Journal of Agricultural and Applied Economics, 29,1(July 1997):163–173

A Qualitative Choice Analysis of Factors Influencing Post-CRP Land Use Decisions

Phillip N. Johnson, Sukant K. Misra, and R. Terry Ervin

ABSTRACT

The future use of Conservation Reserve Program (CRP) lands is an important agricultural policy issue. To examine the effects of factors that influence landowners' post-contract use of CRP lands, a survey of Texas High Plains CRP contract holders was conducted in 1992. This study analyzes the results of the survey using a qualitative choice model. It was found that the presence of a livestock enterprise in the current contract holder's operation increases the probability of these acres remaining in the established cover. Contract holders who value the commodity base have an increased probability of returning their acres to crop production.

Key Words: agricultural policy, Conservation Reserve Program, ordered probit model.

The Conservation Reserve Program (CRP) was the centerpiece of the Conservation Title of the Food Security Act of 1985. The primary objective of the CRP was to reduce water and wind erosion, with secondary objectives to improve surface water quality, create wildlife habitat, reduce production of surplus agricultural commodities, and provide income support for farmers (Dicks). The conservation and environmental benefits of the CRP have cost almost $20 billion (Nowak, Schnepf, and Barnes), with enrollment of cropland through the 12th sign-up period (June 1992) totaling 36.4 million acres. Contract holders with contracts expiring in 1995 were given an opportunity to extend for one year. Under the Federal Agricultural Improvement and Reform (FAIR) Act of 1996, a one-year extension option had been offered for contracts expiring in 1996. Contracted acreage enrolled in 1987 and 1988, totaling 22.4 million acres and representing 61.6% of total enrollment, will expire in the period 1997–98.

With the expiration of the current CRP contracts, landowners must decide on the future use of these lands. The basic land use decision will be whether to return enrolled acres to crop production or to maintain the vegetative cover for grazing, wildlife, or other conservation uses. The decision criteria landowners will use include both socioeconomic and conservation considerations. Characteristics of the CRP lands, as well as characteristics and attitudes of contract holders, are factors that will influence post-contract land use decisions.

Several previous studies have addressed post-CRP land use. The Soil and Water Conservation Society (SWCS) conducted a national survey of CRP contract holders to estimate post-CRP land use (Osborn, Schnepf, and Keim). Survey results indicated that 62.6% of

Phillip N. Johnson and Sukant K. Misra are assistant professors, and R. Terry Ervin is an associate professor, all in the Department of Agricultural and Applied Economics, Texas Tech University, Lubbock.

The authors appreciate the financial support of this project by the Soil Conservation Service of the U.S. Department of Agriculture and the constructive review of the manuscript by Drs. Emmett Elam, Don Ethridge, and Kary Mathis. Publication No. T-1-398.

respondents nationally and 56.3% of respondents in the Southern Plains (Texas and Oklahoma) would return their CRP acres to crop production. Monson and Lenkner used a survey of Missouri CRP participants to identify factors that would limit CRP lands from returning to crop production and determine contract holders' attitudes toward various post-CRP alternatives. Surveys of CRP contract holders have also been conducted in Alabama (Goodman and Hughes), Illinois (Lant, Kraft, and Munyoka), North Dakota (Gustafson and Hill), South Dakota (Janssen and Ghebremicael), Nebraska (Clark et al.), Kansas (Diebel, Cable, and Cook), Oklahoma (Atkinson and Dicks), New Mexico (Skaggs, Kirksey, and Harper), and Texas (Ervin and Johnson). The results of these studies suggest that contract holders have a high degree of interest in extending current contracts.

Skaggs, Kirksey, and Harper developed a multinomial logit model to analyze the relationship between socioeconomic and attitudinal variables and land use choice options using data from a survey of New Mexico CRP contract holders. The authors found that the probability of grazing decreased if the land was irrigated before enrollment in the CRP, increased if soil erosion was the reason for enrollment, decreased with the age of the contract holder, and decreased as the size of the contract increased. Alternatively, the probability of returning CRP lands to crop production increased if the land was irrigated before enrollment in the CRP, increased with the age of the contract holder, and increased as the size of the contract increased.

