NCCC-134
APPLIED COMMODITY PRICE ANALYSIS, FORECASTING AND MARKET RISK MANAGEMENT

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Suggested citation format:

Garrison, C. O., M. Dicks, B. D. Adam, and B. W. Brorsen. 1993. "Grain Markets after the Conservation Reserve Program." Proceedings of the NCR-134 Conference on Applied Commodity Price Analysis, Forecasting, and Market Risk Management. Chicago, IL. [http://www.farmdoc.uiuc.edu/nccc134].

Grain Markets After the Conservation Reserve Program

Carl O. Garrison, Mike Dicks, Brian D. Adam, and B. Wade Brorsen*

Problem Statement

The explicit objective of long term land retirement programs has been to reduce erosion on marginal cropland. Many researchers, producers, and agribusiness managers maintain that all land retirement programs have an implicit objective of supply control. The most recent long term land retirement program, the Conservation Reserve Program (CRP), gives producers an annual rental payment and cost-sharing in exchange for establishing a vegetative cover on marginal land. The CRP has reduced available cropland in the United States by nearly 34 million acres under the first nine signup periods (1986-1990). Among these are 22 million acres with historical crop acreage base (CAB) which will be retained upon contract expiration. Ten million acres have wheat base and another 3.8 million acres have corn base. These acres could potentially produce 288 million bushels of wheat and 340 million bushels of corn (Osborn et al.). The purpose of this research is to determine the impacts the expiration of Conservation Reserve Program contracts will have on production and prices of wheat and corn in the United States.

Market outlook for grains depends on expected production. Clearly, with the first CRP contracts set to expire in 1996, commodity outlook must include the influence of CRP contract expiration. As CRP land becomes eligible for crop production, commodity supplies and government program costs will be affected.

A major unknown for analysts and agribusiness decision makers over the next few years is the extent to which CRP acreage will return to crop production. The fate of land enrolled in the CRP as contracts expire has been the topic of several recent studies. In 1990, the Soil and Water Conservation Society (SWCS) conducted a national survey of CRP contract holders, in part to determine the rate of land returning to crop production. Forty two percent of respondents indicated they would return some CRP acreage to crop production (Nowak et al.). Osborn weighted responses to this survey by the number of acres controlled by each respondent to find crop production would resume on 52.7 percent of CRP acres. However, these estimates were made based on the survey data without testing the data for bias.

Recent work by Garrison et al. has shown the SWCS survey data suffered from two sources of nonresponse bias. A two-limit

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Tobit model was used for response imputation to adjust the data. After correcting for nonresponse bias the mean of recropping weighted by CRP acres was calculated. Results indicate 47.9 percent of the CRP land enrolled in the first nine signups will be returned to crop production. These recropping predictions will be incorporated into market outlook in order to predict most likely changes in production and prices of wheat and corn in the post-CRP era.

Procedure

The producer intentions represented by the SWCS survey are for land enrolled in the Conservation Reserve from 1986 to 1990. For this reason, the analysis will focus on the expiration of contracts entered in this period although subsequent signups have been offered. Enrollment eligibility is based on land characteristics including land capability class and soil loss tolerance. The most highly erodible land was enrolled in the first signups, so it will be the first eligible to return to production. As contracts expire, less fragile land will be eligible. The fourth signup offered incentives commonly referred to as "corn bonus" to entice producers from the corn belt to enroll in the CRP. For these reasons the market outlook for wheat and corn will be forecast by year from 1996 through 2000.

Although the government has alternatives other than allowing all CRP contracts to expire, the analysis is conducted assuming the Conservation Reserve will be terminated in the 1995 farm legislation. However, the analysis considers two alternative proportions of land returning to crop production.

First, a baseline market forecast will be made assuming all CRP contracts are extended. From this, changes in the wheat and corn markets are predicted assuming first that 100 percent of base and then, under the most likely scenario, 47.9 percent of base acres for all crops enrolled in CRP will return to production. Past land use should indicate the most profitable land use, and therefore, the analysis assumes only land which has established crop acreage base will return to production. Although the characteristics of the land enrolled in each signup differ, there is little difference in the average productivity of land between signups (Osborn et al.). Therefore, it is assumed that all land returning to crop production is of average productivity for the production area where it returns. Under these assumptions and scenarios the impacts of CRP contract expiration on the production and prices of wheat and corn is predicted for each year of contract expiration.

The analysis is accomplished using a comprehensive simulation model, POLYSYS, developed at Oklahoma State University and the University of Tennessee. POLYSYS combines linear programming, econometric simulation, and Input-Output models to determine the impacts of policy changes (Dicks et al.). To determine production and price impacts of CRP contract expiration only the LP and econometric components are used. Each component

and the methods used to conduct this analysis are described.

