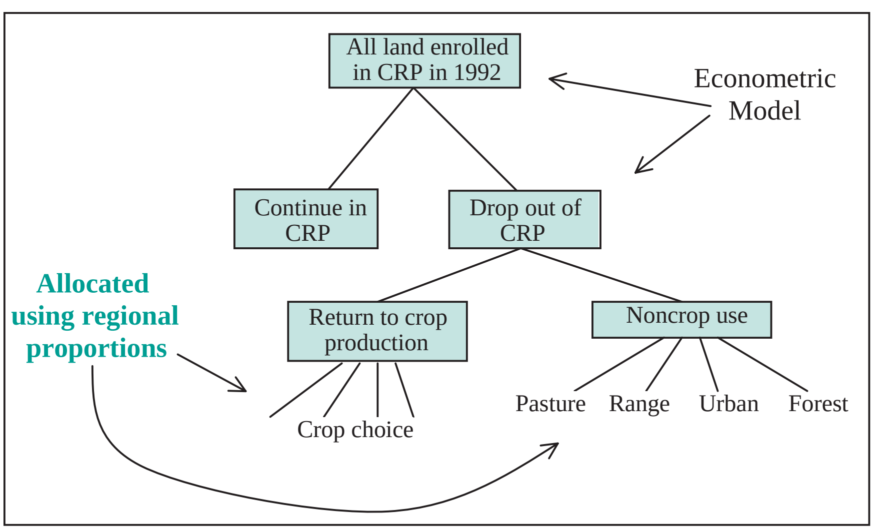
Appendix B: Predicting Land-Use Changes

This appendix describes the econometric model used to predict land uses of CRP parcels after contracts expire. Following traditional discrete-choice studies on land-use change, the model draws on rent theory to simultaneously predict parcel-level CRP re-enrollment and post-CRP land use using county-level profit measures in five broad categories of land use: urban, range, forest, pasture, and crops. The model is calibrated using observation-level land-use data from USDA's Natural Resources Inventory (NRI) and county-level profit estimates constructed from a variety of sources. The model estimates the likelihood a parcel enrolled in CRP as of 1992 continues in CRP through 1997, and, if not, the likelihood it returns to crop production. To predict post-CRP land uses of all parcels enrolled as of November 2002, we extrapolate from this calibration using more recent data on profit and land currently enrolled in CRP. The basic structure of the model is illustrated in Figure B.1.

We condition our estimates on interactions between parcel attributes and county-level profits and profit changes. Specifically, we include a measure of parcel erodibility and indicator variables of land cover while under contract with CRP.[73] Including these variables and interactions should account for some within-county variation in land-use rents as well as variation in the costs of converting land from the CRP cover to another use. Our model also includes regional averages of land-use change to proxy for unobserved land-use determinants correlated across space. Specifically, we include the shares of CRP parcels in each crop district that opted out of the program and the shares returning to crop production conditional on dropping out. In this way, we account for some unobserved factors correlated across space that may affect the rent for crop production relative to other land-use alternatives.[74]

Figure B.1
The structure of the econometric model



Source: Economic Research Service, USDA.

[73] The NRI includes many land characteristics. We use only these two because they are the only variables that have matching counterparts in our prediction data set: the 2002 CRP contract file. For in-sample prediction using the NRI, additional land characteristic variables have little influence over the predictions.

[74] This approach differs from an approach common in the literature on spatial econometrics, which uses a spatially autocorrelated error structure (e.g., Anselin, 1988). We do not employ these methods due to the computational burdens of implementing a spatial error structure in a discrete-choice framework.

A Binomial Probit Model

We estimate the likelihood each CRP land parcel is converted back to crop production using a subset of observations from the NRI enrolled in CRP in 1992 and not enrolled in 1997.[75] The NRI is a panel survey conducted at five-year intervals (1982, 1987, 1992, and 1997) that provides information on land use, land characteristics, and conservation practices for about 800,000 points of non-Federal land in all counties of the contiguous United States plus Hawaii, Puerto Rico, and the U.S. Virgin Islands. Each NRI point represents a different number of acres according to an acreage weight that is inversely proportional to the sampling intensity for that location and land use.

