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Is participation in agri-environmental programs affected by liquidity and solvency?

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ABSTRACT

Financial constraints, both in the short and long run, have an impact on economic well-being of farm families. Additionally, financial constraints have an impact on production efficiency and technology adoption. This study investigates factors affecting farmers' participation in the agri-environmental programs like Conservation Reserve Program (CRP) and the Environmental Quality Incentives Programs (EQIPs) in the U.S. particular attention is given to the roles of liquidity and solvency on participation in CRP and EQIP. Results show that both liquidity and solvency have a negative impact on participation in such programs. Additionally, we found that access to the Internet plays an important role in the farmer's decision to participate in CRP and EQIP. Our results also suggested that beginning farmers are more likely to participate in EQIP program.

Introduction

Conservation Reserve Program (CRP), a payment program incentivizing farmers to retire environmentally sensitive farmland from production, has accounted for approximately 90% of total conservation payments in the United States. The 1985 Farm bill launched CRP aiming to improve water quality, wildlife, and air quality by avoiding agricultural production in highly erodible farmlands. However, with advent of recent farm bill, preferences shifted toward programs like the Environmental Quality Incentives Program (EQIP).[1] Indeed, under the 2002 Farm Bill, much of the increase in conservation funding was allocated to EQIP. The advantage of EQIP over land retirement programs is that farmers can continue commodity production while employing conservation practices thus they are believed to realize low opportunity cost of land while participating. Emphasis in EQIP continued in the Food, Conservation, and Energy Act of 2008 increasing funding of EQIP by $7.25 billion for the fiscal years 2008–2012.

Though EQIP may at first glance seem more financially advantageous to farmers, CRP provides the means for farmers to achieve conservation goals they may already desire: establishing long-term, resource conservation ground covers, such as native grasses, wildlife plantings, trees, filter strips, or riparian buffers on highly erodible cropland or other environmentally sensitive acreage. In that, holistic approaches of CRP benefit more in public environmental perspectives. Additionally, Chang et al. (2008) observe that participation in agri-environmental programs such as CRP can actually increase income and consumption levels of farm households. The authors point out, however, that the effect of CRP participation on household economic well-being differs across income and consumption distribution. Overall, as National Cotton Council chairman Kenneth Hood argues, the program is important for farmers because it "provides assistance for producers who have been practicing resource stewardship all along" (Nelson, 2013).

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[1] In 1996, the Federal Agricultural Improvement and Reform Act authorized the Environmental Quality Incentives Program (EQIP), which offers financial and technical assistance to farmers who increase environmental stewardship while continuing agricultural production (USDA NRCS 2006). Unlike CRP, programs such as EQIP, termed Working Land Conservation Programs (WLCP), support natural resource conservation on working agricultural lands. EQIP provides financial assistance to eligible producers based on a practice implementation.

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Agri-environmental policies such as CRP and EQIP, particularly those in the United States and in European Union have similar origin[2] with basic objectives of incentivizing farmers to reduce negative externalities of agricultural production. However, there are some differences in their specific objectives and nature of payments. Baylis et al. (2008) compared agri-environmental policies in the EU and United States. Broadly, European policies address wider range of externalities with focus of payment in particular farming process than reducing specific negative externalities. The United States policies, on the other hand, are more 'targeted' and focused on reducing specific negative externalities and accounting for individual's opportunity costs (for details, see Baylis et al., 2008).

Adoption of conservational practices in farming is influenced by farm and non-farm factors. Some incentive payments for conservational and environmental services are suggested to play a positive role in mitigating the problem of decline in land use for farming (e.g., Bosselmann, 2012). Foudi (2012) found that economic, biological, and ecological variables derive investment in conservation practices in agriculture. In the European context, Henle et al. (2008), Herzon and Mikk (2007) and Soini and Aakkula (2007) for example, have reviewed agricultural and biodiversity conservation on farmland and conflict in allied policies in Europe and Finland, respectively. These studies have argued that policies such as agricultural support policies, international trade negotiations, biomass production and GMOs policies, and nature conservation policies directly and indirectly put pressure on implementation of agri-environmental conservation programs in Europe. Additionally, farmer's participation in agri-environmental schemes (AES) has been discussed in the European context (for example, Falconer, 2000; Damianos and Giannakopoulos, 2002; Wilson and Hart, 2000).