Janssen and Ghebremicael applied logistic regression analysis to analyze the post-CRP land use decision using data from a survey of South Dakota CRP contract holders. Decision models were estimated for post-CRP land use of cropland and grassland. Results of the cropland decision model indicated that education, location within the state (east and central), number of crop base acres, and anticipated levels of federal price/income support have a positive effect on the decision to return CRP land to crop production, while the level of conservation cost sharing has a negative effect. Further, age of operator, location within the state, and anticipated future crop/livestock market prices were found to have negative effects on the decision to graze CRP land, while the level of livestock-related cost share and the presence of haying equipment have positive effects.

Conservation Reserve Program enrollment in the Texas High Plains Region (THPR) represents approximately 9% of national CRP enrollment, making this region an important area with regard to the impacts of post-contract land use decisions. The THPR is part of the Southern Great Plains and, like the Great Plains, is subject to severe wind erosion. In aggregate, the states comprising the Great Plains contain approximately 41% of the nation's CRP acres, with the THPR representing approximately 20% of this CRP enrollment figure. Environmental benefits (from increased soil productivity and water quality, reduced wind erosion, and wildlife habitat improvements) in the Great Plains from CRP lands have been estimated at more than $1.6 billion (Young and Osborn). Of an estimated $0.5 billion in reduced wind erosion in arid regions, according to Young and Osborn, about 50% occurs in Texas alone. Annual soil erosion on CRP acres enrolled in the THPR has been reduced from an average of 36 tons per acre to two tons per acre (Ervin and Johnson). This decline in erosion is primarily due to reduced wind erosion. The CRP has been found to be a significant factor in decreasing the levels of airborne dust in the THPR (Ervin and Lee). Regions of the Southern Great Plains are similar with regard to farming systems, climate, soils, and topography (Skaggs, Kirksey, and Harper). Therefore, the results of this study should be applicable across the Great Plains.

The purpose of this study is to examine the effects of factors that influence landowners' post-contract use of CRP lands in the THPR. Knowledge of the effects of significant characteristics and attitudes of contract holders and the CRP contracts should help in developing an understanding of post-CRP land use decisions. Results of this study should provide information that will be of use in the development of post-CRP land use policies that will affect the Great Plains Region.

Analytical Framework

A qualitative choice model based on the premises of random utility maximization, developed by McFadden, provides the appropriate theoretical foundation for the model formation. An ordered probit model (as formulated by Misra, Huang, and Ott) was used for empirical estimation.

Consider a sample of T producers, each facing a set of M discrete alternatives. Each alternative i ($i = 1, \ldots, M$) provides utility, U_i, to producer t ($t = 1, \ldots, T$). An individual will choose an alternative i that maximizes utility among M alternatives. The maximum utility attainable given each alternative i can be expressed as

$$(1) \qquad U_i = u(A_k, S_n), \quad k = 1, \ldots, K;\ n = 1, \ldots, N,$$

where U_i is the maximum utility attainable when alternative i is chosen, A_k is a vector of K attributes or characteristics associated with alternative i, and S_n is a vector of N sociodemographic characteristics of the individual t. For estimation purposes, the $u(\cdot)$ is assumed to be a linear function of A_k and S_n, and it can be decomposed into a deterministic component $(A_k, S_n; \theta)_i$, and a stochastic component (ξ_i). Thus, equation (1) can be rewritten as

$$(2) \qquad U_i = (A_k, S_n; \theta)_i + \xi_i,$$

where θ is a vector of parameters associated with A_k and S_n.

In the decision-making process, an individual is assumed to evaluate and compare the utility derived from each alternative i as specified in equation (2). An individual will choose alternative j if and only if it provides the highest utility:

$$(3) \qquad U_j \geq \max(U_i \mid i = 1, \ldots, M;\ j \neq i).$$

In practice, U_j represents a latent variable, which is unobservable. Only the outcome of the decision process is observed. Thus, let Y be the observed variable that is ordinal in nature, and $Y = j$ is the observed outcome when response category j is chosen. It follows that a regression relation implied by equation (3) can be specified and estimated with appropriate statistical procedures:

$$(4) \qquad Y_t = X_t\beta + \epsilon_t,$$

where

$$(5) \qquad Y_t = j \quad \text{if } \mu_{j-1} < Y_t \leq \mu_j \rightarrow U_{j,t} \geq U_{j-1,t}; \quad j = 2, \ldots, M,$$

