

Abstract

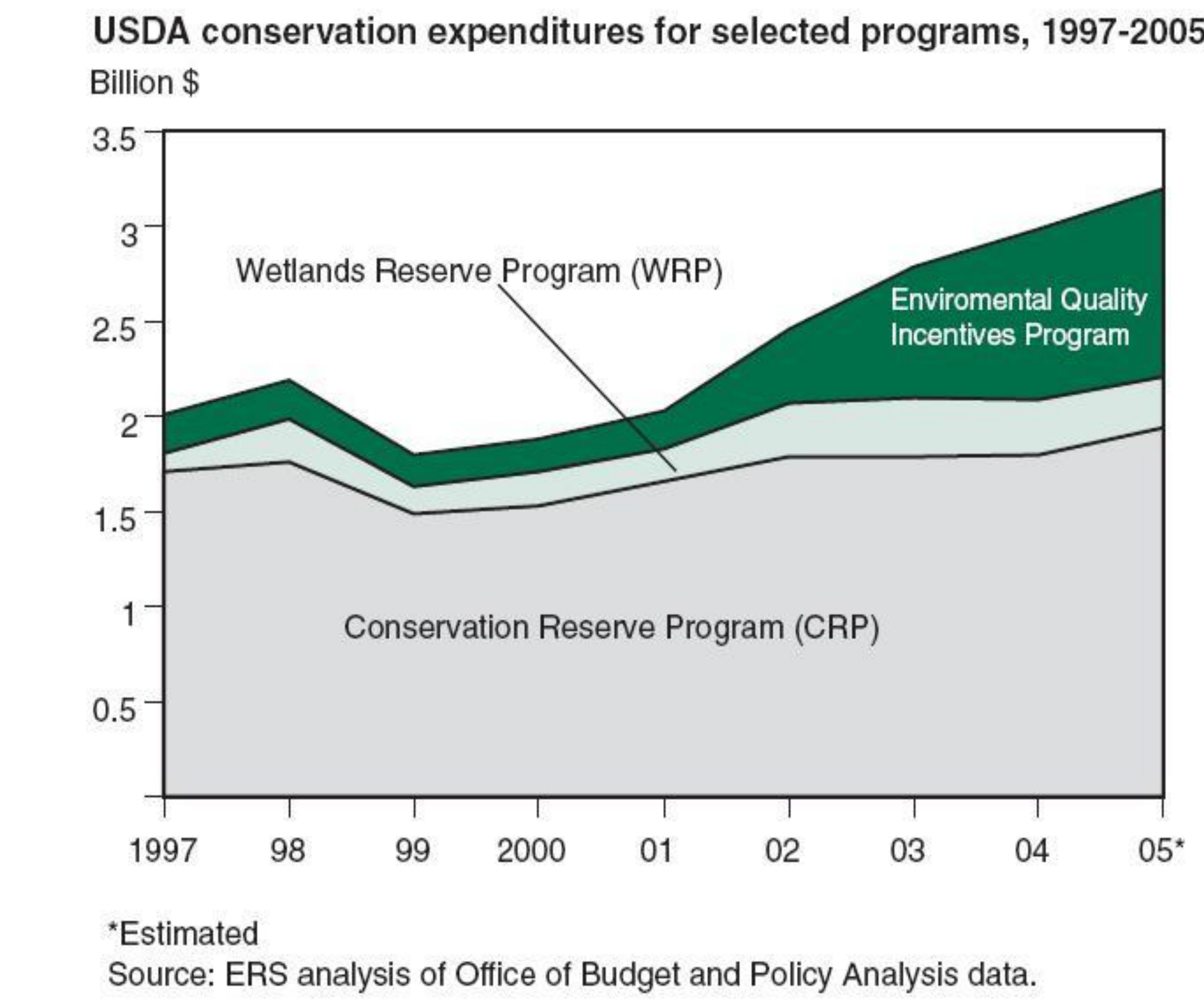
The objective of this study is to identify factors affecting participation in conservation programs by cotton farms in the Southeastern region of the United States, using the 2007-2009 Agricultural Resource Management Survey. We found that participation in land retirement programs and working land conservation programs are explained by different factors.

Background

In the 20th century, a dominant portion of federal spending on farm payments had been targeted for price supports that directly impact commodity prices. This is due to the recognition that agriculture as a business inherently involves more risk and uncertainty than other sectors based on industrial or human actions.

