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Analysis

Conservation by Innovation: What Are the Triggers for Participation Among Swiss Farmers?

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A B S T R A C T

The Swiss government pays subsidies for the adoption of innovative conservation technologies such as no-tillage and slurry spreading with banding. Both a theoretical model and a quantitative survey show that dedication to innovation and conservation triggers farmers' participation in these schemes. Analysis of an excerpt from three interviews with participants shows cases of farmers who are primarily motivated by the possibility of additional income and emphasize the importance of using glyphosate. While this questions their environmental dedication, it underlines the importance of supplementary qualitative research.

1. Introduction

The reasons to subscribe to or abstain from agri-environmental programs are a well-researched subject in agricultural economics and sociology, as illustrated by Uthes and Matzdorf (2013). While the first wave of research mainly highlighted rather superficial influencing variables such as farm size (Falconer, 2000; Mann, 2005), farmers' education (Damianos and Giannakopoulos, 2002; Vanslembrouck et al., 2002), or the farm manager's age (Ilbery and Bowler, 1993), more recent research has focused on farmers' cultural background – "how the behaviors can generate status and prestige within farming communities", as de Snoo et al. (2013; 72) put it. It has been shown that farmers are rather reluctant to subscribe to conservation schemes (Burton et al., 2008). This reluctance has been translated into a monetary value by Christensen et al. (2011).

The promotion of innovative, environmentally friendly technologies has been reflected by social scientists in a rather different discourse, usually not specifically directed toward the farming sector. Authors familiar with this field emphasize the "specifics of policy and the situation in which they are applied" (Kemp and Pontoglio, 2011; 34). Opinions are divided as to whether market-based solutions are preferable (Jaffe and Palmer, 1997) or whether command and control approaches often do a better job (Chien and Shih, 2007). In any case, it is clear that the success factors for promoting environmentally friendly technologies are a complex matter (Jaffe et al., 2005; Fischer and Newell, 2008).

A new Swiss program allows the two discourses to be linked. Since 2014, the Federal government has provided payments for applying specific technologies that contribute to avoiding environmental harm on farmland. This program is described in Section 2 and a theoretical model of how farmers could respond is developed in Section 3. The mixed-methods design for an empirical verification is presented in Section 4, before quantitative and qualitative results are shown in Sections 5 and 6. Section 7 contains methodological and political concluding remarks.

2. Resource Efficiency Payments

Switzerland's government saw untapped opportunities in farming technologies which would save resources and cut emissions. After pilot tests were carried out in selected cantons during 2008–2013, the reform of Swiss agricultural policy toward more targeted payments (Mann and Lanz, 2013) was a good opportunity to broaden the experience into a general program. Since 2014, three different groups of measures to which farmers can subscribe have been available at national level.

The most common pilot programs focused on slurry spreading with different banding technologies, as evidence is strong that this is an effective way to cut ammonia emissions (Pfluke et al., 2010). Applying banding technologies is now reimbursed by the government at 30 Swiss Francs (CHF) per hectare and application, with a maximum of four applications per year. Applications in winter time are not eligible. 2600 farms (i.e. approx. 5% of the Swiss total) participated in the first year of the program.

Conservation tillage has been praised for its ability to diminish erosion, energy use, runoff of agricultural chemicals, and carbon emissions (Uri et al., 1998; Holland, 2004; He et al., 2009). This has encouraged the Federal government to grant payments for different conservation tillage practices. Mulch-till, whereby crop residues are

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mixed with the soil and a certain amount of residues remain on the soil surface during the seed process, is reimbursed at CHF 150 per hectare per year. Even less of the soil surface (not > 25%) is affected by direct drilling, which is reimbursed at CHF 250. In order to strengthen positive environmental effects, payments are increased considerably (CHF 400/ha*y) if conservation tillage is coupled with non-use of herbicides. In the program's first year of implementation, almost 5000 farms subscribed, making it the most widely applied measure within Resource Efficiency Payments.

It has been shown that pesticide spreaders using mechanical protection significantly reduce drift and therefore emissions into the environment (Naef et al., 2013). Mainly targeted toward fruit and vegetable farmers, purchasing the special equipment needed for such technologies is subsidized with CHF 6000–10,000, depending on the specification applied. Under these conditions, 92 farm managers have bought the relevant technology.

3. Theoretical Model

It has long been known that our decisions are shaped by monetary and non-monetary motives (Speare, 1971; Karpoff, 1985; Mohamed and McCowen, 2001). Nevertheless, the history of integrating this knowledge into formal models is rather young. With respect to allocation decisions, Hendrickson and James (2005) developed a model describing the trade-offs between ethical and profit-maximizing behavior. Mann (2013), in his activity-choice-model, later used non-monetary utility in general as the dimension to integrate with income.

