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Does Race Matter in Landowners' Participation in Conservation Incentive Programs?

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This study investigated and compared the participation behavior of white and minority small landowners in Alabama in eight conservation incentive programs. Using nonparametric tests and logit modeling, we found both similarities and differences in participation behavior between these two landowner groups. Both white and minority landowners tended not to participate in conservation incentive programs, and were equally likely to participate in the overall programs, Conservation Reserve Program (CRP), Stewardship Incentives Program (SIP), and Forestry Incentives Program (FIP). White landowners, however, were enrolled in the CRP longer and signed up more acres in the CRP and FIP than minorities. Moreover, minorities were more likely to be dissatisfied with program participation and to be unable to afford the

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cost share. The determinants for program participation vary with program and racial/ethnic background. We suggest new approaches to encouraging program participation by small landowners in general and by minority landowners in particular.

Keywords conservation incentive programs, logit regression, mail survey, racial and ethnic background, small landowners

Introduction

Conservation incentive programs are an important public policy instrument for encouraging natural resource conservation on private lands as well as for ensuring the long-term economic success of farmers. A number of government-sponsored programs provide landowners with technical and cost-share assistance for implementing soil, water, wildlife, and forest resource conservation practices. A number of studies have reported a disparity in program participation by racial and ethnic groups, and the negative impacts of such disparities on minority landownership and economic success (Beauford et al. 1984; Brown and Larson 1979; Demise 1989; USDA Civil Rights Action Team 1997; Zabawa 1989). Many racial and ethnic minority groups have filed class action lawsuits against the U.S. Departmetn of Agriculture (USDA) alleging discrimination in assistance programs (Schelhas 2002). Resolving disparities and increasing the accessibility of these programs to small and minority landowners are thus an important public policy and equity objective (GAO 1997; USDA National Commissions on Small Farms 1998).

We must know more about program participation behavior if we are to enhance the participation of small and minority landowners in conservation incentive programs. Yet there has been relatively little literature that focuses on minority and small landowners. Studies of program participation in general have found participation behavior to be linked to demographics, economic factors, and awareness of the programs. Age, education, and income are positively related to program participation (McLean-Meyinsse et al. 1994; Nagubadi et al. 1996). Other factors that positively influence landowners' participation behavior include membership in landowner organizations (Nagubadi et al. 1996) and size of landholdings (Thacher et al. 1996). Studies that target overall landowners may be insufficient to capture minority and small landowners in the sample to effectively analyze issues affecting them.

Several studies have compared the program participation of minority and white landowners. A study carried out in five Southern states reported that African-American farmers were less likely to participate in conservation programs than whites because they were less aware of the programs and economically worse off (Demise 1989). Molnar et al. (2001) investigated small farmers' adoption of four conservation practices (conservation tillage, crop nutrition management, integrated pest management, and conservation buffers) and found that African-Americans were more likely to cite a lack of information on how to implement conservation practices as a barrier than were whites. Gan et al. (2003) reported that unawareness of existing programs and inability to afford cost sharing were barriers for minority participation in forestry assistance programs. A study in Alabama focusing on the Conservation Reserve Program (CRP) revealed that white landowners had larger CRP contract acreages, but showed no significant difference between minority and white participants in future enrollment plans (Onianwa et al. 1999).

While these earlier studies suggested that minority landowners face economic and awareness barriers, there is a lack of literature on systematic comparisons of minority and white participation in the broad scope of conservation incentive programs. Our study addresses this knowledge gap by (1) further exploring racial and ethnic differences through systematic comparison, (2) identifying the reasons that minority landowners have for participating or not participating in programs, and (3) analyzing the interrelation between participations in eight different conservation programs (Table 1). The study was carried out in Alabama,[1] where there is significant racial and ethnic diversity among farmers/landowners (Bliss and Sisock 1998). Our findings provide additional insights into the similarities and differences in conservation program participation between minority and white landowners,