We hypothesize that the probability a parcel will be converted to crop production upon exit from CRP depends on the profits associated with cropping activities compared with noncropping activities, which vary geographically. The decision also depends on the cover in place while the parcel was enrolled in CRP. For example, land planted with trees may be more costly to convert to cropland than land planted with grass.

We assume the decision to crop a land parcel is tied to a latent variable Y that is a continuous function of observed profit measures, cover type, and erodibility, plus a normal distributed error which encapsulates unobserved factors. The variable Y may be interpreted as the excess profitability of planting crops as compared to the next most profitable alternative. If $Y > 0$, the land is converted to cropland; otherwise, it is not.

Specifically, we assume:

$$Y = f(\mathbf{X}) + e \qquad (1)$$

where $\mathbf{X}$ is a vector of explanatory variables and ε a normal-distributed error uncorrelated with $f(\mathbf{X})$. Thus, if we denote the normal distribution function by Φ,

$$Prob\ (Y > 0) = \Phi(f(\mathbf{X})). \qquad (2)$$

This is a general characterization of a binomial probit.

After examining several functional forms for $f(\mathbf{X})$, we chose a linear model that considers all possible second-order interactions between our county-level rent proxies and parcel-level variables—erodibility and cover.[76] We examine these interactions because lands with different attributes may be more or less likely to convert to crops for a given set of rent measures, especially because these measures are based on relatively coarse county-level data (described below).[77] We begin with a model that includes interactions between all county-level rents and rent changes with both parcel-specific attributes. We then drop and add terms from this more general model in order to minimize the Akaike (1974) information criterion (AIC).

[75] Observations (points) from the NRI are used to model what happens to land that leaves the CRP. To predict what would happen to all CRP land, the coefficients from this model are then applied to parcel data from the CRP contract file.

[76] A longer technical appendix, available online, describes this selection process in greater detail (see http://www.ers.usda.gov). In this selection process, we compared the model described here to a simpler linear model and a more flexible nonparametric model.

[77] A reviewer suggested that CRP rental rate is a sufficient estimator for excess land profitability. We included the additional predictors described for several reasons. First, CRP rental rates (and the county-level profit proxies) do not encapsulate conversion costs, which may include fixed components (for example, cutting down trees). Furthermore, CRP rental rates do not necessarily equal the returns to converting land back to crops. Although CRP rental rates are likely greater than or equal to the rents associated with other land-use alternatives at the time of signup, rents to other land uses change over time, and the bidding process is structured in a way that may allow some farmers to obtain surplus rents by enrolling in CRP. In addition, our CRP rental rate estimate, like our profit estimates, is at the county level, not parcel specific. For these reasons, we include proxies for alternative land-use profits, changes in these profits since initial signup, and specific land attributes as additional predictors.

Let i index the parcel-specific elements of **X**, which we denote by x_i^S; and let j index our county-level rent measures (and differences), denoted by x_j^C. For this specification, we can define $f(\mathbf{X})$ as:

$$f(\mathbf{X}) = \beta_0 + \Sigma_i \beta_i^S x_i^S + \Sigma_j \beta_j^C x_j^C + \Sigma_i \Sigma_j \beta_{ij} x_i^S x_j^C. \quad (3)$$

Our goal is to use the econometric model to predict the likelihood that each current CRP contract will return to crop production if the program were to end. Because the observations (from the NRI) that dropped out of CRP between 1992 and 1997 were not randomly assigned, predictions of this kind can be biased if we extrapolate our model to current CRP parcels. In other words, *un*observed factors may jointly affect the decision to remove a parcel from CRP and convert it back to crops if it has exited.

