS IN THE PALOUSE

by

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ABSTRACT:

Crop yields, farm income, and soil losses were simulated over 1974-84 for southeastern Washington farms in three climatic subregions under alternative conservation and commodity policy scenarios. Historical commodity programs reinforced disincentives to retire highly erodible land, but Cropland Base Protection legislation would increase profitability and decrease risk of land retirement.

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Introduction

The magnitude and existence of future farm price and income support programs is not the only controversial issue in the 1985 Farm Bill. Proposals for more cost-effective and complementary commodity and soil conservation programs have also generated considerable debate. Commodity programs are criticized for encouraging soil erosion because their structure and administration provide incentives for farming highly erodible land that might otherwise be retired to a conservation use (Batie; Benbrook; Krauss and Allmaras; Hoag, Taylor and Young; Ogg and Zellner; Berg and Gray; General Accounting Office).

An estimated 43 percent of U.S. cropland sheet and rill erosion originates from only 6 percent of U.S. cropland (Berg and Gray). Placement of this land into conservation uses such as permanent perennial vegetative cover (PVC) might reduce erosion more cost effectively than other conservation programs. Commodity price and income support programs, however, encourage farming these highly erodible areas to protect cropland "base." Less productive land also provides a potential "cheap" source of low opportunity cost acreage to idle in compliance with acreage reduction programs.

The impacts of commodity and conservation programs on the profitability and riskiness of retiring highly erodible land in the eastern Washington Palouse were examined in recent research by Hoag. Historical commodity and conservation programs and proposals outlined in pending congressional bills were examined. Though not a substitute for national modeling, the Palouse case study provides policy makers a realistic appraisal of the farm-level impacts of specific commodity and conservation programs in one highly erodible region.

Modeling Farm Profits and Risk

The general approach of this study is to compare profits and risks between a conventional farm with no land retirement and a conservation farm that retires highly erodible land to a conservation use. These comparisons were made by simulating crop yields, soil loss, and farm income under alternative policy assumptions for the period 1974-84.

Representative Palouse Farms

To provide information about policy impacts under a variety of farming situations, the dryland grains region of the Palouse is divided into three subregions. Subregions are differentiated by average annual rainfall, which reflects their relative productivity. The low-yielding subregion (LYS) averages 11-15 inches of precipitation annually, the intermediate-yielding subregion (IYS) averages 15-18 inches and the high-yielding subregion (HYS) averages 18-22 inches.

Each Palouse subregion is represented by an average size farm with average subregion soil types and topography. Whole-farm budgets were developed for each subregion with typical rotations--winter wheat-summer fallow in the LYS, winter wheat-spring barley-summer fallow in the IYS and winter wheat-dry peas in the HYS.

Measuring profits and risk required crop yield estimates that varied over time with the same mean and variance as actual Palouse yields. A yield model was estimated by nonlinear least squares, which predicted land-class-specific annual yields using a weather stress index and site characteristics as independent variables (Hoag). The stress index was based on daily moisture available compared to daily moisture required (Hoag; James *et al.*). Yield estimates were disaggregated by land classes to determine the opportunity costs of retiring or diverting acreage.

Commodity and Conservation Programs

Three program scenarios are defined to examine commodity program impacts on land retirement. Each policy scenario is simulated within the three subregions under actual weather, output price, and production cost conditions prevailing over 1974-84. For each year of each simulation, net returns and soil loss are computed for a conservation farm that retires erodible land and a conventional farm that does not. Two levels of erodible land retirement are considered on the conservation farm, all capability class 4 and 6 land and class 6 land only.

In the "base run" scenario it was assumed that neither conservation nor conventional farmers participated in any commodity or conservation programs. In the "historical" scenario conventional and conservation farmers committed 100 percent of barley and wheat program crop acreage to all ASCS direct income support programs, cropland diversion for deficiency payments, paid acreage diversion and payment-in-kind (PIK). The conservation farmer also received 75 percent cost-sharing for establishing PVC on erodible land in conformity with current program provisions.

The third scenario is based on House Bill, H.R.3457, 98th Congress, The Soil Conservation Act of 1983 (SCA). This bill combined three major conservation proposals: 1) cropland base acreage protection (CBP), which allows farmers to retire qualified highly erodible acreage without reducing commodity program base acreage, 2) supplementary rental payments (subsidies) to farmers for retiring highly erodible land, and 3) a "sodbuster" provision that penalizes farmers who bring new highly erodible land into production by excluding them from all federal agricultural income support programs.