Table 1. Conservation incentive programs included in the study

Program	Purpose
Conservation Reserve Program (CRP)	Financial and technical assistance to convert highly erodaible or other sensitive acreage to vegetative cover, including grasses, wildlife plantings, trees, filter strips, or riparian buffers.
Agricultural Conservation Program (ACP)	Financial assistance to prevent soil loss, water conservation, water quality improvements, conservation of forest and wildlife resources, and pollution abatement.
Environmental Quality Incentives Program (EQIP)	Replaced ACP in 1996. Financial and technical assistance to install or implement structural and management practices on agricultural land.
Emergency Conservation Program (ECP)	Financial incentives for rehabilitating farmland damaged by natural disasters.
Farmland Protection Program (FPP)	Provides up to 50% of easement acquisition cost for voluntary sale of development rights to protect land used for agricultural production, protection of water quality, wildlife habitat, preserve, or scenic vistas.
Wetland Reserve Program (WRP)	Technical and financial support for wetland restoration, including long-term conservation and wildlife practices and protection.
Stewardship Incentive Program (SIP)	Technical and financial assistance to protect, manage, and enhance forest resources, for example, forestry management planning, tree plantings, fish habitat improvement, recreational protection and enhancement, wildlife habitat improvement, soil and water protection, shelter belts, threatened and endangered species, and wetland creation and restoration.
Forestry Incentives Program (FIP)	Financial assistance for tree planting, timber stand improvements, and related practices on nonindustrial private forest lands.

which will be helpful for designing and implementing conservation incentive programs involving small landowners.

Methods

Survey and Data

The data for this study were collected by mail survey, using the standard Dillman (1978; 2000) method. The survey was administered by the National Agricultural Statistics Service (NASS) office in Montgomery, AL. The pretested, self-administrated questionnaire solicited the socioeconomic and demographic characteristics of landowners and information about their participation in the incentive programs. The samples were drawn from the NASS office's list of farmers in the state of Alabama. Landowners were classified into two groups: whites and minorities (all nonwhite racial and ethnic groups). Our study focused only on the "small landowners" with annual sales of $40,000 or less. Of the more than 41,000 Alabama landowners in the 1997 Census of Agriculture database (USDA National Agricultural Statistics Service 1999), there were 1,340 minorities and over 24,000 whites who belong to this category. Five percent (1215) of the white landowners were randomly selected, while all the minority landowners were included due to the relatively small size of their population.

A total of 352 minorities and 448 whites responded to the survey, yielding a total response rate of 31%, 26% for minorities and 37% for whites. Although the response rate was low,[2] the homogeneity of the study population was expected to have alleviated potential nonresponse bias (Hammitt and McDonald 1982; Wellman et al. 1980). For quality assurance of the survey responses, a subset of the respondents was interviewed via telephone by trained interviewers from the NASS office. This process was intended to alleviate possible errors and inconsistent answers provided by respondents. Seventy-seven responses were excluded from the analysis due to incomplete information, out-of-business, post office returns, and survey refusals. The remaining 723 responses comprising 313 minorities and 410 whites were tabulated for the final analysis. Among the minority respondents, 85% were African-American, 14% Native American, and 1% Asian/Pacific Islander and others. The demographic and socioeconomic characteristics of the study populations and survey respondents are shown in Table 2. In terms of gender, age, and total farmland area operated, the survey samples resemble the populations quite well.

Nonparametric Tests

Program participation of the two landowner groups was compared using nonparametric tests. The Kruskal–Wallis test was applied because most of the variables analyzed were binary or categorical. Under this test, if the calculated statistic (chi-square approximation) was sufficiently large (relative to the critical value), the probability of the difference occurring by chance alone was small, leading to the rejection of the null hypothesis that the central tendencies for the two landowner groups were the same.

Table 2. Demographic and socioeconomic characteristics of the survey populations and respondents by landowner group

Variable	Census		Sample	
	White	Minorities	White (n = 410)	Minorities (n = 313)
Gender (fraction of males)	0.92	0.91	0.86	0.90
Age (years)	58.6	56.5	60.1	58.8
Education (index)	na	na	2.9	3.0
Membership in farmers or related associations (fraction)	na	na	0.50	0.41
Farmer (fraction)	na	na	0.47	0.59
Total farmland area operated (acres)	121.7	120.0	149.7	139.0
Annual farming income (index)	na	na	3.0	2.8
Household income from farming (percent)	na	na	11.4	11.5

Note. The census data were derived from USDA National Agricultural Statistics Service (1999). Minorities include all nonwhite racial and ethnic groups. The figures for education and annual farming income are index values as shown in Table 3. For education, 3 = some college; and for annual farming income, 3 = $2500–$4999.