The enactment of the Food Security Act in 1985 was a beginning of a new trend in U.S. agricultural policy to address the growing concern for natural resource degradation attributed to agricultural operation. The 1985 Farm Bill launched the Conservation Reserve Program (CRP) that encourages farmers to retire environmentally sensitive farmland from production by providing land rental rates for the retired lands (Cattaneo, et. al, 2005). The Federal Agricultural Improvement and Reform Act of 1996 authorized the Environmental Quality Incentives Program (EQIP) that offers financial and technical assistance for farmers to promote agricultural production and environmental quality as compatible goals (USDA NRCS 2006). The Farm Security and Rural Investment Act of 2002 expanded conservation funding by 80% and reauthorized the EQIP with greater contract flexibility and increased funding (Cattaneo, 2003).

Unlike the CRP that intends to realize long-term environmental benefits by retiring farmlands from production, programs such as the EQIP are termed Working Land Conservation Programs (WLCP) because they support natural resource conservation on working agricultural lands. The advantage of the WLCP compared to land retirement programs is its low opportunity cost of land use, as farmers can continue commodity production while employing conservation practices (Aillery 2006).



The CRP has been by far the largest agri-environmental program since its inception, accounting for approximately 90% of the total conservation payment from 1986 through 2005 (Aillery, 2006). However, the recent farm bills shifted preference from the CRP toward the WLCP. Much of the increase in conservation funding under the 2002 Farm Bill was allocated to the EQIP (Claassen, 2003). This trend continued in the Food, Conservation, and Energy Act of 2008, which authorized the EQIP with increased funding of \$7.25 billion for the fiscal years 2008 to 2012.

In summary, there have been two major trends in U.S. agricultural policy since the 1985 Farm Bill. One is the increasing federal spending on conservation programs to address natural resource concerns due to agricultural operation. The other is the increasing federal spending on the WLCP among those conservation programs.

Objectives

Despite the growing concern for natural resource conservation on farmland and the abundant empirical evidence on factors affecting adoption of environmentally benign farming practices, there are three important issues that have gathered little attention: factors affecting participation in conservation programs and comparison of such factors across different types of conservation programs and different types of farmers.

This study attempts to address these issues by identifying factors affecting participation in the Conservation Reserve Program and the Environmental Quality Incentives Programs for cotton farms in the Southeastern region. We also contrast factors affecting participation in the conservation programs for cotton farms and all farms in the region.

Data

This study primarily utilizes data obtained from the 2007-2009 Agricultural Resource Management Survey (ARMS), developed by the Economic Research Service (ERS) and the National Agricultural Statistical Service (NASS). The ARMS queried farmers on all types of financial, production, and household activities. The ARMS provides information on the characteristics and financial conditions of farm households, including information on input and risk management strategies and government payments.

Our sample consists of 5,813 farms in the Southeastern region of the United States (Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia), of which 483 farms have at least one cotton acre in the observation year. Variable definitions and summary statistics are provided in Table 1.

Table 1: Variable Definitions and Summary Statistics			
Variables	Mean		Z or t-statistic comparing two means ¹
	Cotton Farms	Non-cotton Farms	
Participation in Conservation Programs (=1 if participate, 0 otherwise)			
Environmental Quality Incentives Programs (EQIP)	0.10	0.04	5.59***
Conservation Reserve Programs (CRP)	0.14	0.06	6.94***
Operator Characteristics			
Off-farm (=1 if primary occupation off-farm)	0.02	0.28	12.39***
Years of formal education	2.84	2.65	4.34***
Age	53.23	57.54	7.34***
Farm Characteristics			
Total operated acres	2,819	910	11.05***
Internet (=1 if Internet connection on farm)	0.81	0.66	6.61***
Traditionally Underserved Farmers (=1 if yes, 0 otherwise)			
Limited Resource Farms	0.01	0.07	5.58***
Beginning Farms	0.08	0.19	5.83***
Socially Disadvantaged Farmers	0.01	0.04	3.30***
Farm Financial Characteristics			
Current Ratio (=Current Asset/Current Liabilities)	41.08	99.50	1.39
Debt to Asset Ratio	0.19	0.22	0.08
Primary Enterprise (=1 if yes, 0 otherwise)			
Cotton Farms	0.38	0.00	49.75***
Livestock Farms	0.04	0.65	26.68***
High-value Crop Farms	0.01	0.11	6.64***
County-level Variables			
Soil Productivity Index	64.52	64.82	0.40
Population Interaction Zones for Agriculture (PIZA)	1.28	1.59	7.47***
Total Conservation Payments between 96-008	13.10	12.82	6.32***
Observation Year Dummy Variables			
2007	0.44	0.29	
2008	0.31	0.35	
2009	0.26	0.37	
Number of Observations	483	5,813	
Source: USDA ERS, Environmental Working Group			
*** indicates statistically significant difference between the two means at 1% level.			