and

$$(6) \qquad \Pr(Y_t = j \mid U_{j,t} \geq U_{j-1,t}) = \Phi[(\mu_j - X_t\beta)/\sigma] - \Phi[(\mu_{j-1} - X_t\beta)/\sigma],$$

where X_t is a matrix of explanatory variables that represent A_k and S_n in equation (2), and β is a vector of unknown parameters; ϵ_t is a vector of error terms assumed to be independently and identically normally distributed, i.e., $\epsilon_t \sim N(0, \sigma^2)$; $\mu_1, \ldots, \mu_M$ are the category thresholds for the underlying response variable (Y_t), with $\mu_1 \leq \mu_2 \leq \ldots \mu_M$, and $\mu_1 = -\infty$ and $\mu_M = +\infty$; and $\Phi(\cdot)$ denotes the standard normal cumulative distribution function. The model presented in equation (5) is underidentified because any linear transformation applied to the underlying response variable and threshold value μ_js would lead to the same model. To identify the model, it can be assumed without loss of generality that $\mu_1 = 0$, and $\sigma = 1$. Thus, the log-likelihood function for the model is

$$(7) \qquad \log L(\beta, \mu_2, \ldots, \mu_{m-1}) = \sum_{t=1}^{T} \sum_{j=2}^{M} C_{jt} \log[\phi(\mu_j - X_t\beta) - \phi(\mu_{j-1} - X_t\beta)],$$

where

$$C_{jt} = \begin{cases} 1 & \text{if } \mu_{j-1} < Y_t \leq \mu_j, \\ 0 & \text{otherwise.} \end{cases}$$

Consistent parameter estimates for the β vector and the μ_js that maximize the log-likelihood function can be obtained by applying the ordered probit procedure available in the LIMDEP computer package (Greene).

CRP Contract Holder Survey

During the summer of 1992, a mail survey was conducted among 740 CRP contract holders in the Texas High Plains Region, a 54-county area in northwest Texas that contains approximately 3.1 million of the 4.1 million acres of CRP lands in Texas. The contract holders surveyed represented a stratified sample (by location) comprised of approximately 5% of total contract holders in the Texas High Plains Region. The purpose of the survey was to identify and assess certain characteristics and attitudes of CRP contract holders and the CRP lands. Participants were asked a variety of questions concerning characteristics of the CRP lands in the contract, reasons for entry into the CRP, factors related to grazing potential of the lands, sociodemographic characteristics of the contract holder, and land use expectations if the contracts are not extended. The survey resulted in 439 returned questionnaires, representing a 59.5% response rate. Table 1 presents a summary of the survey results.

Respondents were asked to indicate the probable use of their CRP lands if current contracts are not extended. Results showed that 44% of the contract holders (representing 55% of CRP acres surveyed) would return all their CRP acres to crop production; 23% of contract holders (representing 14% of CRP acres surveyed) would return a portion of their CRP acres to crop production; and 31% of CRP acres would be maintained for grazing, haying, and wildlife. Based on survey responses, 69% of CRP acres would be returned to crop production if current contracts are not extended.

Model Specification

Data used for model estimation were based on a subset of 277 survey observations. The sample size was reduced from the total responses obtained in the survey due to exclusion of those respondents who failed to provide complete answers to a number of questions used in the construction of variables.

The dependent variable (*RECROP*) in the ordered probit model represented responses for the survey question regarding the proportion of acres to be returned to crop production. This variable was specified in three categories: (*a*) contract holders who plan to return all of their acres to crop production (*RECROP* = 2); (*b*) those who plan to return a portion of their acres to crop production (*RECROP* = 1); and (*c*) those who plan to maintain their acres in the established vegetative cover for grazing, haying, or wildlife (*RECROP* = 0). Based on the subsample, 54% of respondents planned to return all their acres to crop production, 30% planned to return a portion of their acres to crop production, and 16% planned to maintain their acres in the vegetative cover.

Independent variables included in the model were hypothesized to influence the contract holder's decision regarding post-contract CRP land use based on prior empirical evidence (Skaggs, Kirksey, and Harper; Janssen and Ghebremicael) and applicable theoretical paradigms. Several alternative model specifications were evaluated. Based on goodness-of-fit measures, a total of 10 independent variables were included in the final model. Definitions and summary statistics of the variables included in the reported model are given in table 2.

