Impact of participation in certified organic production on farm household’s economic and agri-environmental performance

Aditya R. Khanal and Ashok K. Mishra

Aditya R. Khanal
Assistant Professor, Agribusiness Finance
Department of Agricultural and Environmental Sciences
College of Agriculture, Human, and Natural Sciences
Tennessee State University
akhanal1@tnstate.edu

Ashok K. Mishra
Kemper and Ethel Marley Foundation Chair and Professor of Agribusiness
Arizona State University | W. P. Carey School of Business
Morrison School of Agribusiness

Selected Paper prepared for presentation at the 2017 Agricultural & Applied Economics Association
Annual Meeting, Chicago, Illinois, July 30-August 1 2017

Copyright 2017 by [Khanal and Mishra]. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.
**Abstract**

This study analyzes the economic and environmental impact of farm household’s decision to participate in certified organic production. Specifically, we considered organic and conventional as two different production systems and then analyze the participation decision and their impact using propensity score matching estimators. Our results using nationwide farm survey data in the US suggest that participation in certified organic production could result in a significantly higher economic and environmental performance for the growers.

**Background**

- Over the last decade, there has been an increasing demand for organic foods due to growing demand for healthy foods; Organic products are known for their health-related benefits and are also considered to be eco-friendly when it comes to the environment.
- Many farmers are undergoing the transition from conventional to organic farming. The Economic Research Service (ERS) of United States Department of Agriculture (USDA) reports that between 2005 and 2011, total certified organic cropland in the US expanded by nearly 80 percent, to 3.1 million acres.
- However, the overall adoption level for certified organic cropland and pastureland is about 0.8 and 0.5 percent of the total U.S. cropland and pastureland, respectively.
- Studies related to production side of organic farming are very limited. Studies such as producer’s decision and performance due to certified organic farming, switch or no switch decisions, and quantitative studies on economic and environmental outcomes attributable to organic farming are important research questions.
- Additionally, decisions to participate in certified organic farming may be interlinked or vis-à-vis correlated with decisions to participate in agri-environmental programs, farm household’s concern about environmental conservation, and structural and agricultural diversification (Khanal and Mishra, 2015; Dries, et al., 2012; Menera et al., 2015).

**Methods**

This study computes average treatment effects of certified organic production participation using non-parametric propensity score matching (PSM) methods. The empirical procedure is to first estimate a probability model to calculate each farm household’s probability to participate in certified organic, i.e., the propensity score, and then calculate the average treatment effect for treated (ATT). Several techniques can be used to match adopters and non-adopters of similar propensity score. We used nearest neighbor matching (NNM), radius based matching (RBM) and kernel based matching (KBM). A common support and balancing condition are required; we identified common support in each case and also tested for balancing property.

**Results and Discussion**

- Table 1 shows mean comparison between organic and conventional farm households.
- Table 2 shows the results of probit specification of the PSM. Relatively younger and educated operators, farms adopting direct-to-consumer sales and market contracts, and those located near to market are more likely to participate in certified organic production.
- Our results show a significant effect of participation in certified organic production on farm household’s incomes and environmental outcomes, regardless of matching estimator (NNM, RBM, KBM).
- Our ATT results on matching estimators suggest that certified organic producers generate around $551 to $571 thousands higher in value of total production as compared to conventional producers.
- We found that certified organic farmers receive higher amounts for conservation and environmental quality incentive programs as well as enrolled more acres for cover crops and soil improvement programs as compared to conventional producers.
- Results show that organic producers receive $4,600 higher payments related to environmental incentives and quality; they enroll around 16 and 25 additional acre for soil improvement and cover crops compared to conventional producers.

**Data**

This study uses data from 2012 Agricultural Resource Management Survey (ARMS) conducted by National Agricultural Statistics Service (NASS), and ERS, USDA. 2012 ARMS survey is unique and includes a separate section for certified organic farming related questions such as acreage and total farm sales from certified organic production.

**Acknowledgments**

Dr. Khanal’s time in this study comes from the TSU Evans-Allen project TENX-1623-GFSHPP, supported from United States Department of Agriculture, National Institute of Food and Agriculture (USDA-NIFA). We acknowledge Dr. Mishra for assistance related to ARMS data.