Decisions to exit CRP and to plant crops if exiting are likely determined jointly. For example, land relatively more profitable in crop production is probably more likely to exit and to be converted to crop production. It is unclear, however, whether or not our model and explanatory variables capture these joint determinants. If unobserved factors jointly determine the likelihood a parcel drops out of CRP and the likelihood it returns to crop production given it is no longer enrolled in the program, there is a sample selection problem.

We deal with this problem using Heckman's two-step procedure (Heckman 1978, 1979). Effectively, this procedure jointly models the decision to exit CRP with the decision to return a parcel not re-enrolled in CRP to cropland production. In practice, we do this in two steps.[78] In the first step we predict whether or not a parcel with an expiring CRP contract will re-enroll in CRP. We denote with the estimated value of a latent variable to which the probability a CRP parcel drops out of CRP is linked. We then calculate the predicted "odds ratio" that each parcel will drop out of CRP. That is,

$$\text{odds ratio} = h = \frac{\phi(\hat{D})}{\Phi(\hat{D})}, \quad (4)$$

where $\phi(\hat{D})$ is the value of the normal density function at $\hat{D}$ and $\Phi(\hat{D})$ is the probability that a parcel drops out of CRP (the cumulative normal density at $\hat{D}$). We use the same structure described above to estimate the first-stage CRP dropout.[79] We then construct the odds ratio and include it as a predictor in the second-stage estimates—the model described above for whether land not re-enrolled in CRP returns to cropland production. This procedure provides consistent estimates in the second stage even when the error in the first stage is correlated with the error in second stage.

[78] One can also estimate these two equations simultaneously using full-information maximum-likelihood. At present, this approach is infeasible for projection pursuit regression, a non-parametric method we used to check the fit of the simpler parametric models reported. We used the two-step procedure for all specifications to provide a consistent basis for comparison between candidate models.

[79] We do not report estimates of these first-stage models. These estimates are available upon request.

Data

As described above, we use an in-sample data set for our estimation and an out-of-sample data set to predict post-CRP uses of lands currently enrolled in the program. The in-sample data set contains observations of CRP re-enrollment and land-use choices as well as parcel-level observations of erodibility and CRP cover from the NRI. More recent data on current CRP acres were obtained from the Farm Service Agency (FSA). The FSA data contain information on total county acres in CRP and observations of erodibility and cover practice for each CRP contract.

The data set used in the first stage includes all NRI observations enrolled in CRP in 1992 and/or 1997. The data set used in the second stage includes all lands enrolled in 1992 but not enrolled in 1997. The first-stage sample includes 21,172 observations and the second-stage subsample includes 2,756 observations. These observations span 1,599 counties in 42 States and 762 counties in 39 States, respectively.

We consider six land use categories, designated by the NRI, that exhaust the non-Federal land base: crops, pasture, forests, urban, range, and other.[80] The NRI also provides an extensive set of variables on land characteristics including two we incorporate into our model: erodibility and land cover. Land cover is classified into two categories: grasses and/or legumes and trees and/or wildlife practices.[81] In 1992, approximately, 85 percent of total contract acres were in grass/legumes and 15 percent in trees/wildlife. In total, 19,785 NRI points, representing 34,042,100 acres, were reported in the CRP in 1992 with 91 percent of acres under grass/legumes and just 9 percent in trees/wildlife cover. Of these 1992 CRP acres, approximately 11 percent were no longer enrolled in CRP by 1997. The estimated mean dropout rates for lands in the grasses/legumes was slightly higher than for lands under trees/wildlife cover, with 11 percent and 9 percent of acres dropping out from each cover type, respectively.

Of the land that dropped out of the CRP between 1992 and 1997, about 63 percent returned to crop production. This percentage was sensitive to the type of cover, with land in trees and wildlife substantially more likely to continue under forest rather than in crop production or grazing. Although 56 percent of acres in trees/wildlife were covered in forest as of 1997, less than 1 percent of lands in grass/legumes were planted or naturally regenerated with trees after dropping out of CRP.[82]

To make predictions regarding post-CRP land use on currently enrolled acres, we use data obtained from FSA on 589,932 CRP contracts, representing all 33.3 million acres enrolled as of November, 2002. This data set contains data on acreage enrolled, county location, erodibility, and CRP cover practice for every CRP contract.