The variable *ENROLL* represents the reason for enrollment of the CRP acres and was specified as either economic (= 1) or conservation (= 0). Contract holders who enrolled acres for conservation reasons would be expected to consider conservation as important in their land use decision at contract expiration. Conversely, those who enrolled for economic reasons (higher expected income and/or reduced risk levels) would be expected to give a greater weight to relative profitability among alternative land uses in their land use decision. Therefore, given the specification of the dependent variable, the expected relationship for *ENROLL* within the model is positive.

Soil type (*SOIL*) and conservation compli-

Table 1. Summary of CRP Survey Results

Survey Questions	Responses as a Percent of CRP Acres Surveyed
Proposed use of CRP acres assuming no extension of the current program (N = 395):	
Return all acres to crop production	55
Return a portion of acres to crop production	14
Maintain vegetative cover for wildlife	2
Maintain vegetative cover for grazing or haying	29
Reasons for enrollment of acres in CRP (N = 439):	
Economic	52
Conservation	48
General soil type of enrolled acres (N = 439):	
Deep sand	12
Sandy loam	55
Loamy sand	16
Clay	17
CRP acres subject to conservation compliance (N = 439):	
Acres subject to compliance	56
Acres not subject to compliance	13
Don't know	31
Currently have a livestock enterprise in the farming operation (N = 431):	
Have a livestock enterprise	42
Do not have a livestock enterprise	58
Water and fencing for livestock (N = 431):	
Availability of water for livestock	
Yes	66
No	34
Availability of fencing for livestock	
Yes	36
No	64
The financial value of the commodity support base would be considered in the land use decision (N = 399):	
Yes	86
No	14
Education (N = 417):	
High school or less	40
Some post-high school education or training	28
Bachelor's degree or higher	32

ance requirements (*CONS*) are variables that explain conservation factors of the CRP acres. *SOIL* was specified as loamy sand (= 1) or other (= 0), which included soils tending toward more erodible soil types. The expected relationship between *SOIL* and the dependent variable is positive given the expectation that loamy sands would be more likely to be returned to crop production. The need for a conservation compliance plan due to highly erodible (HEL) soils was specified with the variable *CONS* as yes (= 1) or no or does not know (= 0). Contract holders with CRP acres that require a conservation plan if returned to crop production would be expected to consider the difficulty and cost of compliance in their land use decision. Therefore,

Table 2. Definitions and Summary Statistics of Variables in Ordered Probit Model

Variable Definition	Variable Name	Mean	S.D.	Max.	Min.
Dependent Variable:					
Land use 0 = 0% to crop production 1 = a portion to crop production 2 = 100% to crop production	*RECROP*	1.217	0.841	2	0
Independent Variables:					
Reason for CRP enrollment 1 = economic 0 = conservation	*ENROLL*	0.513	0.501	1	0
Soil type 1 = loamy sand 0 = other	*SOIL*	0.181	0.385	1	0
Conservation compliance 1 = yes 0 = no or do not know	*CONS*	0.560	0.497	1	0
Livestock enterprise 1 = yes 0 = no	*LIVESTOCK*	0.426	0.495	1	0
Water and fencing 1 = yes 0 = no	*WAT/FEN*	0.242	0.429	1	0
Financial value of commodity base 1 = yes 0 = no	*BASE*	0.827	0.379	1	0
Education 1 = bachelor's degree or higher 0 = up to some college	*EDUC*	0.307	0.462	1	0
Acres in the CRP contract	*ACRES*	253.7	279.2	1,967	9.5
Cotton base 1 = cotton base 0 = other	*COTTON*	0.502	0.501	1	0
Sorghum base 1 = sorghum base 0 = other	*SORG*	0.137	0.345	1	0

Note: Sample size = 277.

the expected relationship for *CONS* within the model is negative.

Upon contract expiration, the crop base associated with CRP acres will be returned to these lands. The variable *BASE* relates to the financial value of the commodity base. The financial value of the commodity base is capitalized into land values and would be expected to influence the decision to return CRP acres to crop production. This variable is associated with a survey question asking if the contract holder would consider the financial value of the commodity base in the post-contract land use decision. The variable was specified as yes (= 1) or no (= 0). If contract holders considered the financial value of the commodity base, a positive relationship to the dependent variable would be expected.