The latter approach is applied to a conservation measure C, such as resource efficiency payments, in Fig. 1. Consider three farmers with the option to pursue conventional farming (depicted as reference R) or to enter C. In the reference situation R, the farmers are identical in the income (Yr) and non-monetary utility n_r they derive from R and in terms of the income they can generate from the conservation measure without government funding (Yc) and with government funding (Yc′). Thus, all of the potential participants, before making a decision about enrolling in one of the programs, start at point R on indifference I_3, generating a non-monetary utility of n_r. The farmers are also identical in terms of their indifference functions, where total utility U follows the pattern:

$$U(I_5) > U(I_4) > U(I_3) > U(I_2) > U(I_1).$$

The only issue distinguishing the three farmers is the different attitude toward C. As mentioned above, farmers show different degrees of awareness of environmental issues and have different interests in innovative technologies. Both can be constituents of n. Farmer 1 only derives n_1 from the conservation measure, Farmer 2 n_2 and Farmer 3 n_3.

Introducing a government payment for C obviously affects U if C is chosen, leaving R's position constant. It has been shown for Switzerland that a subscription to conservation measures often increases the farmer's income (Mann, 2003), which will be used as an assumption in the following. In the case of Farmer 1, participating in C would now shift the income from Yc to Yc′ and thus produce a point on I_2 instead of I_1. Because R can generate utility on I_3, which is better than I_2, C will still not be chosen. Farmer 3 will follow C even without public payments, but can now shift his utility from I_4 to I_5. Farmer 2 is the only one who will alter his behavior. For him, payments shift C from I_2 to I_4, so that he now prefers it over R on I_3.

As mentioned above, the three farmers in the model have identical costs for implementing the program. This distinguishes our model from a more traditional farm management perspective, where many scholars (Engel et al., 2008; Ducos et al., 2009; Fraser, 2009) explain participation by the level of marginal cost. The model above focuses instead on different non-monetary differences between farmers. In the case of resource efficiency payments, such differences should be detectable along two different lines:

- Attitudes to conservation are likely to influence subscription to the program. Farmers who consider environmental issues an important part of farming will be more likely to participate than farmers who are more production-oriented;
- Farmers can be differentiated into innovators (fond of using new technologies), early adopters and laggards (Diederen et al., 2003). Innovators are likely to be more open than laggards to subscription to programs involving new technologies.

The model therefore places a new emphasis on factors influencing participation which should be tested empirically in the subsequent sections.

4. Methodology

Mixed-methods research has been criticized for its difficulties in dealing with “non-true but useful” and “true but non-useful” phenomena (Johnson and Onwuegbuzie, 2004). Fielding and Schreier (2001) nicely summarized the challenges of sequencing, because both placing qualitative interviews before and after standardized surveys provides methodological shortcomings. However, as Johnson and Turner (2003) pointed out, one benefit of mixed-methods research is that it elucidates divergent aspects of a phenomenon. In the case of a public program linking conservation to innovation, this advantage

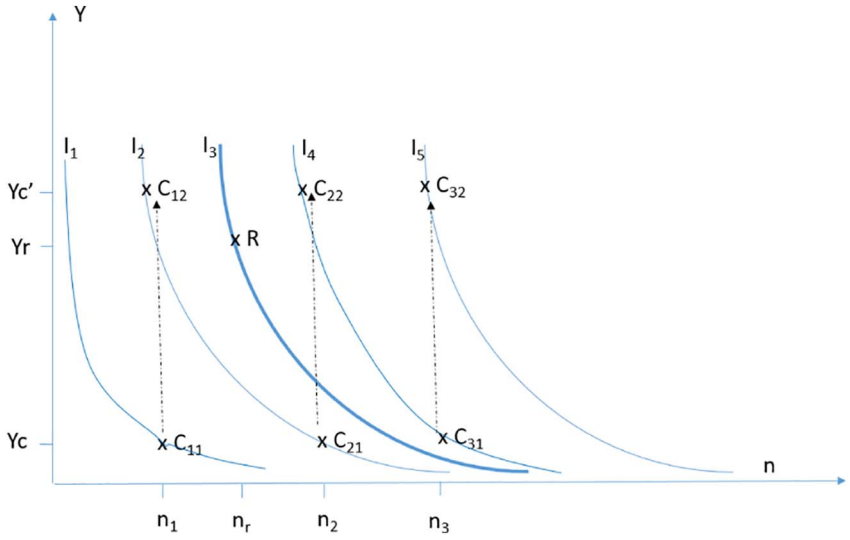

Fig. 1. A model to explain participation in conservation measures.

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