Besides erodibility and land cover, our key explanatory variables are county-level profit proxies for five alternative land uses: crops, pasture, forest, urban, and range. Using county-level data derived from various sources, we construct measures of revenues less variable costs for each of these five land-use activities.

We assume landowners and operators base their expectations of future land-use returns using current levels of prices and, when relevant, the average value of yields over the previous 5 years. In this way, we smooth over idiosyncratic weather shocks that affect yields in particular years. We use the current commodity price because time-series of most commodity prices show a strong degree of autocorrelation—price shocks are far more persistent than yield shocks. Data on cash costs as a percentage of revenue at the State and regional level, respectively, are from the Census of Agricul-

[80] Our data on land use is from USDA National Resources Inventory (NRI). “Croplands” include row and close-grown crops, fallow, pasture and haylands in rotation with crops, permanent haylands, vineyards, orchards, and nurseries. “Pasture” includes land managed for introduced forage for livestock grazing. “Range” includes land under native or introduced forage suitable for grazing which, unlike pasture, receives only limited management. “Forests” are areas at least one acre in size and 100 feet in width that are least 10-percent stocked with trees with the potential to reach 13 feet at maturity. From an aerial perspective, this definition equates to a canopy cover of at least 25 percent. “Urban lands” include areas in residential, industrial, commercial, otan areas, as these are separately identified by the NRI.

[81] While the NRI distinguishes between trees and wildlife covers, we group these two into one category given the small number of observations.

[82] NRI's forest classification can include lands with early evidence of natural forest regeneration.

ture and USDA's Economic Research Service (ERS). County acreage data from NASS and the Census of Agriculture provided weights for averaging across individual crops. County-level estimates of total Federal program payments per acre are from the Census of Agriculture and include receipts from deficiency payments, support price payments, indemnity programs, disaster payments, and payments for soil and water conservation projects. Since we cannot observe the exact year in which a land-use decision is made between NRI surveys, we use 1996 prices in our econometric estimation of re-enrollment decisions following contract expiration over 1996-1997. For the out-of sample predictions, we use 2001 prices, the latest year for which all of our data are available.

Using these levels of prices and yields, we construct measures for each county in the contiguous United States of the expected per acre annual net returns that can be expected from the major land-use alternatives. We estimate net returns to continuing in CRP, to returning to crop production, and to the four major noncrop land uses (pasture, forest, urban, and range). For our measure of returns to re-enrolling in the CRP, we use county-average CRP rental rates per acre obtained from FSA's data on individual contracts. The estimates for returning to crop production include the net returns from market sales as well as government farm program payments, excluding payments for cropland retirement under the CRP and the Wetlands Reserve Program (WRP), which are jointly reported in the Census of Agriculture. These land-retirement programs are excluded because we separately model the decision to reenroll in the CRP. Returns to forests and urban uses are initially calculated as the net present values of a perpetual stream of timber harvests and rents from housing development, respectively, and then annualized with an assumed private discount rate of 5 percent.

For all CRP contracts as of November 2002, crop returns (and changes in returns) are lower than in the total in-sample, with values of $58 ($22) and $90 ($53), respectively. This reflects the decline in crop prices from 1996 to 2001. Returns to pasture (and changes in returns) are also slightly higher for the NRI observations that drop out of CRP, compared to the NRI points that stay in CRP. Total pasture returns (but not changes in returns) are also higher in the total out- versus in-sample.