Studies from Europe report that in addition to size, education, type of farm, and farmer's attitude, financial reasons are important determinants of participation in agri-environmental schemes (Whitby, 1996; Brouwer and Lowe, 1998; Wilson and Hart, 2000). Wilson and Hart (2000), a study based on nine EU countries and Switzerland, found that over 70% of the farmers reported financial reasons as "very important" in the decision to participate in agri-environmental schemes. Though financial consideration was an important factor, levels of payments were not the primary reasons for non-participation among farmers in their study areas. However, these studies fail to assess the role of specific farm financial performance (such as *liquidity* and *solvency*) in participation decisions.

Despite the growing concern for natural resource conservation on farmland and the abundant data on factors affecting adoption of conservation practices, three important issues have garnered little attention: (a) factors affecting participation in agri-environmental programs across different types (such as CRP and EQIP); (b) identification of key financial factors that influence the effectiveness of involvement in agri-environmental programs, production, and marketing decisions; and (c) how the farm financial performance variables, especially availability of capital and debt accrued through purchase of inputs, affect participation in agri-environmental programs (CRP and EQIP). Financial limitations or flexibility can factor significantly into the adoption of agri-environmental programs or best management practices on the farm. For example, Koontz (2001) points out that financial motivation may not be important for landowners that do not depend on the land for their livelihood, while both monetary and non-monetary motivations are important for those who do.

Encouraging participation by farmers in regions with high erosion could increase the environmental benefits provided by conservation programs. Participation in CRP and EQIP could also reflect a farmer's concern for the environment by removing vulnerable land from production, while retaining more environmentally friendly land for production. Understanding participation patterns across EQIP and CRP program is relevant in light of the 2008 Farm Act, which increased funding for working-lands programs (EQIP) but reduced the amount of land that could be enrolled in CRP. With different nature of these policies in place, it is very interesting to analyze the determinants of participation in these programs and test whether the decision is shaped by financial position of farms.

Broadly, five categories of financial indicators are prevalent in literature as indicators of farm financial progress and risk-bearing ability: (1) liquidity, (2) solvency, (3) profitability, (4) financial efficiency, and (5) repayment capacity (for in-depth review of these ratios, see Barry et al. (1999). In this study we focus on two financial performance variables or financial ratios: *current ratio*—a measure of liquidity (defined as farm's ability to meet debt obligations in the short-run) and *debt-to-asset ratio*[3]—a measure of solvency (defined as farm's ability to meet debt obligations in the long-run). A financial ratio is simply a comparison of two businesses to each other or over time for the same business. Liquidity and solvency variables have been deemed important in studies involving technology adoption (Lin, 1991; Feder and Umali, 1993), but have not been addressed in agri-environmental programs. It is our hypothesis that short-run and long-run debt—measured by *current ratio* and *debt-to-asset ratio*, respectively—affects farmer's decision to participate in agri-environmental programs like CRP and EQIP.

Therefore, the objective of this study is to identify factors affecting farmer's participation in two important agri-environmental programs, CRP and EQIP, in the United States. Particular attention is given to the roles of liquidity and solvency on participation decision in the CRP and EQIP programs. We employ bivariate probit model to analyze participation decisions and the role of financial performances. We expect that our findings provide some insightful policy implications for similar agri-environmental and farmland conservation programs implemented across different countries including those in Europe and America.

Empirical model

Participation in the CRP, EQIP, and other conservation programs are voluntary, and the rate of participation depends on farmers' perception of costs and benefits. Theoretically, farmers will participate in the CRP and/or the EQIP if the expected utility from participating exceeds the expected utility from not participating (Konyar and Osborn, 1990). However, one should be aware that voluntary participation in farm programs has both economic and social consequences (Chambers and Foster, 1983). For example, EQIP, established by the 1996 Farm Bill, provides cost shares of up to 75% for the establishment of best management practices (BMPs) and up to 90% for limited-resource or socially disadvantaged farmers. Thus, farmers must have additional incentive, such as concern for the environment, to willingly take on the remaining costs themselves, ceteris paribus, and maximize their utility.

A bivariate probit model is used to analyze the impact of liquidity, solvency, and other farm and socio-economic characteristics on farmers' participation in the CRP and EQIP programs. Although participation can be estimated consistently by separate single equation probit methods, this could be inefficient because it ignores the correlation between the disturbances or error terms of the underlying stochastic utility functions associated with the CRP and

[2] Latacz-Lohmann and Hodge (2003) have reviewed and discussed the development of agri-environmental policies in Europe.

[3] It measures the level of debt held by outside sources. Increasing debt levels translate into higher risk as the operation loses flexibility and more stress is placed on earnings to service debt.