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Farmers in Low Socioeconomic Status Counties Enroll Less Land, Receive Less CRP Funding per Acre

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Participation in the Conservation Reserve Program (CRP) is associated with a number of factors, including farm and operator characteristics, the behavior of program participants, and the distribution of environmental needs on agricultural land (Chang and Boisvert, 2009; Lambert et al., 2007). But these factors do not fully explain who participates, how much acreage participants enroll, and payments per acre received in CRP. This study examines the roles of socioeconomic status and other community-level characteristics that may be related to CRP participation, while controlling for characteristics that are expected to directly influence participation decisions and enrollment.

Two Methods to Examine Participation: Logit and Tobit

We estimate a binary logit regression to describe the probability of CRP enrollment. The binary observation of whether or not a farm has land enrolled in CRP is regressed on farm-level characteristics, county-level CRP characteristics, and county-level community characteristics. Regressions are estimated with and without a measure of socioeconomic status (SES) to examine its association with other variables that may affect enrollment.

Acreage enrolled and payments received in CRP are also of interest. Farms offering contracts in CRP must decide how much land to offer and the payment per acre they are willing to accept to retire the land. Using a Tobit empirical model, we regress the share of operated acreage enrolled in CRP and the payment per acre received in CRP on the farm- and county-level independent variables. A Tobit model is appropriate in this case because many potential offers of acreage and payments will not be observed when farms are not enrolled in CRP.

What Factors Influence Participation in CRP?

Farm-level characteristics that may be associated with CRP participation include farm size (in acres), operator age and education, tenure (share of operated acreage that is owned), farm household and off-farm income, non-CRP Government payments being received, and whether the farm is operated by a beginning or minority farmer. Farm data are drawn from the 2002 and 2007 Agricultural Resource Management Survey, administered by NASS and ERS.

From the Government side, the cost and potential environmental benefits of the proposed contract are important in determining which contract offers are enrolled. Contract costs are based on county soil rental rates, which capture the average opportunity cost of retiring farmland in a county. Potential environmental benefits are measured by county average soil erodibility and the county average score in CRP for providing air quality benefits and treating environmental issues in conservation priority areas.

Does Community Socioeconomic Status Affect Individual CRP Decisions and Agreements?

The primary community-level factor of interest is socioeconomic status (SES). We measure SES at the county level with a normalized index of several key socioeconomic indicators (RAND, 2007). The index accounts for average household income, education levels, unemployment rate, poverty status, amount of public assistance, and households with children headed by a female. In addition to SES, we also control for whether farms operate on American Indian reservations, the share of county land that is in reservations, and whether the county is within a metropolitan area.

SES and CRP Participation. Results suggest farms in low socioeconomic status counties are less likely to be enrolled in CRP (table 1). An increase in SES from the 20th percentile to the 50th percentile is associated with an increase in the probability of CRP enrollment of.025 (a 28% increase evaluated at the mean). Including SES may also correct for some omitted variable bias for variables that are correlated with SES. The estimated marginal effects of being a minority farmer and operating within an American Indian reservation decrease when SES is included, indicating that farms in low-SES counties also tend to be operated by minorities and operate on reservations.

SES and CRP Acreage and Payments Tobit estimates suggest that farms in counties with lower SES enroll a smaller share of their farmland in CRP and receive lower payments per acre, although the magnitude of the relationship is small (table 2). For farms enrolled in CRP, an increase in SES from the 20th percentile to the 50th percentile is associated with an additional enrollment of 0.6% (a 2.1% increase) of their farm land and an additional $3.37 per acre (a 2.9% increase). Including SES appears to control for unobserved factors that are correlated with county soil rental rates, the potential to provide air quality benefits, and location in CRP priority areas.

Table 1: Marginal effects of selected variables on probability of enrollment in CRP/WRP (binary logit regression)

Variable	CRP/WRP participation (1)	(2)
Socioeconomic status index	.005	
County average annual soil rental rate ($)	.001	.001
Exogenous EBI (air qual. and priority area)	.004	.004
Operator education—High school or some college	.056	.057
Operator education—4yr college or beyond	.107	.109
Minority operator	-.041	-.051
Farm within American Indian reservation	-.048	-.055
County land in reservation (%)	.023	-.025
Metro county	-.052	-.044
Pseudo R^2	.157	.154
Obs.	24,198	

Data sources: 2002 and 2007 ARMS Phase III, USDA-NASS and USDA-ERS (farm and operator characteristics); RAND (2007) (socioeconomic status); USDA-FSA CRP contract file, 2005 (soil rental rate and exogenous EBI).