Lastly, our explanatory variables include regional averages of land-use change to proxy for unobserved land-use determinants correlated across space. Specifically, we include the shares of CRP parcels in each crop district that opted out of the program and the shares returning to crop production conditional on dropping out. In this way, we account for some unobserved factors correlated across space that may affect the rents from crop production relative to other land-use alternatives.[83]

County-Level Estimates of Annual Net Returns

Cropland Net Returns: Estimated annual cropland net returns per acre consist of two components: a weighted average of the net returns per acre for 21 major crops based on prices, yields, costs, and acres, and total Federal farm program payments per acre, excluding conservation payments for cropland retirement. We used State-level marketing-year-average prices

[83] Technically, the regional proportions on the right-hand side of the regression are endogenous. However, because there are a relatively large number of observations in most crop districts, this should not affect regression estimates. The average number of NRI CRP points in a crop district is 81. This number ranges from 1 to 742, with 75 percent of districts having more than 10 observations.

and county-level yields from the National Agricultural Statistics Service (NASS) for all crops (barley, all dry edible beans, corn, cotton, flaxseed, alfalfa hay, other hay, oats, peanuts, potatoes, rye, rice, sorghum, soybeans, sugarcane, sugar beets, sunflowers, tobacco, winter wheat, durum wheat, other spring wheat).

<u>Pasture Net Returns</u>: Annual net returns per acre for pasture were estimated using pasture yields from the National Cooperative Soil Survey (NCSS), averaged for each county using NRI soils and acreage data. We multiplied these yields by the State price for "other hay" from NASS and subtracted costs per acre for hay and other field crops from the Census of Agriculture.

<u>Range Net Returns</u>: Annual net returns per acre for rangeland were estimated using forage yields from NCSS, weighted with NRI soils and acreage data and multiplied by State-level per head grazing rates for private lands from the ERS database on cash rents. Costs for range management are assumed to be borne by the tenant and thus reflected in the grazing rates.

<u>Forest Net Returns</u>: We estimate annual forestry net returns per acre by annualizing at a 5- percent interest rate the net present value of a weighted average of sawtimber revenues from different forest types based on prices, yields, costs, and acres. State-level stumpage prices were gathered from a variety of State and Federal agencies and private data reporting services. Regional merchantable timber yield estimates for different forest types were obtained from Richard Birdsey of the U.S. Forest Service. Regional replanting and annual management costs were derived from Moulton and Richards (1990) and Dubois, et al. (1999). The net present value of an infinite stream of forestry revenues for each forest type was calculated using an optimal rotation age determined with the Faustmann formula, assuming forests start at year zero in a newly planted state. County acreage and sawtimber output data from the U.S. Forest Services's Forest Inventory and Analysis (FIA) and Timber Product Output (TPO) surveys provided weights for averaging across individual forest types and species, respectively.

<u>Urban Net Returns</u>: Annual urban net returns per acre are estimated as the median value of a recently developed parcel, less the value of structures, annualized at a 5-percent interest rate. This measure corresponds to the average annual rents from an acre of improved bare land and is based on the value of land for construction of single-family homes, which is the primary use of developed land at the national scale. Median county-level prices for single-family homes were constructed from the decennial Census of Population and Housing Public Use Microdata Samples and the Office of Federal Housing Enterprise Oversight (OFHEO) House Price Index. Regional data on lot sizes and the value of land relative to structures for single-family homes were obtained from the Characteristics of New Housing Reports (C-25 series) and the Survey of Construction (SOC) microdata from the Census Bureau. Further details on the construction of the urban net returns are provided in Plantinga, et al. (2002).

More complete descriptions and citations of data sources are provided in Lubowski (2002) and are available from the authors upon request.

Empirical Results

Table B.1 summarizes the estimates of the two parametric models, equations 3 and 4, both with and without Heckman's sample-selection correction. The variable names denote the crop-district-level crop share variable; the parcel-level measures of erodibility and cover type (grass/legumes and trees/wildlife); and the county-level CRP rental rates and measures of net returns to alternative land uses. The best linear model with interactions (determined by minimization of the AIC) explains 31.6 percent of the deviance. When we include Heckman's odds ratio to correct for sample-selection bias, the fit improves to just 31.7 percent of the deviance. The model implies that crop profits, cover type, the spatial variable, erosion, and the CRP rental rate are the most significant explanatory variables explaining conversion back to crops. The greater crop profits and crop profit growth, the greater the likelihood a parcel will return to cropland. When interaction terms are considered, the significance of these variables is most evident via their interaction with the other variables and with each other. Forest and pasture profits reduce the likelihood that CRP parcels are converted to cropland, but they are not individually statistically significant. Wildlife cover and especially tree cover reduce the likelihood of conversion to crops compared with grass or legume covers. These interactions suggest that the effects of both profits and cover types can be different depending on the erodibility of the land.