POLYSIM (Policy Simulator) is the econometric component used to estimate annual supply and demand, as well as prices for major U.S. commodities. POLYSIM uses a baseline set of data over the analysis period in order to predict prices and production (Dicks et al.). For this analysis, the Food and Agriculture Policy Research Institute (FAPRI) baseline assumptions (November 1992) are used to construct the supply and demand components of POLYSIM used to predict production and price. However, this baseline includes an estimate of CRP land returning to crop production. For the purpose of this analysis the FAPRI baseline has been adjusted to represent complete extension of all CRP contracts. The FAPRI baseline originally assumed 60 percent of the crop base acres would return to crop production. These acres are removed from the baseline scenario. POLYSIM uses percentage changes from baseline values and supply and demand price elasticities, capturing cross-price relationships, to estimate the effects of changes in farm policy (Dicks et al.). The initial simulation using the modified FAPRI baseline provides a measure of the production and price changes that could be expected if the CRP is extended or none of the land returns to production. The estimates of price for each year of analysis are incorporated into RASS (Resource Allocation Summary Sheet), the second component of POLYSYS, to predict changes in harvested acreage as CRP land returns to crop production.

RASS is an interregional linear programming model which estimates the expected distribution of crop production activities across the 105 production areas of the contiguous United States. RASS combines variable cost, yield, price, and acreage for each crop in each of the production areas. Each crop is summarized in a separate spreadsheet and the spreadsheets are linked through an objective function to maximize net returns. An input sheet is used to provide change in each of the variables to represent pre-planting expectations (Dicks et al.). For this analysis, changes in the acreage available for crop production due to yearly CRP contract expiration in each production area were made in RASS to predict the change in harvested acreage. This prediction is then used in POLYSIM to predict supply, demand, and market prices in each year.

RASS and POLYSIM are linked in a recursive framework which uses the forecasting abilities of POLYSIM to provide expected prices, costs, and yields. Based on these expectations, RASS determines the optimal allocation of cropping activities for all regions and aggregates them to a national level. The output from RASS is then supplied to POLYSIM to estimate the price response associated with the estimated levels of harvested acreage.

For this analysis the expected price, variable costs, and national program acreage for 1996 obtained from the FAPRI baseline in POLYSIM are supplied to RASS. The changes in available crop acreage in each production area due to contract

expiration under each scenario for 1996 are made in RASS. RASS is then used to predict changes in harvested acreage under the alternative scenarios. RASS also predicts changes in national yields, cost of production, and commodity program participation that will occur as a result in changes in land use. These changes are represented as percentages for each crop. The percentage changes are then provided to POLYSIM to estimate the impacts of CRP expiration on production and prices of wheat and corn for 1996. Using these predictions, the 1997 price under the alternative scenarios of recropping for each crop is forecast by POLYSIM. The procedure is repeated under each land-use scenario to obtain the impacts of contract expiration in 1997 along with a forecast for 1998. This recursive procedure is repeated for each year from 1996 through 2000 to determine the yearly impacts of CRP contract expiration of the first nine signups.

Results

The results of this analysis show that as CRP land returns to production price and production diverge from the baseline estimates generated by POLYSIM. Because predictions are based on deviations from a set of baseline assumptions affecting supply and demand in each year, price does not consistently decline or production increase in absolute terms over time. Rather, price diverges from the baseline prediction as land returns to crop production over time. The impacts of Conservation Reserve Program contract expiration on the market outlook for corn and wheat are be discussed separately.

As CRP contracts expire, the price of corn steadily diverges from the baseline price predicted by POLYSIM. The impacts on corn price for each year of contract expiration are shown in Table 1. The impact in 1996 is minimal. The biggest year-to-year impact on corn prices is in 1997, the year contracts for land enrolled under the corn bonus expire. The 1997 baseline price is $2.39/bu. The price under the 47.9 percent CRP recropping scenario is $2.35/bu., a 1.7% decline from the predicted baseline, and the price under the 100 percent recropping scenario is $2.45/bu., a 5% decline.

Predicted corn production under the alternative scenarios is shown in Table 2. Corn production behaves in a similar manner to price, although the predicted production under each scenario is above the baseline. By 2000, production is expected to be 2% higher than the baseline under the 47.9 percent scenario, and 5% higher under the 100 percent scenario. The results for predicted corn price and production deviations from the baseline are illustrated in Figure 1.

While corn price does not show real decline from the baseline until 1997, Table 3 indicates the price of wheat is expected to drop 0.5% from the POLYSIM baseline in 1996 under the 47.9 percent scenario, and 1% under the 100 percent scenario. Wheat price consistently diverges from the baseline until in 2000 it is 7% below the baseline under the 47.9 percent scenario, and

below under the 100 percent scenario. Table 4 indicates that in 2000 wheat production will be 6% above the baseline under the 47.9 percent scenario, and 12.5% above the baseline under the 100 percent scenario. The results for predicted wheat price and production deviations from the baseline are illustrated in Figure 2.

Implications

The results of this analysis clearly suggest that CRP contract expiration will influence the price of wheat and corn. Under the most likely scenario, based on past production practices and producer intentions, 47.9 percent of the base acres enrolled in the CRP will return to production. Under this scenario, price of corn declines by more than 2% from baseline by 2000, and the price of wheat declines by more than 7%.