Dependent variable: Participation = 1 if enrolled in CRP/WRP

Grey cells indicate estimate is not significantly different from zero at 95% confidence level, based on delete-a-group jackknife variance calculation.

Table 2: Marginal effects of selected variables on share of acreage enrolled and payment per acre in CRP (Tobit regression)

Variable	Acreage (1)	Acreage (2)	Payment (3)	Payment (4)
Socioeconomic status index	.002		1.02	
County average annual soil rental rate ($)	4.3e-4	4.9e-4	.231	.257
Exogeneous EBI (air qual. and priority area)	.002	.002	.676	.757
Operator education High school or some college	.024	.024	11.4	11.5
Operator education 4yr college or beyond	.039	.040	17.5	17.7
Minority operator	-.024	-.030	-9.76	-12.0
Farm within American Indian reservation	-.031	-.034	-10.4	-12.1
County land in reservation (%)	.016	-.001	5.93	-2.31
Metro county	-.023	-.019	-10.2	-8.57
Pseudo R^2	.165	.163	.042	.041
Total obs.	24,198		24,198	
Uncensored obs.	4,212		4,250	

Data sources: 2002 and 2007 ARMS Phase III, USDA-NASS and USDA-ERS (farm and operator characteristics); RAND (2007) (socioeconomic status); USDA-FSA CRP contract file, 2005 (soil rental rate and exogenous EBI).

Dependent variables:

Acreage = Share of total operated acres enrolled in CRP/WRP

Payment = Payment per acre enrolled in CRP/WRP

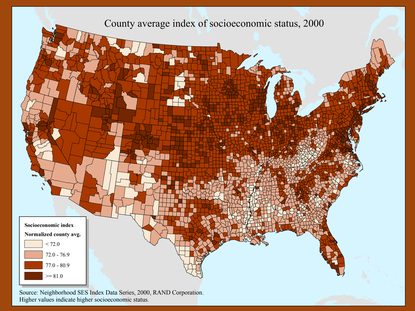
Grey cells indicate estimate is not significantly different from zero at 95% confidence level, based on delete-a-group jackknife variance calculation.

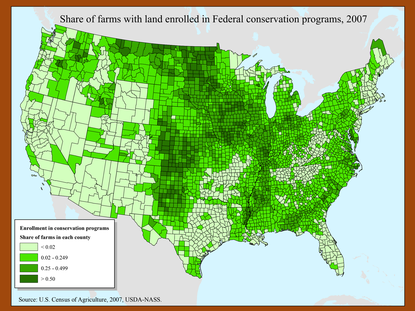
Marginal effects are calculated for the truncated mean, or:

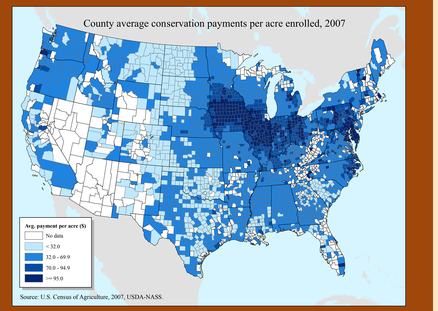
$$\partial E(Acreage \mid \mathbf{x}, 0 < Acreage < 1) / \partial x \quad \text{(acreage)}$$

$$\partial E(Payments \mid \mathbf{x}, Payments > 0) / \partial x \quad \text{(payment)}$$

Counties with low socioeconomic status tend to enroll smaller share of farms in conservation programs, receive lower payments per acre







Study Conclusion: Unobserved Farm and Operator Characteristics, or a Role for Community Well-Being?

Results suggest that after controlling for factors typically thought to be associated with CRP participation, socioeconomic status accounts for some unexplained variation in participation. In general, farms in low socioeconomic status counties are less likely to participate in CRP, enroll a smaller portion of their farms when they do participate, and receive smaller payments per acre enrolled. SES appears to have a larger impact on the probability of enrollment than the share of acreage enrolled and payments received per acre. Future research is required to determine whether these observations are due to unobserved farm-level factors that determine participation and are correlated with SES, or whether there exists some other relationship between community well-being and farm participation in Government programs.

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[1]The views expressed are the authors' and should not be attributed to ERS or USDA. Ueda is a Ph.D. student at the University of Maryland, Department of Agricultural and Resource Economics and a research intern at ERS. Hand and Farrigan are Economists with the USDA Economic Research Service. Correspondence: mhand@ers.usda.gov.

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