None of the provisions of H.R.3457 were passed by the 1984 Congress, but a USDA two-year pilot program in 1984 offered cropland base acreage protection as described in the bill, and increased erodible land retirement cost-sharing to 90 percent for farmers committing erodible land to PVC for at least 5 years. Therefore, the SCA scenario will also include 90 percent cost-sharing for highly erodible land retirement. Rental payments are ignored in the first stage of the SCA scenario to examine the ability of CBP and 90 percent cost-sharing alone to reverse previous commodity program land retirement disincentives. A complete discussion of breakeven rental payment costs and impacts in the Palouse is found in Hoag.

Farm Profits and Risk

Profits are defined as the net returns to labor and management. Although partial budgeting with only variable costs--and some changing fixed costs--is sufficient for comparing profits, all costs excluding operator's labor and management are incorporated so that estimates of the probability of labor and management returns falling below zero over the simulation period can be calculated as a measure of risk.

A second measure of risk used is the variance (or standard deviation) of farm profits. Dillon (p. #111) states that "for many decision makers and many decision problems, reasonable or adequate appraisal (of expected utility) is given by consideration of just the mean and variance of profit." Decision makers' risk preferences are not modeled, but chance of loss and variance of profit provide useful information about the riskiness of the different policy scenarios. Stochastic dominance is used successfully here to rank choices with only minimal assumptions about risk preferences. Risk is expected to be reduced with the introduction of "income stabilizing" commodity programs.

Empirical Results

Results are presented in sequence beginning with those of the first scenario with no programs and concluding with those of the historical programs complemented with SCA incentives. This organization provides a method to evaluate conservation incentives without government programs, determine how those incentives change with the introduction of historical commodity and conservation programs and assess the potential of SCA policies to reverse historical program disincentives.

Base Run Results

The results of each scenario in each Palouse subregion over the 1974-84 period are given in Table 1. Net returns are computed on a farm-wide basis and include costs of establishment and maintenance of PVC on retired land, net of cost-sharing when appropriate, and costs for idling land in compliance with commodity programs as appropriate.

Since the costs of retiring land are positive, the breakeven point between retirement and non-retirement is below the point at which gross returns equal variable costs on erodible acreage. Breakeven land retirement occurs at the point at which gross returns on erodible land fall short of variable costs by an amount equal to annual PVC maintenance costs and amortized establishment cost net of any annual fixed cost savings from retirement. The latter saving

Table 1. Conventional and Conservation Farm Average Net Returns and Risk for Alternative Commodity and Conservation Policy Scenarios in the Palouse, 1974-84.

			Average Net Returns and Risk by Precipitation Subregion and Policy Scenario[a]								
			Low Yielding Subregion			Intermediate Yielding Subregion			High Yielding Subregion		
Return or Risk	Farm	Land Classes Retired	Base Run	Historical w/o SCA	Historical w/SCA	Base Run	Historical w/o SCA	Historical w/SCA	Base Run	Historical w/o SCA	Historical w/SCA
Average Net Returns ($/farm)	Conv.	none	-3,147	-2,459	-2,459	4,515	5,714	5,714	27,064	30,964	30,964
	Cons.	6	-4,054	-7,057	-1,826	3,971	4,224	9,570	24,757	28,618	30,018
	Cons.	4+6	-12,571	-13,724	-4,801	-5,151	-4,411	3,989	13,143	15,992	23,569
Standard Deviation of Net Returns ($/farm)	Conv.	none	33,596	34,396	34,396	27,927	26,679	26,679	44,488	41,260	41,260
	Cons.	6	32,690	36,690	32,816	26,435	26,179	23,084	43,364	40,287	39,820
	Cons.	4+6	31,655	34,583	28,783	24,422	24,600	20,394	38,731	36,830	33,977
Probability of Loss (years out of 11)	Conv.	none	7/11	6/11	6/11	5/11	5/11	5/11	3/11	2/11	2/11
	Cons.	6	7/11	6/11	6/11	5/11	5/11	3/11	3/11	2/11	2/11
	Cons.	4+6	8/11	8/11	7/11	7/11	6/11	4/11	4/11	3/11	2/11

[a]The base run simulates returns with historical weather, costs, and prices, but no commodity programs. The historical run w/o SCA adds historical commodity programs, and the historical run w/SCA further adds SCA conservation programs.

is generally quite small for Palouse farms because retirement generally would not permit reducing machinery investment. It also is not possible to sell erodible land separately in the long run because it is scattered throughout each field in discontiguous small parcels on upper hilltops or slopes.