Logit Models

In addition to the comparisons of means, we also examined program participation behavior by the two racial/ethnic groups by their socioeconomic and demographic characteristics. As in other studies (Bell et al. 1994; Nagubadi et al. 1996; Rahm and Huffman 1984; Smith 1995), we assumed that landowners made their participation decisions based on utility maximization. For a given conservation incentive program, an individual landowner (i) has two choices, to participate ($y_i = 1$) or not to participate ($y_i = 0$). The average utility derived by the landowner is presumably based on a set of variables (X) that include the attributes of the choices and the socioeconomic and demographic characteristics of the landowner. Thus, the landowner's participation behavior can be portrayed by a probability model:

$$P_i = \Pr[y_i = 1] = F(X_i'\beta) \tag{1}$$

We adopted the logit model (Judge et al. 1988; Greene 2003) in this analysis. We began with analyzing and comparing the determinants for the participation in the overall eight programs by the two racial/ethnic groups using the following empirical model:

$$\text{PLAP} = f(\text{POAP, MEM, AGE, EDU, GEN, LAND, FMINC, PFMINC}) \tag{2}$$

The detailed explanations of the variables in this equation are presented in Table 3. The dependent variable PLAP is binary, representing the participation in at least one of the eight conservation incentive programs. The independent variables were factors that we hypothesized to have impacts on program participation based on previous studies discussed earlier.

Table 3. Definition of variables in the logit models

Variable	Description	Expected sign
PLAP	Participation in the CRP, ACP, ECP, FPP, WRP, SIP, FIP, or EQIP (1 = participation, 0 = nonparticipation)	
PCRP	Participation in the CRP (1 = participation, 0 = nonparticipation)	+/−
PACP	Participation in the ACP (1 = participation, 0 = nonparticipation)	+/−
PECP	Participation in the ECP (1 = participation, 0 = nonparticipation)	+/−
PSIP	Participation in the SIP (1 = participation, 0 = nonparticipation)	+/−
PFIP	Participation in the FIP (1 = participation, 0 = nonparticipation)	+/−
PEQIP	Participation in the EQIP (1 = participation, 0 = nonparticipation)	+/−
POAP	Participation in other programs (1 = participation, 0 = nonparticipation)	+/−
MEM	Membership in farmers or related associations (1 = members, 0 = nonmembers)	+
AGE	Age of the landowner (years)	+
EDU	Education (1 = below high school, 2 = high school diploma, 3 = some college, 4 = college degrees, and 5 = graduate degrees)	+
GEN	Gender (1 = males, 0 = females)	+/−
LAND	Total farmland area operated (acres)	+
FMINC	Annual farming income (1 = less than $1000, 2 = $1000–$2499, 3 = $2500–$4999, 4 = $5000–$9999, 5 = $10,000–$39,999, 6 = 40,000–$99,999, and 7 = $100,000 or above)	+
PFMINC	Household income from farming (percent)	+

Membership in farmer or related associations was expected to increase the landowner's knowledge of the incentive programs and their potential benefits, which would encourage program participation and was expected to have a positive effect. Participation in other programs would expose the landowner to government programs and agencies, encouraging participation in conservation programs. On the other hand, participation in other programs may reduce the landowner's interest in the program in question if they do not have enough land for another program. Hence, the direction of the impact of participation in other programs is uncertain. The sign for age and gender is also ambiguous. Education was hypothesized to have a positive effect on program participation because it would help landowners to better understand these programs. Larger landholdings, higher farming incomes, and larger shares of farming income in their household income were expected to increase the likelihood of landowner participation in these programs for economic reasons.

There was far more participation in the CRP than in any other program, and thus we compared the participation behavior of the two landowner groups in the CRP as well. Because participation in one program may affect participation in another program, we also examined the interactions among these programs by asking whether they were complements or substitutes. Therefore we constructed a second model to assess and compare the participation behavior in the CRP by the two landowner groups and the relationships between their participation in the CRP and other programs, as follows:

$$\text{PCRP} = f(\text{PACP, PECP, PSIP, PFIP, PEQIP, POAP, MEM, AGE, EDU, GEN, LAND, FMINC, PFMINC}) \quad (3)$$

Here participation in the CRP (PCRP), the dependent variable, is binary. In addition to the independent variables in Eq. (2), factors indicating participation in the Agricultural Conservation Program (ACP), Emergency Conservation Program (ECP), Stewardship Incentive Program (SIP), Forestry Incentives Program (FIP), and Environmental Quality Incentives Program (EQIP) were added, symbolized by the binary variables PACP, PECP, PSIP, PFIP, and PEQIP, respectively (Table 3). Due to the facts that only special types of land were qualified for the Farmland Protection Program (FPP) and Wetland Reserve Program (WRP) and that a very small portion of the landowners participated in these two programs, they were excluded from the logit models. Following our earlier logic, these independent variables were assumed to have their signs of effects on CRP participation similar to those on overall program participation (Table 3).