Cotton, grain sorghum, and wheat are the major crops of importance in the region. About 50% of the survey respondents indicated cotton as the predominant crop base on the land enrolled in the CRP contract. Grain sorghum and wheat were listed as the predominant crop base on 14% and 36% of CRP contracts, respectively. The presence of a particular crop base was included in the model with the variables *COTTON* and *SORG*.[1] The presence of a particular base was specified as yes (= 1) or no (= 0). Given the crop program considerations at the time of the survey, it was expected that if the land was returned to crop production, it would be returned under the crop base existing on the land. A crop base that represents a more profitable crop alternative would be expected to have a positive relationship to the dependent variable.

The decision to maintain CRP lands for grazing or haying may be related to the presence of a livestock enterprise within the contract holder's current farming operation. Additionally, the presence of livestock water and fencing on CRP acres may influence the decision to graze. The variable *LIVESTOCK* relates to the presence of a livestock enterprise within the contract holder's operation, and was specified as yes (= 1) or no (= 0). The variable *WAT/FEN* relates to the presence of water and fencing for livestock on the CRP acres within the contract holder's operation, and was specified as yes (= 1) or no (= 0). The expected relationship for *LIVESTOCK* and *WAT/FEN* within the model is negative, because these factors would be expected to influence contract holders to maintain CRP acres for grazing.

The variable *ACRES* is a continuous variable that is expected to have a positive relationship to the dependent variable because larger sized tracts of land represent more significant contributions to a farm's income. The specification of the variable *EDUC* was some college (= 0) and bachelor's degree or higher (= 1). Although there is a lack of theoretical foundations supporting a relationship between education and cropland decision, empirical evidence suggests a linkage between personal factors such as education and a farmer's conservation effort (Janssen and Ghebremicael; Kalaitzandonakes and Monson; Norris and Batie). However, no a priori relationship was hypothesized for the education variable due to a lack of applicable theoretical paradigms and inconsistent empirical evidence.

[1] A variable for wheat base was not included in the final model because it was found to be statistically insignificant and tended to bias other coefficients.

Table 3. Regression Results of Land Use Plans, *RECROP* (Ordered Probit Analysis)

Variable	Estimated Coefficient	Asymptotic *t*-Ratio	Level of Significance
Constant	−0.489774***	−1.793	0.073
ENROLL	0.244980*	1.579	0.114
SOIL	0.293101*	1.468	0.142
CONS	−0.173469	−1.125	0.260
LIVESTOCK	−0.502574***	−3.144	0.002
WAT/FEN	−0.559311***	−2.857	0.004
BASE	1.231360***	6.554	0.000
EDUC	0.417364***	2.440	0.015
ACRES	0.000512**	2.224	0.026
COTTON	0.333249**	1.962	0.050
SORG	0.410420**	1.713	0.087
μ_2	0.825344***	9.284	0.000

Summary Statistics:
No. observations = 277
−2 × log-likelihood ratio[a] = 32.6
Pseudo-R^2 = 0.31
Percent correctly classified = 61.2

Note: Single, double, and triple asterisks (*) denote significance at the .10, .05, and .01 level, respectively.
[a] The likelihood ratio statistic is distributed as χ^2 with 10 degrees of freedom and is significant at the .01 level.

Empirical Results

The estimation results from the ordered probit model are presented in table 3. Several goodness-of-fit measures are reported. Two measures are the log-likelihood ratio and the McFadden pseudo-R^2 (Maddala). An additional measure examines how well the model classified the respondents correctly based on the estimated probabilities. These measures indicate that the model had explanatory power and fitted the data reasonably well. The model correctly predicted 61.2% of the respondents' land use choices. Coefficients of all variables except *CONS* were significantly different from zero at the 0.10 level or better.

The signs for the variables *ENROLL* and *SOIL* were consistent with hypothesized relationships. The positive sign for the *ENROLL* variable supports the hypothesis that those acres enrolled in the CRP for economic reasons are more likely to be returned to crop production. The positive *SOIL* variable coefficient indicates that loamy sand soils are more likely to be returned to crop production. The coefficients for both of these variables were significantly different from zero at the 0.10 level.