Heckman's odds ratio is statistically significant in all the models and implies, conditional on observable characteristics, that parcels that continued in CRP are less likely than those having dropped out to be converted to crop production upon contract termination. This seems consistent with economic intuition that the better the cropland, the greater the enticement to take land out of CRP and place it back into crop production. This effect, however, is small. Regardless of whether or not we use the Heckman correction, the average predicted probability that a parcel will be converted to crop production is lower for parcels that did not drop out of CRP compared with those that did. Indeed, the average probabilities are quite similar, which suggests that our explanatory variables capture most of the differences between parcels that dropped out of CRP and those that did not.

The linear model implies that crop rents, cover type, location (the spatial surface), and the prime farmland indicator are the most statistically significant explanatory factors predicting conversion to crop production. The greater the net returns from cropping and the growth in these returns, the greater the likelihood that a parcel will revert to crop production upon exiting CRP. In the larger model with interaction terms, the significance of the different variables is partially evident through their interaction with the other variables and with each other. Due to the many interactions in the larger model, one cannot easily discern marginal effects of each variable from a casual inspection of coefficients. Insight into the average marginal effects of the net return variables can be obtained by examining how the predictions change when adding and subtracting 50 percent to one variable at a time, holding all other variables static. Results from these simulations are reported in Table B.2. Increases in crop net returns, including government payments, (and decreases in range and urban net returns) modestly increase the predicted likelihood that the average parcel will convert to

Table B.1—Summary of parametric probit models

Explanatory variable	Model					
	Simple linear model		AIC minimum		Heckman two-step	
	Estimate	Standard error	Estimate	Stamdard error	Estimate	Standard error
INTERCEPT	**-1.051**	0.120	**-0.853**	0.244	**-1.691**	0.3905
CROPSHARE	**2.015**	0.109	**1.977**	0.113	**2.011**	0.1146
ERODIBILITY	**-0.007**	0.002	-0.011	0.006	-0.010	0.0061
URBAN	0.000	0.000	0.000	0.000	0.000	0.0000
RANGE	0.000	0.003	-0.016	0.011	-0.016	0.0110
CROPS	**0.002**	0.001	0.001	0.002	0.0001	0.0019
FOREST	-0.004	0.006	0.004	0.007	0.003	0.0072
PASTURE	-0.0003	0.0030	**-0.011**	0.004	**-0.012**	0.0041
Δ URBAN	0.0000	0.0001	0.000	0.000	-0.0001	0.0002
Δ RANGE	-0.0002	0.0133	0.035	0.045	0.034	0.0454
Δ CROPS	**0.002**	0.001	**0.007**	0.002	**0.008**	0.0019
Δ FOREST	0.001	0.008	-0.004	0.011	-0.0004	0.0111
Δ PASTURE	-0.003	0.002	**-0.008**	0.003	-0.005	0.0035
RENT	**0.004**	0.001	0.000	0.004	0.002	0.0045
COVER-T	**-0.591**	0.141	0.584	0.366	0.390	0.3704
COVER-W	**-0.393**	0.173	0.375	0.393	0.345	0.3932
EI*CROPS			**-0.0002**	0.0001	**-0.0002**	0.0001
EI*PASTURE			**0.0008**	0.0002	**0.0008**	0.0002
EI*Δ RANGE			**0.0021**	0.0010	**0.0021**	0.0010
EI*Δ FOREST			**-0.0007**	0.0004	**-0.0007**	0.0004
URBAN*RENT			0.0000	0.0000	0.0000	0.0000
RANGE*RENT			**0.0004**	0.0002	**0.0004**	0.0002
RANGE*COVER-T			**-0.0598**	0.0255	**-0.0572**	0.0256
RANGE*COVER-G			0.0271	0.0243	0.0274	0.0244
CROPS*RENT			**0.0001**	0.0000	**0.0001**	0.0000
FOREST*COVER-T			-0.0300	0.0163	-0.0221	0.0164
FOREST*COVER-G			**-0.0727**	0.0264	**-0.0634**	0.0264
Δ URBAN*RENT			0.0000	0.0000	0.0000	0.0000
Δ RANGE*RENT			**-0.0018**	0.0009	**-0.0019**	0.0009
Δ CROPS*RENT			**-0.0001**	0.0000	**-0.0001**	0.0000
Δ PASTURE*RENT			0.0001	0.0001	0.0001	0.0001
Heckman odds ratio					**0.4087**	0.1475
Percent deviance explained	29.3	31.6	31.7			
AIC	2,685.8	2,621.6	2,615.5			