Table 1 demonstrates that cotton farms have higher participation rates in both CRP and EQIP than other farms. On average, cotton farmers are less likely to work off-farm, more educated, and younger than other farmers. The percentages of traditionally underserved farms are significantly lower among cotton farms than other farms. Cotton farms also operate more acres but in counties with lower population interaction.

Methods

Following the random utility framework, we employ a bivariate probit model to estimate factors affecting participation in CRP and EQIP:

$$\begin{aligned} \text{CRP} &= \delta'X + \varepsilon_1 \\ \text{EQIP} &= \eta'X + \varepsilon_2 \end{aligned}$$

We run two versions of this model: 1) all farms in the Southeastern region and 2) cotton farms in the region. Maximum likelihood estimates of the above model are provided in Table 2.

Main Findings

- Participation in land retirement programs and working land conservation programs are explained by different factors.
- Farms whose primary enterprise is cotton are less likely to participate in EQIP in both models.
- In Model 1, limited resource farmers are less likely to participate in EQIP but more likely to participate in CRP.
- In Model 1, off-farm employment is negatively correlated with EQIP participation but positively correlated with CRP participation.
- Internet access on farm increases the probability of EQIP participation in both Models.

- Larger farms are more likely to enroll in conservation programs.
- Financial ratios have contrasting impacts on EQIP and CRP participation in both models. In Model 1, both current ratio and debt to asset ratio are negatively correlated with CRP participation, while in Model 2, current ratio is positively correlated with CRP participation.
- PIZA has a negative impact on EQIP and CRP participation; farmland with higher opportunity costs is less likely to be enrolled in conservation programs.
- Comparison of the two models reveals that factors affecting cotton farmers' decision to participate in conservation programs are quite different from those for the general farm population in the Southeastern region.

Table 2: Bivariate Probit Estimates on EQIP and CRP Participation ¹				
Variable	Model 1		Model 2	
	All Farms		Cotton Farms	
	EQIP	CRP	EQIP	CRP
Operator Characteristics				
Off-farm	-0.171**	0.225**	-0.123	-0.243
Years of formal education	0.087**	0.112***	0.103	0.094
Age	0.004	0.011	0.087	0.122**
Age Squared	0.000	0.000	-0.001	-0.001*
Farm Characteristics				
Total operated acres (Log)	0.150***	0.205***	0.036	0.222**
Internet	0.281***	0.079	0.683**	-0.062
Traditionally Underserved Farmers				
Limited Resource Farms	-0.350*	0.238**	Not Enough Observations	
Beginning Farms	-0.096	0.039		
Socially Disadvantaged Farmers	-0.214	0.282		
Farm Financial Characteristics				
Current Ratio (Log)	0.005	-0.028*	-0.012	0.159***
Debt to Asset Ratio (Log)	0.063***	-0.061***	0.030	0.058
Primary Enterprise				
Cotton Farms	-0.300*	-0.107	-0.368*	-0.148
Livestock Farms	0.040	-0.578***	Not Enough Observations	
High-value Crop Farms	-0.173	-0.445**		
County-level Variables				
Soil Productivity Index	-0.001	0.000	0.006	-0.006
PIZA	-0.098**	-0.232***	0.087	-0.613***
Total Conservation Payments	0.052	0.108***	0.159	0.184*
Observation Year (2007 is the base group)				
2008	0.127*	-0.230***	0.101	0.003
2009	0.087	-0.112	0.224	0.222
Constant	-3.38***	-4.94***	-7.44***	-7.91***
Correlation Coefficient	0.162***		0.002 ²	
Number of Observations	5813		483	
¹ All figures are coefficient estimates. ***, **, and * indicate significance at 1%, 5%, and 10% levels.				
² Correlation coefficient is not statistically significant; results from separate probit models are presented.				

Conclusion

This study identifies factors affecting participation in conservation programs by cotton farms in the Southeastern region of the United States, using 2007-2009 Agricultural Resource Management Survey. Different factors explain cotton farmers' participation decision in land retirement programs and working land conservation programs. On one hand, this indicates successful policy implementation; two types of conservation programs can attract different types of farmers thereby allowing a wider spectrum of farmers to engage in conservation efforts. On the other hand, it poses a challenge for policy-makers to accurately identify farmers who are willing to adopt environmentally benign farming practices under different incentive schemes.

References

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