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Research article

Sustainability partnership and viticulture management in California

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ABSTRACT

Agricultural regions in the United States are experimenting with sustainability partnerships that, among other goals, seek to improve growers' ability to manage their vineyards sustainably. In this paper, we analyze the association between winegrape grower participation in sustainability partnership activities and practice adoption in three winegrowing regions of California. Using data gathered from a survey of 822 winegrape growers, we find a positive association between participation and adoption of sustainable practices, which holds most strongly for practices in which the perceived private benefits outweigh the costs, and for growers with relatively dense social networks. We highlight the mechanisms by which partnerships may catalyze sustainable farm management, and discuss the implications of these findings for improving sustainability partnerships. Taken together, we provide one of the most comprehensive quantitative analyses to date regarding the effectiveness of agricultural sustainability partnerships for improving farm management.

1. Introduction

With over half of US land in agricultural production (Nickerson et al., 2007), agricultural sustainability has become an agenda-setting concept in agricultural policy and environmental management. One emerging means of addressing agricultural sustainability is through the use of sustainability partnerships, defined by Warner (2007a, p.67) as multi-year relationships between at least growers, an agricultural support organization, and scientists to extend knowledge about agricultural and environmental management through applied research and outreach. This article focuses on a primary objective of sustainability partnerships: whether grower participation in partnership activities catalyzes the adoption of sustainable practices that are expected to contribute to economic, social, and environmental goals. Describing and evaluating sustainability partnerships is critical because they are becoming an increasingly important policy tool in agriculture. Our comparative study draws on survey data from over 800 growers in three of the most important wine regions in California, making it one of the most comprehensive analyses to date of these types of partnerships.

Our analysis makes several contributions to research in agricultural and environmental management. First, identifying drivers of sustainability is vital given the enormous impact that agricultural decisions have on food systems and to natural resources on and off the farm. For example, non-point source pollution from agriculture is one of the most severe water quality problems in the US (Davies and Mazurek, 2014; Hoornbeek et al., 2013), groundwater over-pumping for irrigation is one of the most severe water supply and quantity issues (Glennon, 2012; Wada et al., 2012), and agricultural practices can be detrimental to both worker safety and human health (Damalas and Eleftherohorinos, 2011; Horrigan et al., 2002). Sustainability partnerships claim to mitigate the environmental impacts of agriculture, along with providing economic and social benefits that help enhance the overall reputation of particular regions or crops. As with sustainability generally, these specific claims about partnerships are disputed and thus create a demand for evidence-based research.

Second, there is a long-established research tradition in environmental management that examines the diffusion of innovations in agricultural practices (Marra et al., 2003; Pannell et al., 2006; Rogers, 2010). This tradition has emphasized the idea of best management practices (BMPs), which promised a synergy between economic and environmental benefits (Baumgart-Getz et al., 2012). Encouraging the adoption of BMPs is the primary goal of many agricultural incentive programs such as the Environmental Quality

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Incentive Program of the USDA, the European Commission's Joint Research Centre and the European Index for Sustainable Productive Agriculture of the European Conservation Agriculture Federation. Building on the theme of BMPs, sustainable practices seek to integrate social, economic, and environmental goals and often invoke more recent concepts like resilience or adaptive management to environmental change (Lin, 2011). Sustainability partnerships also seek to encourage the diffusion of innovations in the form of sustainable management practices, for example, by supporting social networks that spread information about the costs and benefits of innovations and foster norms of cooperation (Warner, 2007a).

Third, sustainability partnerships represent the application of the broader idea of collaborative governance to the agricultural sector and sustainability. In the last two decades, collaborative governance has been a central topic of research in public administration and the policy sciences (Ansell and Gash, 2008; Biddle and Koontz, 2014; Emerson et al., 2012; Lubell et al., 2002; Sabatier et al., 2005; Wyborn and Bixler, 2013). Sustainability partnerships represent one of many "species" in the broader "genus" of collaborative governance (Ansell and Gash, 2008). Here, we follow the more encompassing definition of collaborative governance used by Emerson et al. (2012), that includes the "processes and structures of public policy decision making and management that engage people constructively across the boundaries of public agencies, levels of government, and/or the public, private and civic spheres in order to carry out a public purpose that could not otherwise be accomplished." This definition encompasses sustainability partnerships, which build formal and informal policy networks among multiple stakeholders including local special districts, Cooperative Extension, pest control advisers, producer associations, university scientists, and regulatory and other governmental officials. Our study thus provides an in-depth examination of a particular instantiation of collaborative governance, which links collaborative governance research to the literature on environmental management in agriculture.