As shown by the base run average returns results in Table 1, farming erodible land was always more profitable (or less unprofitable) than retiring it in every subregion without commodity and conservation programs. The conventional farm (CV) that did not retire any land earned consistently higher returns than the conservation farm with class 6 retirement (C6) or with class 4 and 6 retirement (C46). Unreported year-by-year results revealed class 6 retirement was more profitable than conventional farming in 1977 and 1984 in the LYS, in 1977, 1981, 1982, and 1984 in the IYS but never more profitable in the HYS (Hoag). Class 4 plus 6 retirement was never more profitable than conventional farming. In all other years, farming the erodible land was more profitable because yields were not sufficiently poor to push returns below breakeven levels.

The impact of historical programs on risk is also summarized in Table 1. In all precipitation subregions standard deviation of net returns fell when switching from a CV to a C6 or C46 farm. However, the probability of loss increased for the C46 farm in all the subregions because of the substantial decline in average net returns. Retiring land reduces net returns and increases the likelihood that returns will not cover production costs in any given year.

Historical_Programs_Without_SCA

Table 1 also provides the results of the simulation with historical commodity programs and 75 percent cost-shares for erodible land retirement. In most cases net returns increased with 100 percent participation in commodity programs. However, in years with no commodity program payments, 1974 for example, the addition of programs increased conservation farm returns only slightly. This slight increase was due only to the 75 percent cost-sharing for retiring erodible land. On the LYS conservation farms, commodity programs failed to increase net returns because the retired erodible class 4 acreage was relatively productive and did not represent a "cheap" source for set-aside.

Breakeven rental payments to conservation farmers are presented in Table 2. Breakeven (BE) rents are the amount required to equate the profitability of conservation and conventional farming. Results given in Table 2 show that the introduction of historical commodity programs increased BE rental payments for conservation farmers. Losses from conservation farming--represented by a positive BE rent--increased by more than fivefold on the C6 farm and by 20 percent for the C46 farm in the LYS. Similar percentage increases were experienced in the IYS and lower percentage levels were found in the HYS, but HYS changes from programs were similar on an absolute basis. Historical commodity programs increase BE rents because these programs increase the profitability of farming erodible land. Conventional farmers maintain a higher "base" and a cheaper source of set-aside.

Commodity programs are expected to reduce risk because income stabilization is a goal of the Agricultural Stabilization and Conservation Service (ASCS). The 1974-84 commodity programs did indeed increase income stability in the IYS and HYS for the CV farm as indicated by lower standard deviations. However, the standard deviation was not decreased in the LYS primarily because of the sunk costs in summer fallow in PIK years, which magnified losses from participation. Participation in farm programs also generally reduced the chance of experiencing a loss in any given year. The chance of loss fell from 7/11 to 6/11 in the IYS and from 4/11 to 3/11 in the HYS for the C46 farm.

Considering both risk measures indicates that the commodity programs slightly decrease risk, but do so less or sometimes can even increase risk for the conservation farm. Conservation farm risk increased in the LYS because its remaining cultivated land available for idling in acreage reduction programs is relatively higher yielding than that of the CV farm. This increased its opportunity costs during years with high yields or prices. Risk also increased in the LYS because participation lowered net returns and increased the chance of loss of profit.

Table 2. Breakeven Rental Payments for Palouse Land Retirement.

		Breakeven Rental Payments by Scenario		
Yield Subregion	Land Classes Retired	Base Run	Historical w/o SCA	Historical w/ SCA
		. . . .	$/farm	. . . .
Low	6	907	4,598	(633)[a]
	4+6	9,424	11,265	2,342
Intermediate	6	544	1,490	(3,856)[a]
	4+6	9,666	10,125	1,725
High	6	2,307	2,346	946
	4+6	13,921	14,972	7,395

[a]Conservation farm had higher returns than the conventional farm.

Historical Programs with SCA

The SCA has no influence whatsoever on net returns of the CV farm because it retires no acres. In contrast, the conservation farm's profits increased sharply with CBP, which permitted some or all of its retired erodible acres to be counted as commodity program diversion. As shown in Table 2, breakeven rents decreased for all subregions. Year-by-year results revealed there was not a single year in the 1974-84 period during which the SCA incentives failed to provide higher net returns than historical programs for the conservation farm. However, in years with zero diversion payments, the conservation farm's income rose by only a small amount, which was attributable to the increased cost-sharing.