The coefficients for the variables relating to livestock (*LIVESTOCK* and *WAT/FEN*) were negative and significantly different from zero at the 0.01 level. The signs of the coefficients for these variables support the hypothesis that the presence of a livestock enterprise or livestock water and fencing availability increase the likelihood of these acres remaining in vegetative cover for grazing.

Coefficients for the variables relating to commodity bases support the hypothesized relationship to the dependent variable. Contract holders who value the commodity base are more likely to return their acres to crop production. The coefficient for the *BASE* variable was significantly different from zero at the 0.01 level. The variables for cotton and grain sorghum base (*COTTON* and *SORG*) were significant at the 0.05 level, indicating that CRP acres with cotton and grain sorghum bases are more likely to be returned to crop production.

As the size of the contract increases, the likelihood of those acres returning to crop production increases. The coefficient for the *ACRES* variable was positive and significant at the 0.05 level. This result was consistent with expectations, and implies that larger CRP acreages may represent more significant proportions of the income potential of a contract holder's operation. The coefficient for the *EDUC* variable was positive and significant at the 0.01 level. This suggests that as education levels increase, contract holders are more likely to return CRP acres to crop production. This finding is in agreement with the results of Janssen and Ghebremicael, who found that education is significant in a contract holder's decision to return CRP land to crop production. This finding agrees with the results of Norris and Batie, who found a positive relationship between education and conservation adoption decision.

For qualitative choice models, the estimated coefficients should be interpreted in the sense that they affect the probability that a certain event would occur. This interpretation can be obtained by computing the probability derivatives or marginal probabilities from the estimated model. The marginal probability is used to measure the change in probability of each choice with respect to a change in each explanatory variable. However, the probability derivatives for binary variables do not exist. Therefore, the predicted probability for a given binary variable was calculated by holding all other variables at the sample means. Table 4 presents the estimated marginal probabilities and probabilities of selecting one of the three categories of post-CRP contract land use decisions. For each row in table 4, the sum of marginal probabilities is equal to zero, and the sum of probabilities is equal to one. The sum of marginal probabilities is always zero because an increase in the probability in one category must be offset by corresponding probability decreases in another category or categories.

As shown in table 4, a one-acre increase in the contract size (*ACRES*) increases the probability of returning 100% of the contract acres to crop production by 0.0002. This result suggests that larger contracts will have a higher probability of being returned to crop production, while smaller contracts will have a higher probability of remaining in the established cover. Contract holders who place a value on the commodity base (*BASE* = 1) have a higher probability of returning their CRP acres to crop production than those who do not place a value on the base, i.e., 55.1% for *BASE* = 1 compared to 13.5% for *BASE* = 0. The type of commodity base, with respect to the contract acres, also influences the land use decision. Contracts with cotton base (*COTTON*) have a probability of 0.51 of being returned

Table 4. Estimated Marginal Probabilities and Probabilities by Decision Categories

Variable	Return 0% to Production	Return a Portion to Production	Return 100% to Production
	Decision Categories		
	Marginal Probability		
ACRES	−0.00015	−0.00005	0.00020
	Probability		
ENROLL			
1 = economic	0.195	0.291	0.514
0 = conservation	0.269	0.314	0.417
SOIL			
1 = loamy sand	0.163	0.275	0.562
0 = other	0.245	0.309	0.446
CONS			
1 = yes	0.253	0.311	0.436
0 = no	0.201	0.294	0.505
LIVESTOCK			
1 = yes	0.325	0.320	0.355
0 = no	0.170	0.278	0.552
WAT/FEN			
1 = yes	0.375	0.319	0.306
0 = no	0.190	0.289	0.521
BASE			
1 = yes	0.170	0.279	0.551
0 = no	0.609	0.256	0.135
COTTON			
1 = cotton base	0.197	0.292	0.510
SORG			
1 = sorghum base	0.177	0.282	0.541
EDUC			
1 = bachelor's degree +	0.151	0.267	0.581
0 = up to some college	0.270	0.314	0.416

100% to crop production, while the corresponding probability for contracts with grain sorghum base (*SORG*) is 0.541.