Bold indicates statistical significance with 5-percent confidence.

Source: Economic Research Service, USDA.

crops upon exiting CRP. Because crop prices increased markedly between 1986 and 1996, the estimates suggest that a smaller share of exiting CRP lands would have returned to crop production if net returns had not increased. Similarly, a larger share would have returned to crop production if government payments had not decreased during this period. The predicted likelihood of returning to crops was not sensitive to the simulated changes in either forest or pasture net returns.

Table B.3 compares the in-sample (NRI parcels that dropped out of CRP) and out-of-sample (NRI parcels still enrolled in CRP in 1997) predictions. All models predict that between 61.2 and 61.3 percent of in-sample acres return to cropland and that between 52.2 and 53.4 percent of out-of-sample

Table B.2—Sensitivity of predictions to changes in net returns variables

Scenario		Predicted acres returning to crop production in 1997[1]					
		In-sample (exited CRP)			Out-of-sample (in CRP in 1997)		
Variable	Change in 1996 level[2]	All parcels	Grass or legume cover	Trees or wildlife cover	All parcels	Grass or legume cover	Trees or wildlife cover
				Percent			
Original results		61	64	26	53	56	31
Crop net returns	+50	66	69	29	58	61	35
(*CROPS*)	-50	56	59	22	48	51	27
Pasture net returns	+50	60	63	25	52	55	30
(*PASTURE*)	-50	62	65	27	55	57	32
Forest net returns	+50	60	63	23	52	55	28
(*FOREST*)	-50	63	66	30	55	58	34
Range net returns	+50	58	61	23	52	54	27
(*RANGE*)	-50	64	66	32	56	57	38
Urban net returns	+50	56	59	24	50	53	30
(*URBAN*)	-50	65	68	28	56	59	32

[1]Predictions are estimates from the Heckman two-step model based on the linear model with interactions.
[2]Predictions based on the indicated percentage change in the 1996 levels of a particular variable (e.g. CROPS) as well as on the corresponding new values for the 1986-1996 change in this variable (e.g. Δ CROPS).

Source: Economic Research Service, USDA.

Table B.3—Predicted acreage returning to crop production

Model	In-sample (dropped out of CRP)	Out-of-sample (in CRP in 1997)
	Percent	
Actual (see table 4.1)	62.6	N/A
Simple linear	61.2	52.2
Linear with interactions (AIC minimum)	61.3	52.5
Heckman two-step	61.2	53.4

Source: Economic Research Service, USDA.

acres enrolled in CRP in 1997 would have returned to cropland had their contracts been terminated.

To make predictions about post-CRP use of land remaining in CRP, we utilize parameter estimates derived mainly from data on parcels that dropped out of CRP. Because these parcels are somewhat different from the parcels that continued in CRP, we must extrapolate.