Results and Discussion

Comparison of Landowner Groups

Among the survey respondents, about 29% of the whites and 33% of the minorities participated in at least one of the eight incentive programs. The CRP was the most popular program, followed by the ACP, ECP, and FIP for both racial/ethnic groups of landowners. Table 4 summarizes the means for white and minority respondents and the results of the statistical tests. The two groups of landowners showed no statistically significant difference in their participation in the CRP, SIP, FIP, and overall programs. Participation by the two landowner groups was significantly different in the ECP and EQIP at the 5% significance level and in the ACP, FPP, and WRP at the 10% level, with a larger portion of minorities participating in these programs than whites. This may be due to more marginal quality of minority landholdings, making them more vulnerable to environmental stress and encouraging them to participate in the ECP, EQIP, ACP, FPP, and WRP. However, the number of the landowners participating in these four programs by either group was relatively small.

Although participation in the CRP by whites and minorities was similar, the length of their participation and the acreage enrolled were significantly different. Whites participated in the CRP longer and enrolled more acres than minorities. Average acreage enrolled in the FIP by whites also was significantly larger than that by minorities. White farmers owned larger farms so that they were able to place more acres into these programs. We found no statistical differences between the two

Table 4. Comparisons of program participation by landowner group in Alabama

Variable	Mean		Probability
	White ($n = 410$)	Minorities ($n = 313$)	
Proportion of the landowners participating in the programs			
Participation in the ACP	0.061	0.096	0.080
Participation in the ECP	0.044	0.090	0.013
Participation in the FPP	0.015	0.035	0.072
Participation in the WRP	0.002	0.013	0.097
Participation in the EQIP	0.010	0.035	0.018
No significant difference: Participation in the overall eight programs, CRP, FIP, SIP, and other farm programs.			
Length of participation and acreage enrolled			
Months of participation in the CRP	118.8	92.3	0.008
Acreage enrolled in the CRP	69.4	49.0	0.045
Acreage enrolled in the FIP	58.3	34.0	0.034
No significant difference: Length of participation and acreage enrolled in the ACP, ECP, EQIP, FPP, SIP, and WRP and length of participation in the FIP.			
Perceived benefits of program participation			
More grazing available for livestock	0.239	0.510	<0.001
No significant difference: Prevention of soil erosion, better financial return than other land use, extra income, increased land value, more timber production, increased greenery and wildlife, additional space for recreation, and others.			
Reasons for nonparticipation			
Cannot afford the cost share	0.073	0.118	0.039
These programs exclude poor farmers	0.073	0.143	0.002
I don't like conservation compliance	0.027	0.010	0.096
Lack of help from government agencies	0.090	0.137	0.045
No interest	0.261	0.141	<0.001
Dissatisfaction with information/services received (1 = very satisfied, 5 = very dissatisfied)	1.283	1.526	0.026
No significant difference: No knowledge of the program, do not have enough land, the conservation plan was not approved, ineligibility of the land, and the program does not apply to my operation.			

landowner groups in terms of the length of participation and the acreages enrolled in the other six programs (Table 4).

The most perceived benefit of participation for both groups was to prevent soil erosion. This is consistent with the key purpose of many major programs analyzed here, and also reflects the fact that more landowners were enrolled in the CRP, which had soil conservation as a major program objective, than in any other program. The second most important motivation for program participation was extra income for

white landowners and livestock grazing for minorities. Significantly more minorities than whites valued livestock grazing as part of the benefits for program participation (Table 4). Our findings are supported by other research that has shown that livestock grazing on minority-owned lands has been an important practice and component of the integrated farming operations by minorities (Gan and Kolison 1999; Gan et al. 2003; Molnar et al. 2001).