Contract holders with no current livestock enterprise (*LIVESTOCK* = 0) and/or CRP acres without water and fencing (*WAT/FEN* = 0) have a higher probability of returning 100% to crop production. The probability of returning 100% to crop production when *LIVESTOCK* = 0 is 55.2%, compared to 35.5% when *LIVESTOCK* = 1. If the reason for entering acres into the CRP (*ENROLL*) was for financial reasons, there is a greater probability of returning 100% to crop production. Conversely, acres enrolled for conservation reasons reflect a greater probability of remaining in the established cover. Acres subject to conservation compliance (*CONS* = 1) have a lower probability of being returned 100% to crop production. Contract holders with a bachelor's degree or higher (*EDUC* = 1) have a greater probability of returning acres to 100% crop production.

Conclusions and Policy Implications

The post-contract land use decision for CRP lands was grouped in this analysis into three categories: (*a*) return all acres to crop production, (*b*) return a portion of the acres to crop production, or (*c*) maintain all acres in the established vegetative cover. The results of a survey of contract holders in the Texas High Plains Region indicated that 69% of CRP acres would be returned to crop production in the absence of an extension of current contracts. An estimated 55% of CRP acres would be returned to crop production as total acres in a contract, with 14% of CRP acres returning to crop production as a portion of acres in a contract. Survey results also suggest that about 86% of respondents' decision to return CRP acres to crop production would be influenced by the financial value of the commodity base. Further, approximately 56% of the responding contract holders were found to own CRP acres that require a conservation plan if returned to crop production.

The results of the ordered probit analysis suggest that the financial value of the commodity base will be a significant factor in the post-contract land use decision. The presence of a livestock enterprise in the contract holder's operation increased the probability of these acres remaining in the established cover. The probability of acres returning to crop production increased with contract size. As the education level of contract holders increased, the likelihood of their acres returning to crop production increased.

The future of CRP lands is closely related to the direction of agricultural policy in the U.S., which has centered around the concept of flexibility in crop production decisions and reduced farm program payments. This concept is embodied in the Federal Agricultural Improvement and Reform Act of 1996. Under the 1996 farm legislation, crop bases will remain fixed for payment purposes, while farmers will have flexibility in the crops they choose to plant. Annual transition payments will be made over a seven-year period, with the implication being that at the end of this period (in the year 2002) payments will no longer be made. Therefore, the financial value of a crop base for an individual farm will decline over the seven-year period of market transition payments as the present value of future payments declines, and will be uncertain thereafter.

While it is true that the level of payments associated with commodity bases has declined in recent years, the probit analysis indicated that contract holders who consider the financial value of the commodity base in their post-contract land use decision are more likely to return their acres to crop production. The financial value of the commodity base to contract holders, as supported by the results of the analysis, would be significantly reduced under the 1996 farm legislation. With planting flexibility, the decision with regard to returning CRP acres to crop production will be based on the relative profitability of alternative crop or livestock enterprises. The enactment of the 1996 farm legislation replaces commodity price supports with seven years of transition payments that are decoupled from production, while providing greater cropping flexibility. If the future financial value of the commodity base is reduced, as will be the case under the 1996 farm legislation, CRP contract holders may be less likely to return acres to crop production.

The results of the ordered probit analysis suggest that the presence of a livestock enterprise within the current operation of the contract holder and/or the presence of water and fencing on the CRP contract acres increase the likelihood of CRP acres remaining in the permanent vegetative cover. Findings of the 1994 Soil and Water Conservation Society survey (Osborn, Schnepf, and Keim) show that cost sharing of water and fencing would have limited impacts, with only 13% of the CRP acres in the Southern Plains being kept in grass for five years with cost sharing. However, the post-contract policy implications of this study indicate that cost sharing for providing water and fencing on CRP contract acres could increase the likelihood of these acres remaining in the established cover.

The 1996 farm legislation allows the use of post-contract CRP acres for grazing, with market transition payments being made. This provision may encourage the maintenance of these acres in the permanent vegetative cover. The importance of a livestock enterprise within the CRP contract holder's operation indicates that the establishment of livestock enterprises during the transition period may provide encouragement for more acres to be maintained in the vegetative cover established under the CRP.

References

Atkinson, M.M., and M.R. Dicks. "Post-CRP Land Use Decisions in Oklahoma." In *Proceedings of the NCT-163 Post-Conservation Reserve Program Land Use Conference,* Denver CO, 10–11 January 1994.

