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Sustainable participation behaviour in agri-environmental measures

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ABSTRACT

In recent years, studies have identified the determining factors for participation in voluntary agri-environmental measures (AEMs) by farmers who support sustainable agricultural production practices. Although the previous implementation of AEMs is an important determinant of sustainable behaviour, attempts to investigate the forces driving this long-term behaviour are scarce. This study aims to provide empirical insights into which determinants of probability of sustainable behaviour are associated with AEM participation by Slovenian farmers. Particular attention is given to the drivers of farm and farmland use characteristics. The data used are taken from the Farm Accountancy Data Network for the 2004–2010 period. Logit regressions for Markov transition probability models and a long-term sustainable participation behaviour model are used to explore the existence of distinct characteristics of AEM participation for different sub-periods. The empirical results confirmed that different drivers are associated with sustainable behaviour across time periods and farm types. Land productivity, capital intensity and farm size have significant effects on the probability that a farmer will consistently participate in the AEM programme for at least 5 year period. These findings suggest that farm-specific characteristics are the primary drivers of sustainable behaviour associated with AEM participation.

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1. Introduction

Voluntary based agri-environment measures (AEMs) were developed in the Common Agricultural Policy (CAP) of the European Union (EU) to provide incentives for environmental protection and to ensure sustainable agricultural production practices. This policy initiative aims to change the behaviour of farmers in ways consistent with environmental concerns in rural areas. The level of participation in and success rates of this initiative vary between EU Member States, giving rise to the question of whether AEMs are truly an effective policy instrument for the promotion of consistent sustainable behaviour for the long-term period. To answer this question, a reliable analysis of the policy's implementation and its ability to foster sustainable behaviour through AEM participation is essential.

Many studies have investigated the determining factors that result in participation in AEMs by previously experienced farmers by reviewing how consistent those farmers were in their execution of

sustainable behaviours. Although having previous experience with AEMs is an important determinant of sustainable behaviour, the results from past studies vary according to the region studied and the type of measure being implemented. Wynn et al. (2001) found that being a farmer with prior experience in AEMs (among conventional farmers) had a positive influence on the speed of participation in other AEMs. A study conducted by Vanslebrouck et al. (2002) showed that although previous experiences had a significant influence on whether farmers participated in the “extension of field margins” measure, prior experience did not explain participation in the “plantation in yard” measure. The research by Defrancesco et al. (2008) showed that previous experience in environmental farming practices was a significant determinant of farmers' participation in additional AEMs in the same parcel. The literature also considers the fact that being an early adopter of environmentally farming practices positively influences a farmer's likelihood to adopt additional AEMs (Unay Gailhard et al., 2015).

Engaging farmers in the consistent implementation of AEMs over time is a challenge for the sustainable management of AEM contracts, particularly with regard to inspiring the required changes in farmers' behaviours. The entry of a farmer into an AEM agreement requires a commitment to operate a particular parcel according to the rules for the applicable measures over a specific

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time period (typically a minimum of five years). However, if the farmer is no longer interested in maintaining the commitment made in the contract within that time period, he may have the right to abandon the contract.

This paper focuses on Slovenia, where a decreasing trend in the number of farms enrolled in AEMs was observed for the 2007–2014 period as their number decreased from 26,852 in 2007 to 15,906 in 2014 (MAFF, 2015). This suggests that it might be difficult to ensure consistent long-term participation in the AEM programme, which is arranged through single contracts. AEM programmes could consider this fact by ensuring consistent and sustainable timelines for AEM schemes. In the meantime, sustained participation in the AEM programme remains of concern to policymakers who aim to achieve consistency over the long-term. Consistent sustainable behaviour might be influenced by the complexity of a farmer's behavioural choices. This question has not been investigated in the literature. This paper aims to fill that gap by contributing to a better understanding of the drivers of sustainable behaviours performed by farmers through their participation in the AEM programme. Particular attention is given to the drivers of farm and farmland use characteristics and to the participation of farmers in other voluntary Rural Development (RD) measures.

Arguably, the differences in sustainable AEM participation can be related to time, which one would expect in turn to be influenced by AEM scheme design and implementation, programme rules, and the goals of policymakers and farmers. These factors may affect the strategic behaviour of farmers in relation to AEM implementation (Taylor and Van Grieken, 2015). Hence, rather than investigate drivers of participation for a static time period, a dynamic analysis over time is important to the understanding of sustainable behaviour. This paper explores the existence of distinct dimensions within AEM participation by assuming that drivers may influence farmers' behaviour differently at different times.