Unfamiliarity with the programs was the primary reason for not participating in conservation incentive programs for both landowner groups. "No interest" was ranked second for white landowners and fourth for minorities, suggesting that these programs did not provide enough incentives for some landowners, particularly whites. Significantly more minorities than whites said that they could not afford their cost share for these programs. This correlates with the result that more minority landowners felt that these programs excluded poor farmers and indicated inadequate assistance from government agencies. There was no significant difference in the responses of the two groups in the importance of three nonparticipation reasons: "Don't have enough land," "My conservation plan was not approved," or "My land is not eligible".

Most landowners were satisfied with information and services received from sponsoring agencies, although more minorities were dissatisfied than whites. The dissatisfaction by minority landowners may be in part attributable to the different ways they would like to receive the information. Even though most landowners in both landowner groups liked printed materials and direct contacts, minorities preferred direct personal contacts and in-field demonstrations more than whites, who like printed materials better. One way to help improve the satisfaction of minority landowners may be to adjust methods by which information about these programs is disseminated.

Participation in Overall Programs

The results of the logit models for participation in the overall eight programs are shown in Table 5. The likelihood ratio tests suggest that the explanatory variables are jointly significant in explaining the program participation by both minority and white landowner groups. The correlations between the independent variables in the models for both whites and minorities were all within ± 0.27. The maximum condition index was 20.9 and 20.5, respectively, for the models associated with whites and minorities, suggesting no apparent multicollinearity. These test results indicate that the logit models are robust.

The determinants of program participation by the two landowner groups were quite different except for total land area. As expected, for both landowner groups large farmers were more likely to participate in these incentive programs. For each additional 100 acres of farmland, the probability of participation in these programs would increase by about 10% for both minorities and whites. Landowners with larger landholdings may have more land qualified for different programs, may be in a better position in making investments on their land and affording the cost share, and may see greater potential for tax savings and other economic benefits from program participation, leading to higher program participation.

For the white landowners, the only factor other than landholding size that had a significant effect on program participation was age of the landowner. As in other studies (Nagubadi et al. 1996), older landowners were more likely to participate in

Table 5. Estimated logit models for participation in the overall eight programs

	Estimated coefficient		Marginal effects	
Variable	White	Minorities	White	Minorities
POAP	−0.327	0.265	−0.066	0.059
	(0.314)	(0.334)	(0.063)	(0.074)
MEM	0.037	0.902[a]	0.007	0.200
	(0.240)	(0.271)	(0.048)	(0.060)
AGE	0.025[b]	0.013	0.005	0.003
	(0.011)	(0.012)	(0.002)	(0.003)
EDU	0.122	0.213[b]	0.024	0.047
	(0.106)	(0.100)	(0.021)	(0.022)
GEN	0.135	−0.999[b]	0.027	−0.221
	(0.343)	(0.427)	(0.069)	(0.094)
LAND	0.004[a]	0.005[a]	0.001	0.001
	(0.001)	(0.001)	(0.0002)	(0.0003)
FMINC	−0.065	0.039	−0.013	0.009
	(0.105)	(0.103)	(0.021)	(0.023)
PFMINC	0.001	−0.002	0.0003	0.0005
	(0.009)	(0.009)	(0.002)	(0.002)
Intercept	−2.814[b]	−2.810[b]	—	—
	(1.099)	(1.158)		
Log likelihood function	−219.7	−171.1		
Restricted log likelihood	−245.2	−197.6		
Chi-square	51.0[a]	52.9[a]		
Number of observations	410	313		

Note. Standard errors in parentheses.
[a] Significant at .01.
[b] Significant at .05.

these programs. For a 1-year increase in age, the probability of participation would increase by 0.5%. All other variables, including membership in farmer and related associations, participation in other programs, education, gender, annual farming income, and share of farming income in total household income, did not significantly affect their participation behavior.

For the minority landowners, in addition to farmland area, membership in farmer and related associations, education, and gender had a significant effect on their participation. Members of farmer and related associations and landowners with a higher level of education were more likely to participate. On average, a member of farmer and related associations would be 20% more likely to participate in these programs than nonmembers. An increase in education by one level would increase the probability of participation by 4.7%. Females had a higher propensity to participate than males. Other things being equal, the probability of participation by female minorities was 22% higher than male minorities. However, other factors, such as participation in other farm programs, age, annual farming income, and percentage of farming income in total household income, did not significantly contribute to participation. These results suggest that landowners' knowledge of the conservation

incentive programs was vitally important to program participation by minorities, as association with farmer organizations exposed them to information on these programs and education helped them understand the programs and their participation requirements and procedures. Women might be more concerned about resource conservation (Mohai 1992), leading to more participation in these programs.