Table B.4 reports the AIC-selected model's predictions for the 2002 CRP contract file, taking into account changes in our profit measures between 1997 and 2002. We made separate predictions for each contract based on the parcel's cover and erodibility, and our profit estimates. We then aggregated these predictions to obtain State-level and nationwide predictions. The table reports the number of CRP acres enrolled in each State as of November 2002 and the predicted number and share of acres returning to cropland if the program were to end, ranked by the amount of land in the CRP (column 2). The 95-percent confidence interval for the predicted percentage of each

Table B.4—Predicted share of CRP acres returning to crops upon program expiration, 2002

State	CRP land (acres)	Predicted land returning to crops (acres)	Predicted share returning to crops (95-percent confidence interval)
Iowa	1,857.6	1,631.9	88 (55- 99)
Kentucky	312.5	271.4	87 (53 - 96)
Louisiana	203.9	15.3	8 (1 - 24)
North Dakota	3,331.8	2,616.5	79 (73 - 86)
South Dakota	1,431.1	1,118.8	78 (64 - 86)
Tennessee	246.1	186.4	76 (42 - 91)
Illinois	963.2	709.0	74 (37 - 96)
Missouri	1,542.5	1,091.0	71 (43 - 87)
Nevada	0.2	0.0	7 (3 - 20)
Pennsylvania	118.9	82.3	69 (43 - 87)
Wisconsin	634.2	396.3	62 (54 - 72)
Oregon	455.5	281.4	62 (28 - 87)
New Mexico	593.0	355.9	60 (32 - 82)
South Carolina	217.7	12.4	6 (1- 16)
New Hampshire	0.2	0.0	6 (0 - 58)
Florida	86.7	4.9	6 (0 - 31)
Minnesota	1,695.3	1,004.2	59 (45 - 77)
Wyoming	277.8	159.2	57 (45 - 77)
Indiana	294.0	166.3	57 (19 - 84)
Montana	3,407.4	1,720.5	50 (42 - 66)
New York	59.3	25.8	44 (27 - 64)
Texas	4,031.0	1,749.0	43 (29 - 57)
Ohio	295.2	121.2	41 (24 - 67)
Kansas	2,656.0	1,070.5	40 (35 - 50)
North Carolina	113.3	45.6	40 (16 - 58)
Colorado	2,203.1	880.9	40 (15 - 71)
Idaho	789.4	305.5	39 (15 - 71)
Virginia	56.2	21.7	39 (15 - 64)
Vermont	1.1	0.4	39 (12 - 74)
Mississippi	871.4	334.4	38 (15 - 58)
Maine	24.1	8.5	35 (21 - 64)
Michigan	306.1	101.0	33 (17 - 59)
Georgia	308.6	9.6	3 (0 - 15)
California	144.4	37.9	26 (1 - 61
Nebraska	1,135.9	288.8	25 (10 - 60)
Maryland	66.8	16.1	24 (9 - 67)
Massachusetts	0.1	0.0	2 (0 - 71)
Alabama	482.6	90.8	19 (7 36)
New Jersey	2.3	0.4	19 (5 - 64)
Oklahoma	1,023.9	174.7	17 (12 - 29)
Arkansas	164.8	26.4	16 (3 - 41)
Washington	1,276.6	192.7	15 (3 - 59)
West Virginia	1.6	0.2	13 (1 - 54)
Utah	201.1	19.8	10 (3 - 37)
Connecticut	0.3	0.0	0 (0 - 20)
Delaware	6.9	0.0	0 (0 - 13)
48-State total	33,891.7	17,346.0	51 (40 - 63)

Source: CRP Contracts file as of November, 2002

State's CRP land returning immediately to crops if CRP contracts were to expire is reported in parentheses.

Nationwide, the model predicts that 51 percent of the land enrolled in CRP would return to crop production if the program expired at the end of 2002. This number is slightly less than our 1997 out-of-sample predictions. Most of this difference stems from the decline in commodity prices between 1997 and 2002. To a lesser extent, this difference stems from differences between the 1997 NRI sample of CRP parcels and the November 2002 contract file, which occur due to new CRP signups since 1997 and sampling error in the NRI.