Based on previous studies, we define a sustainable behaviour as an individual action that has a "long period of time" focus (Milfont and Gouveia, 2006; Rabinovich et al., 2010). We investigate the role of drivers on AEM participation over three time periods: (i) AEM participation probability for two consecutive years during the 2004–2010 period; (ii) AEM participation probability at the end of the RDP period from 2003 to 2006 and just prior to the start of the new RDP period (2007–2013); and (iii) sustainable AEM participation over at least five consecutive years in the 2004–2010 period. In the first two time periods, represented by transition Markov probability models, sustainable behaviour is investigated in terms of the probability of transitions between two AEM participation statuses: AEM participation and non-participation. For the third time period, the model aims to investigate farmers' sustainable behaviour in terms of consistent and inconsistent AEM implementation.

In this study, the features of sustainable behaviour are assumed to be specific to the type of farming that is performed and should reflect different environmental goods and services (e.g., the behaviour should prevent, reduce or eliminate pollution and any other form of environmental degradation) that arise from the ecological functions of farms. Therefore, sustainable behaviour models are investigated across farm types, with special focus given to field crops, dairy and other grazing farms.

The rest of the paper is structured as follows: Section 2 introduces a review of theories of the sustainable behaviours related to AEM participation. Section 3 describes the structure of the Slovenian Agri-Environmental Programme (SAEP) and provides participation trends in the SEAP according to year. Section 4 explains the dataset and methods. Section 5 describes three applied models. Section 6 presents the econometric results of the sustainable behaviour models. Finally, section 7 discusses the results, provides details for future research and concludes.

2. Previous literature on sustainable behaviours related to AEM participation

In reviewing the theoretical foundation for sustainable (pro-environmental) behaviour, one can observe two main distinctions in literature. On the one hand, there are studies that model the reasons for sustainable behaviour based on an explanation of values, attitudes, and intentions. Some of these studies investigate the role of education (Zsóka et al., 2013; Cincera and Krajhanzl, 2013), institutional context (Velasco and Harder, 2014; Fudge and Peters, 2011), environmental communication (Bremmers et al., 2009) and knowledge (Redman and Redman, 2014) in sustainable practices. On the other hand, there are studies that focus on how to shift behaviours towards more desired activities, such as helping an individual think in "long period of time" focus. This second set of studies draws on behavioural models in sustainable consumption (Tanner and Kast, 2003; Wang et al., 2014), sustainable use of natural resources (for water use, see Marinho et al., 2014; for energy use, see Frederiks et al., 2015; Spence et al., 2014), sustainable practices in the industry (for the land remediation industry, see Hou et al., 2014); in tourism (see Ioppolo et al., 2013; Font et al., 2015), or sustainable land management activities (for soil conservation practices, see Ingram and Morris, 2007; Prager and Posthumus, 2010). In practice, both types of studies aim to help identify initiatives that influence individuals to make profound behavioural changes.

In studying sustainable participation in AEMs, there is an increasing body of research which examines the influence factors in participation behaviour with different theoretical frameworks. *Theory of diffusion and adoption of innovation* (Rogers, 1983) one of the primarily used theories by Morris and Potter (1995) for analysis on United Kingdom AEM programmes. This study utilised quasi-market incentives to encourage farmers adoption of innovations, where innovation was defined as "an idea, practice, or object perceived as new" (Rogers, 2003, p.12). The application of the theory in this context primarily answers the question of how new implemented AEMs are adopted by farmers and highlights differences in the factors that influence adopters and non-adopters (or early and late adopters). Arguments related to the knowledge and persuasion stages of behavioural change have gained prominence by studies of Crabtree et al. (1998), Deffuant et al. (2008) and Mathijs (2003) where they show the importance of social factors in the decision making.

The social network approach is another widely applied theory to analyse the importance of socio-informational networks of farmers (Deffuant et al., 2008; Barreiro-Hurle et al., 2010; Frondel et al., 2012). These studies attempt to explain farmers' decisions using the opinions of informal and formal information sources, including extensions, farm advisory services and mass media. Skerratt (1998) found that a farmer's likelihood of participating is influenced in principle by other farmers. In addition to the source of social networks, persuasiveness of the arguments provided by network actors is important to AEM participation (Juntti and Potter, 2002). Frondel et al. (2012) found that utilised information measures may affect AEM participation either positively or negatively; however, such information allowed for a more informed selection of the programme. Recently, results of Fleury et al. (2015) highlight that the intensity and quality of relationships between farmers and other local and upper level stakeholders play a vital role in AEM participation.

Beedell and Rehman (2000), Grammatikopoulou et al. (2012) and Mettepenningen et al. (2013) structure their analysis with the basis of the *theory of planned behaviour*, which developed from the reasoned action theory (Fishbein and Ajzen, 1975; Ajzen and Fishbein, 2005). The theory assumes that farmers' behavioural

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