An increase in the conservation farm's net returns while there is no change in the CV farm's net returns obviously means that the SCA would increase the relative profitability of conservation farming. If necessary BE rental payments fall by more than they were increased by the historical commodity programs, the SCA incentives are successful at offsetting commodity program disincentives to retire land. If the gap between conventional and conservation farm returns is closed by more than it was widened by the historical programs, the SCA provides additional incentives to land retirement.

In all cases the SCA benefits decreased the conservation farm's disadvantage by more than commodity programs had increased it (see Table 2). In the LYS and IYS, where the C6 farm's breakeven rents with SCA are negative, the SCA benefits were sufficient to completely reverse commodity and production retirement disincentives.

In most cases, however, the results show that even with the SCA, without rental payments, it generally is not profitable to retire erodible land in the

Palouse. Only for the very low-yielding class 6 land in the low and intermediate-yielding subregions was the SCA sufficient to make land retirement profitable.

Although the SCA still required rental payments to create positive profit incentives for land retirement in the Palouse, it is informative to examine why the SCA provisions (excluding rental payments) weakened disincentives to retire erodible land. There are four reasons why the SCA strengthens the relative profitability of the conservation farm when there are acreage reduction programs. First, production net returns increase because the conservation farmer is able to devote more acres to wheat or barley production. The base acreage on the conservation farm does not decrease under the SCA. The conservation farm may use the retired acreage to fulfill diversion requirements and produce on the unretired higher quality land, some of which would have been required to be diverted if there were no SCA.

The second reason profitability is increased is that the larger wheat acreage base on the conservation farm permits larger commodity program support payments. If required diversion for commodity programs is equal to or larger than the erodible acreage retired, the conservation farm is assured a higher deficiency payment than the CV farm because of its higher average proven yield on cultivated land. The third reason, related to the second, is that the conservation farm has lower diversion costs in commodity programs with SCA because it uses already retired acreage to fulfill the diversion requirements. Finally, the SCA improves the net returns of the conservation farm by increasing from 75 to 90 percent cost shares for land retirement.

The risk on the CV farm is not changed by the SCA because its net returns are unaffected. However, the SCA decreased the risk, defined as standard deviation of net returns and the probability of net returns falling below zero, of both types of conservation farms in all regions. The standard deviation fell by 20, 19 and 8 percent in the LYS, IYS and HYS, respectively. The SCA decreased the probability of loss from 5/11 to 3/11 and 6/11 to 4/11 on the C6 and C46 farms in the IYS and from 3/11 to 2/11 on the C46 farm in the HYS. Based on these measures, we conclude the SCA would reduce the risk as well as increase the profitability of erodible land retirement in the Palouse.

Stochastic Efficiency

Stochastic efficiency can be used to rank actions without knowledge of risk preferences. The first-degree stochastic dominance (FSD) principle, with reasonable assumptions about utility maximization, indicates that an action is preferred to another regardless of preferences for risk (Anderson, Dillon and Hardaker). Second-degree stochastic dominance (SSD) is more restrictive than FSD, requiring the added assumption of risk aversion. Often actions cannot be ranked with FSD or SSD and additional information is required.

Without any programs the CV farm dominated the C46 farm with FSD. The C6 farm was dominated only in the high-yielding subregion. Historical programs increased the position of the CV farm causing its dominance over the C46 and C6 farm in all subregions. The SCA programs eliminated the CV farm's dominance over all farms in all subregions.

Summary

Retiring highly erodible land can appear to be an inexpensive conservation option because it often has low returns. In the Palouse, however, retirement without policy incentives was not profitable even in the lowest-yielding subregion. Unsubsidized land retirement also was unattractive from a risk standpoint because lower returns increased the possibility of profits falling below zero.

Results also showed that historical commodity programs increased returns but also increased the gap in net returns between conventional and conservation farming in the Palouse. Risks of farming generally were diminished by commodity programs both by reducing standard deviation of profits and by increasing income and hence lowering the chance of loss.

The addition of SCA program changes reduced the gap between conventional and conservation farming more than traditional commodity programs had increased it. The conservation farm became more profitable in the LYS and IYS for class 6 land retirement due primarily to SCA acreage base protection provisions. The SCA also reduced risk on the conservation farm.

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