Clark, R.T., S.L. Elmore, M. Baker, and B.B. Johnson. "Nebraska's CRP Land-Producer Intentions for Future Use." In *Proceedings of the NCT-163 Post-Conservation Reserve Program Land Use Conference,* Denver CO, 10–11 January 1994.

Dicks, M.R. "More Benefits with Fewer Acres Please!" *J. Soil and Water Conserv.* 42(1987): 170–73.

Diebel, P.L., T.T. Cable, and P.S. Cook. "The Future of Conservation Reserve Program Land in Kansas: A Landowner's View." In *Proceedings of the NCT-163 Post-Conservation Reserve Program Land Use Conference,* Denver CO, 10–11 January 1994.

Ervin, R.T., and P.N. Johnson. "Economic Evaluation of the Conservation Reserve Program in the Southern High Plains of Texas." Report prepared for the Soil Conservation Service State Office for Texas, Temple TX, December 1992.

Ervin, R.T., and J.A. Lee. "Impact of Conservation Practices on Airborne Dust in the Southern High Plains of Texas." *J. Soil and Water Conserv.* 49(1994):430–35.

Goodman, B., and B. Hughes. "Impact of Returning CRP Grassland in Alabama." In *Proceedings of the NCT-163 Post-Conservation Reserve Program Land Use Conference,* Denver CO, 10–11 January 1994.

Greene, W.H. LIMDEP. Bellport NY: Econometric Software, Inc., 1990.

Gustafson, C., and C. Hill. "Future Land Use Decisions of North Dakota Conservation Reserve Program Participants." In *Proceedings of the NCT-163 Post-Conservation Reserve Program Land Use Conference,* Denver CO, 10–11 January 1994.

Janssen, L.L., and T. Ghebremicael. "Post-Contract CRP Land Use Decisions in South Dakota: Results from a 1993 CRP Survey." In *Proceedings of the NCT-163 Post-Conservation Reserve Program Land Use Conference,* Denver CO, 10–11 January 1994.

Kalaitzandonakes, N.G., and M. Monson. "An Analysis of Potential Conservation Efforts of CRP Participants in the State of Missouri: A Latent Variable Approach." *J. Agr. and Appl. Econ.* 26(1994):200–208.

Lant, C., S.E. Kraft, and K. Munyoka. "The Plans of CRP Contract Holders for the Post-Contract Use of Their CRP Land." In *Proceedings of the NCT-163 Post-Conservation Reserve Program Land Use Conference,* Denver CO, 10–11 January 1994.

Maddala, G.S. *Limited-Dependent and Qualitative Variables in Econometrics.* New York: Cambridge University Press, 1983.

McFadden, D. "Econometric Models of Probabilistic Choice." In *Structural Analysis of Discrete Data with Econometric Applications,* eds., C.F. Manski and D. McFadden, pp. 198–272. Cambridge MA: The MIT Press, 1981.

Misra, S.K., C.L. Huang, and S.L. Ott. "Consumer Willingness to Pay for Pesticide-Free Fresh Produce." *West. J. Agr. Econ.* 16(1991):218–27.

Monson, M., and R. Lenkner. "A Sample of CRP Contract Holders on Future Land Use." In *Proceedings of the NCT-163 Post-Conservation Reserve Program Land Use Conference,* Denver CO, 10–11 January 1994.

Norris, P.E., and S.S. Batie. "Virginia Farmers' Soil Conservation Decisions: An Application of Tobit Analysis." *S. J. Agr. Econ.* 19(1987):79–90.

Nowak, P.J., M. Schnepf, and R. Barnes. "When Conservation Reserve Program Contracts Expire: A National Survey of Farm Owners and Operators Who Have Enrolled Land in the Conservation Reserve." Soil and Water Conservation Society, Ankeny IA, 1991.

Osborn, C.T., M. Schnepf, and R. Keim. "The Future Use of Conservation Reserve Program Acres: A National Survey of Farm Owners and Operators." Soil and Water Conservation Society, Ankeny IA, 1994.

Skaggs, R.K., R.E. Kirksey, and W.M. Harper. "Determinants and Implications of Post-CRP Land Use Decisions." *J. Agr. and Resour. Econ.* 19(1994):299–312.

Young, C.B., and C.B. Osborn. "The Conservation Reserve Program: An Economic Assessment." Agr. Econ. Rep. No. 626, USDA, Economic Research Service, Washington DC, February 1990.