The intercepts for both models are significant. The negative intercepts indicate that the small landowners in both racial/ethnic groups, in general, tended not to participate in these incentive programs.

Participation in the CRP

The estimated logit models for participation in the CRP are presented in Table 6. The likelihood ratio test indicates that the models are in general well fitted statistically. No collinearity was detected for both models, as their maximum condition index was smaller than 22. Although the CRP was the most popular program, the participation behavior in the CRP was quite different from that in the overall programs. Also, the statistically significant determinants for participation in the CRP by whites and minorities diverged except for participation in the FIP. The CRP and FIP appeared to complement each other. Participation in one program encouraged participation in the other for both racial/ethnic groups of landowners. The landowners' participation in the ACP, ECP, SIP, and EQIP was found to be independent from their participation in the CRP. None of these eight programs competed with each other. They appeared to serve the different conservation and landowner assistance purposes quite well.

In addition to FIP participation, total farmland area, gender, and participation in other traditional farm programs significantly influenced the decision of whites on their participation in the CRP. For each additional 100 acres of farmland, the probability of participation in the CRP would increase by 4%. Female landowners were almost 10% more likely to participate in the program than males. Participation in other programs like livestock and feed assistance programs would increase the probability of participation in the CRP by about 10% as well. For minority landowners, besides participation in the FIP, the only other determinant for their participation in the CRP was annual farming income. Landowners with a higher farming income were more likely to sign up for the CRP. This echoes the reasons for nonparticipation indicated by the minority landowners surveyed. Ability to afford the cost share was apparently a constraint that prevented the minority landowners from participation in the CRP. Again, the intercepts of both models were significant and negative, implying that both white and minority small landowners tended not to participate in the CRP.

In spite of some similarities, landowners exhibited different participation behavior in the CRP compared to the overall programs. In addition, the determinants for participation in the CRP varied across landowner groups. For example, participation in both the CRP and overall programs by whites was significantly influenced by total land area. As discussed previously, large landowners were more likely to have land qualified for the programs and had more incentives to participate due to the economies of scale and tax savings. However, land area was not a significant determinant for minority participation in the CRP; instead, farming income became significant. In fact, the average acreage enrolled in the CRP by the minorities was

Table 6. Estimated logit models for participation in the Conservation Reserve Program

Variable	Estimated coefficient		Marginal effects	
	White	Minorities	White	Minorities
PACP	−0.061	0.309	−0.007	0.028
	(0.630)	(0.557)	(0.076)	(0.051)
PECP	−0.055	0.265	−0.007	0.024
	(0.758)	(0.621)	(0.091)	(0.057)
PSIP	−0.704	1.363	−0.085	0.125
	(1.009)	(1.414)	(0.121)	(0.130)
PFIP	1.402[b]	1.434[c]	0.168	0.131
	(0.570)	(0.744)	(0.068)	(0.069)
PEQIP	1.161	0.735	0.139	0.067
	(1.195)	(0.766)	(0.143)	(0.070)
POAP	0.811[c]	0.752	0.097	0.069
	(0.485)	(0.519)	(0.057)	(0.047)
MEM	0.048	0.489	0.006	0.045
	(0.302)	(0.388)	(0.036)	(0.035)
AGE	0.020	−0.014	0.002	−0.001
	(0.013)	(0.017)	(0.002)	(0.002)
EDU	0.117	−0.077	0.014	−0.007
	(0.130)	(0.145)	(0.016)	(0.013)
GEN	−0.797[b]	−0.808	−0.096	−0.074
	(0.367)	(0.558)	(0.044)	(0.051)
LAND	0.004[a]	0.0002	0.0004	0.00002
	(0.001)	(0.0003)	(0.0001)	(0.00003)
FMINC	−0.102	0.331[b]	−0.012	0.030
	(0.129)	(0.138)	(0.015)	(0.012)
PFMINC	−0.006	−0.024	−0.001	−0.002
	(0.011)	(0.015)	(0.001)	(0.001)
Intercept	−4.398[a]	−2.802[c]	—	—
	(1.465)	(1.590)		
Log likelihood function	−159.2	−105.5		
Restricted log likelihood	−184.2	−117.7		
Chi-square	50.0[a]	24.3[a]		
Number of observations	410	313		

Note. Standard errors in parentheses.
[a] Significant at .01.
[b] Significant at .05.
[c] Significant at .10.

much smaller than that by the white landowners (Table 4), implying that minority landowners with small landholdings also actively participated in the CRP.