As the 1995 farm bill is debated these impacts must be considered. The Conservation Reserve Program creates a dilemma for the future of farm policy. The objectives stated by the Clinton administration have been both to protect the environment, and also to reduce the federal budget deficit. Continuation of the CRP would require substantial government spending to protect marginal land from erosion. However, if the CRP is eliminated, commodity program spending under the current legislation will increase as farm prices decline in the post-CRP era. Government program costs and the costs to the environment must be weighed in deciding the future of the CRP. These costs will play an important role in future market outlook for major U.S. crops.

Table 1. Predicted Corn Price Deviations from the Baseline, 1996-2000

Year	Baseline ($/bu)	47.9 Percent (%)	100 Percent (%)
1996	2.48	0	-0.40
1997	2.39	-1.67	-2.93
1998	2.38	-1.68	-3.78
1999	2.45	-2.04	-4.48
2000	2.58	-2.32	-5.04

Table 2. Predicted Corn Production Deviations from the Baseline, 1996-2000

Year	Baseline (Million bushels)	47.9 Percent (%)	100 Percent (%)
1996	8822.2	0.10	0.19
1997	8887.7	1.36	2.83
1998	8919.0	1.67	3.46
1999	9013.5	1.98	4.14
2000	9140.3	2.23	4.64

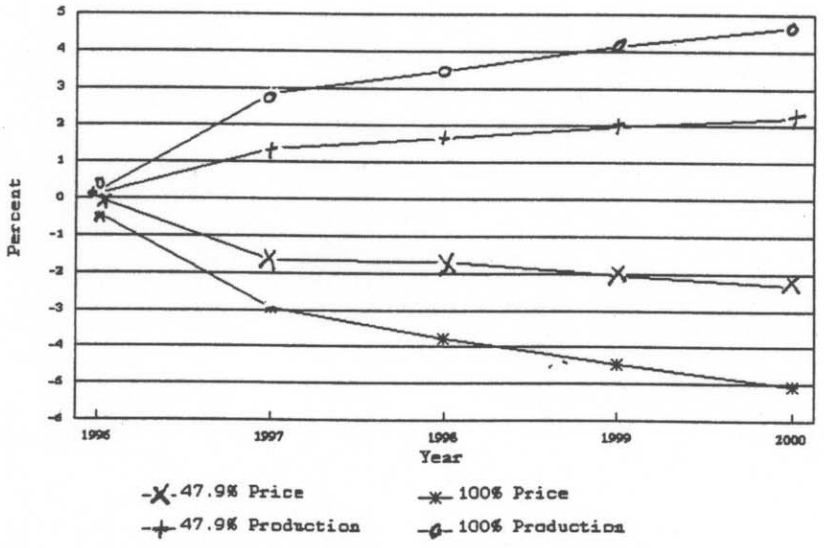

Figure 1. Predicted Corn Price and Production, Deviations from the Baseline, 1996-2000

Table 3. Predicted Wheat Price Deviations from the Baseline, 1996-2000

Year	Baseline ($/bu)	47.9 Percent (%)	100 Percent (%)
1996	3.67	-0.54	-1.09
1997	3.75	-3.20	-6.93
1998	3.65	-5.48	-9.58
1999	3.81	-6.30	-11.29
2000	4.04	-7.18	-12.87

Table 4. Predicted Wheat Production Deviations from the Baseline, 1996-2000

Year	Baseline (Million bushels)	47.9 Percent (%)	100 Percent (%)
1996	2535.4	0.31	0.65
1997	2499.2	2.36	4.95
1998	2495.0	4.09	8.54
1999	2461.1	5.11	10.68
2000	2464.9	5.98	12.50

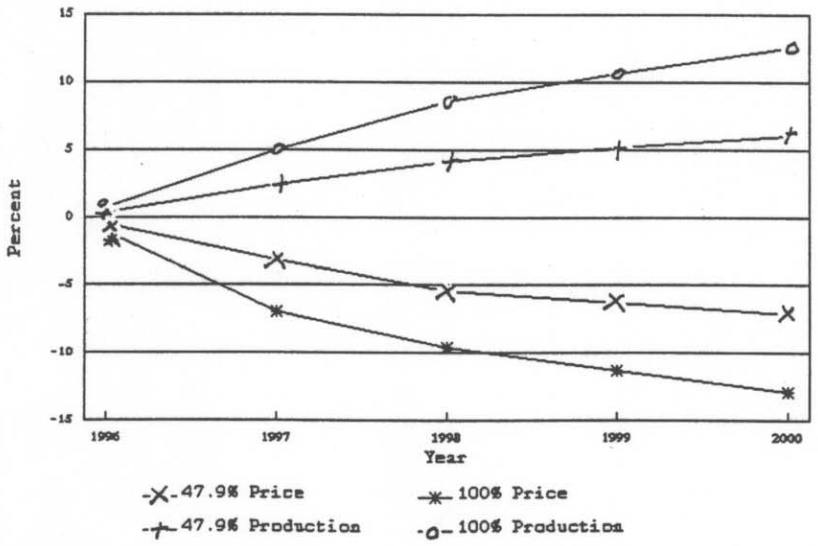

Figure 2. Predicted Wheat Price and Production, Deviations from the Baseline, 1996-2000

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