Fourth, instead of narrowly examining the effectiveness of a single policy instrument such as environmental certification (Delmas and Lessem, 2017; Potoski and Prakash, 2005, 2009), we analyze the relationship between sustainable practice adoption and the full portfolio of activities offered by sustainability partnerships. While all of the partnerships offer third-party sustainability certification programs, the organizations involved also provide a variety of outreach and extension activities that deliver information and assistance regarding government regulation and incentive programs, how to implement agricultural practices, and changes in economic conditions. These partnership activities can catalyze innovation, learning and cooperation in social networks that influence practice adoption (Levy and Lubell, 2017; Lubell et al., 2011; Prokopy et al., 2008; Rogers, 2010).

Fifth, we examine the effect of partnership participation controlling for two other drivers of grower behavior, the perceived costs and benefits of individual practices and the extent to which growers are embedded within social networks used to share knowledge. The costs and benefits of different practices are customary variables in the diffusion of innovation literature (Rogers, 2010), and partnerships also may support the growth and maintenance of social networks. At minimum, it is important to control for these other variables in order to better estimate the correlation between partnership participation and practice adoption. While we do not directly measure economic costs and benefits of the practices, we argue that the perceived costs and benefits that we do measure are important proximate drivers of decision making. Our analysis finds an interaction effect between the perceived benefit/cost ratio of individual practices and partnership participation, and also an interaction effect between the perceived benefit/cost ratio and a grower's centrality in social networks, which suggest that the perceived economics of agricultural decision-making place an important constraint on partnership effectiveness. While other researchers have examined the importance of practice costs and benefits (Pannell, 2008) and the role of social networks in agricultural sustainability (Levy and Lubell, 2017; Lubell and Fulton, 2007, 2008; Saltiel et al., 1994; Warner, 2007a), to our knowledge no analysis has simultaneously considered all of these factors and the interactions among them.

Lastly, since regional variability plays an important role in agriculture generally (Singh and Dhillon, 1984), and particularly in viticulture (Peters, 1997), our comparative study tests whether our findings are valid in different regional contexts. Previous research on agricultural partnerships has either focused on the performance of single partnerships (Klonsky et al., 1998; Ohmart, 2008; Shaw et al., 2011) or only considered the adoption behaviors of growers participating in more intense research and outreach activities such as self-assessment and certification (CSWA, 2009; CSWA, 2012). Other studies have relied primarily on qualitative methods or descriptive statistics (Broome and Warner, 2008; Pence, 1998; Pence and Grieshop, 2001; Warner 2007a, 2008). By analyzing data from three of the most important winegrowing regions in California, the findings of our research are more broadly generalizable.

1.1. Sustainability partnerships in California viticulture

The California viticulture industry has embraced the concept of sustainability and the partnership model is well-established as an institutional arrangement for putting sustainability into action (Broome and Warner, 2008; Klonsky et al., 1998; Ohmart, 2011; Pence, 1998; Pence and Grieshop, 2001; Ross and Golino, 2008; Thrupp, 1996; Warner, 2007a). Beginning in the 1990s, partnerships emerged in most of the state's major viticulture regions and currently operate at both the regional and state scale (Broome and Warner, 2008; Warner, 2007a). In a previous study of California winegrapes, Warner noted, "California's winegrape growers have undertaken more partnerships to greater effect than those of any other US crop …" (Warner, 2007b: 143). Sustainable viticulture partnerships have also developed in other winegrowing regions in the world such as New Zealand (Gabzdylova et al., 2009), South Africa (Von Hase et al., 2010), and Australia (Pomarici et al., 2014), and are beginning to appear in other types of cropping systems such as almonds (Brodt et al., 2006). Hence, viticulture represents an important early example with lessons for agriculture more broadly and also a potential for comparative research.

We focus on sustainability partnerships in three of California's primary winegrowing regions (Elliott-Fisk, 2012): Central Coast, Lodi, and Napa Valley. At the time of writing, respectively the primary organizations in each region are the Central Coast Vineyard Team (CCVT), a voluntary membership organization including growers, winemakers and industry partners, with a membership representing over 80,000 acres, the Lodi Winegrape Commission (LWC), a mandatory membership commodity organization representing an estimated 750 growers and 100,000 acres, and the Napa Valley Grape Growers Association (NVGA), a voluntary membership grower and vineyard organization representing approximately 700 growers, vineyard owners and industry partners, including the majority of planted vineyard land in Napa County, California. These lead organizations coordinate networks of regional and statewide grower and vintner organizations, commodity boards, regulators, researchers, individual growers, and consumers (Broome and Warner, 2008). All of the partnerships have experienced an evolution from providing technical assistance to growers to promoting BMPs in various ways, whether through promotion of integrated pest management, development of voluntary self-assessment