Association with farmer organizations and education were not significant determinants of minority participation in the CRP. Of the eight programs, the CRP is probably the most widely known program because it has been implemented

for many years with a large number of enrollments and landowners generally have more knowledge of the CRP than other programs. Thus, association with farmer organizations and education was no longer important in assisting landowners in gaining information on the CRP.

Conclusions

White and minority small landowners showed some similarities in their participation in conservation incentive programs. They were similar in terms of their likelihood to participate in the CRP, SIP, or FIP individually and conservation programs in general and their tendency not to participate in conservation programs. However, these surface similarities belie other differences in program participation. First, white landowners, on average, were enrolled in the CRP longer and signed up more acres in the CRP and the overall programs than minorities. Second, minority landowners were more likely to be enrolled in the ECP, EQIP, ACP, FPP, and WRP than whites, perhaps because minorities have more of the marginal and degraded lands that qualify for these programs. Third, besides the awareness of incentive programs, the second most critical barrier to participation was inability to afford the cost share for minorities and "no interest" for whites. Fourth, more minority landowners than whites were dissatisfied with the information and service received. The dissatisfaction may be in part due to differences in the ways they preferred to receive information. Finally, we also found differences in motivation for participation between the two groups, notably, that "to provide opportunities for livestock grazing" was a very important reason for minority participation.

Both the white and minority landowners also shared some common determinants of their participation in the conservation incentive programs: Large landowners were more likely to participate, and enrollment in the FIP was positively related to participation in the CRP. However, differences in participation determinants also were obvious, and the factors influencing their participation vary across programs. While the age of white landowners significantly influenced their participation in the overall programs, membership in farmer associations, education, and gender were the deciding factors for minority participation. In terms of participation in the CRP, land area, gender, and participation in other farm programs were the determinants for whites, while only annual farming income, in addition to participation in the FIP, significantly affected minority participation.

The differences in the program participation behavior for the two racial/ethnic groups suggest the need for different approaches to attracting their participation. First, making the programs more affordable to minorities is critical to enhance their participation, while stimulating the participation interest through increasing the incentive level is important for white landowners. Second, there is a general need to better advertise these programs among all small landowners, but minority landowners are more likely to be reached through personal contacts rather than written communications. One way to reach minority landowners is through local farmer associations or similar organizations. Third, special needs and constraints facing minority landowners, such as livestock grazing and land limitations, should be incorporated into program design and implementation.

Our results suggest that one way to increase the participation of minorities would be to target those with the following characteristics: relatively larger landholdings, a higher level of education, higher farming income, more links with farmer and

related organizations, and female gender. However, landowners with these characteristics may not necessarily be those who need government assistance most. Thus, among the programs with different conservation purposes, there is a need to develop options that specifically address the needs and constraints of socially and economically disadvantaged landowners.

Due to the low response rate, general cautions should be taken in interpreting the results of this study. Also, because only a small portion of the sample (and the population) is females, the results on gender may be biased. Further studies in other states in the U.S. South and the entire region would help verify our findings. In addition, the differences in program participation by white landowners and minorities imply that there may be fundamentally different structural relationships between program participation and independent variables for different racial and ethnic groups. Testing of whether such differences in the structural relationships exist is another task for future studies.

Notes

1. While Alabama is an appropriate site for this study, other states may be different. Similar studies in other states can further illuminate the similarities and differences in participation in conservation incentive programs among racial and ethnic groups.
2. We acknowledge the difficulties presented by the low response rate from our survey, although all reasonable measures were taken to avoid it. Further efforts are needed to address the challenge of low response rates in surveys of small and minority landowners. It may be possible to increase response rates by collaborating with nongovernmental and independent institutions in implementing surveys; also, in-person interviews, although expensive, may also be more effective.

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