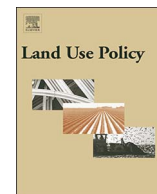




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To leave or not to leave? Understanding determinants of farmers' choices to remain in or abandon agri-environmental schemes

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ABSTRACT

Effectiveness of Agri-Environmental Schemes (AESs) as tools to enhance the rural environment can be achieved not only by increasing uptake rates, but also by avoiding participating farmers abandoning the scheme once they are in. For this reason, it is important to also consider what affects farmers' decisions to remain in the scheme rather than leave it at the end of the contractual obligation. However, up to now, there has been very little on this issue in the literature. The paper offers a contribution to this by revealing the role of determinants like the farmer's and farm structural characteristics, farmer's learning process, neighbourhood effect and the impact of changes in the policy design on the farmer's decision to remain in the scheme over a long time scale. This is examined in a long-standing scheme in the case study area, the Veneto Region of Italy. The paper uses duration analysis and is based on longitudinal panel-data of the entire population of 2000–2015 adopters. By using only data available in official regional records, it also provides regional policy-makers with an operational tool that is useful to analyse the impact of their AES design changes. The results of the duration models show that a larger farm size, a younger farmer age, the succession in the family farm, and the farmer's positive attitude towards the environment, trigger longer durations in AES. Similarly, the impact of the accumulation of the farmer's experience in the scheme management, as well as the neighbourhood effect increase the probability of remaining. Lastly, the changes in policy tailoring and targeting also have a positive impact on maintaining the farmer in the scheme. The paper concludes by noting that duration analysis can deliver useful results in order to guide policy-makers in the effort to steer higher levels of farmers' persistence in the scheme and provides some recommendations for a more mature agro-environmental policy design.

1. Introduction

Over the last four decades, the importance of EU Agri-Environmental Schemes (AESs) as voluntary tools aimed to enhance the rural environment beyond legal requirements has greatly increased, in terms of both expenditure and participation (Riley, 2016). After a few voluntary initiatives by individual countries in the 1980s (Ducos et al., 2009), AESs gained momentum with the introduction of the first EU-wide Regulation 2078/92; since then, AESs have regularly been proposed to farmers in three consecutive EU Rural Development rounds. Prompted by the need to improve policy outcomes, research in the field of AES adoption has grown in parallel (Wilson and Hart, 2001) and a large body of literature now provides scientific evidence of the role of farm structural factors, farmers' characteristics, motivations and attitudes, and institutional elements as determinants of participation (see Mettepenningen et al., 2013; Reimer et al., 2014; Lastra-Bravo et al., 2015 for updated reviews).

In recent times, stimulated by a growing availability of participation data and emerging concern about AESs' effectiveness in the long-term, there has been a debate on the temporal dynamics of participation (Ingram et al., 2013). It has been argued that AESs sometimes need a long period to produce the desired environmental benefits, often beyond the ordinary contract duration (Swetnam et al., 2004). In addition, they may require relevant changes to farming practices, resulting in more complex and lengthy decision-making patterns (Gamon and Scofield, 1998; Jackson-Smith et al., 2010; Karali et al., 2014; Pedzisa et al., 2015). Once accomplished, adoption should hence be accompanied by steady behavioural changes (Reimer et al., 2014), while early withdrawals from the schemes may jeopardize or even nullify the AESs' long-term success (Wilson and Hart, 2001; Burton and Paragahawewa, 2011; Riley, 2016).

These arguments point out that there is a need to better understand the determinants of farmers' choices over a longer time scale than that of a single contract; they also indicate that looking at AES from a single

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perspective that considers only adoption determinants would not fully capture the impact of the policy design, hindering any understanding of the reasons why a farmer would decide to remain in the scheme, signing a new contract, or leave it when the opting-out opportunity is available at the end of the contract. Attentively considering the patterns of the decision to remain in a medium-long-term perspective would feed a policy design better oriented towards persistent sustainable environmental change (Morris, 2004).

Yet, given the recent attention to AESs' time dynamics, and a persisting scarcity of longitudinal data at farm level (Moser and Barrett, 2006; Kallas et al., 2010), the research on farmers' choices regarding continuation or disadoption of AESs over long time periods is in an early stage and still poorly represented in the literature (Riley, 2016).

This paper aims to contribute to the nascent AESs' duration research by considering the role played by the time dimension on the farmers' decision process when he/she faces the option of remaining in the scheme by subscribing a contract again. More specifically, it intends to reveal the effects – over the 'remaining or leaving' option – of determinants such as some static farmer's and farm structural characteristics as well as time-varying aspects affecting the innovation diffusion patterns like the farmer's learning process linked to the duration and neighbourhood effect. The paper also addresses the effects of changes in the policy design, which have up to now been scarcely explored even in the adoption literature (Raggi et al., 2015).

We chose as case study the AES with the longest history in the agri-environmental policy of the Veneto Region¹, Italy: a scheme aimed at supporting planting and/or maintaining hedgerows and buffer strips on farmland; with some policy design changes, the scheme has been ongoing in Veneto without interruption since the early 1990s. Analysing such AES gave us the opportunity not only to explore the effect of time on farmers' decisions in a long time perspective, but also to contribute to fill a gap in the literature as, to our knowledge, adoption and disadoption of schemes focused on planting and/or maintaining landscape and habitat elements as hedgerows or buffer strips have been scarcely explored so far.

Additionally, our work provides regional policy-makers with a relatively ready-to-implement tool, useful to analyse the impact of their AES design changes on the decisions of farmers to remain or leave, and to further improve the schemes accordingly. This is possible because only data obtained from official regional records on AES contracts have been used. As this information on participating farms is already possessed by the public authorities, no *ad hoc* costly and time-consuming sample-based data collection is required to perform the analysis.

The study is based on a longitudinal panel dataset of the entire regional population of adopters, i.e. those who have been in the AES for at least one contract period over a time span of sixteen years (2000–2015).

2. Related literature

Initial contributions to studying how AES adoption rates have evolved over time come from the agricultural innovation diffusion literature, which has cast light on the factors affecting the entry decision by early, medium and late adopters. Examples include studies of diffusion of organic agriculture (Padel, 2001; Läßle and Van Rensburg, 2011), as well as best management (Brown et al., 2016) and soil conservation practices (Varble et al., 2016). The joint effect of time, space and social capital variables has also been tackled by several studies, showing the effect of physical neighbourhood (Lewis et al., 2011; Chen et al., 2012), peer-to-peer learning (Woolcock and Narayan, 2000) and networks (Berger, 2001; Klerkx and Leeuwis, 2009; Moschitz et al., 2015; Taylor and Van Grieken, 2015) on adoption rates of different agricultural practices.

¹ The term 'region' is used here with a legal-administrative meaning, rather than a broad geographical one. The regional government in Italy has legal-political jurisdiction over the design of the Rural Development Programmes, hence over AESs.

A series of researches address the issue of why farmers adopt or abandon a certain farming practice in different periods in relation to external changes. Marenja and Barrett (2007), for example, showed how financial factors, technological progress and perception of risk, delay the speed at which Kenyan farmers adopt or abandon soil fertility management practices, while Nyblom et al. (2003) highlighted the role of information in decreasing uncertainty when adopting innovation in Finland. Yet, the literature on the determinants of the remaining or leaving option over time seems hitherto to have mostly concentrated on a broad international focus, with researches addressing cover crops in northern Honduras (Neill and Lee, 2001), agricultural system shifts in western Nigeria (Kolawole et al., 2003), lower-input rice technology adoption and disadoption in Madagascar (Moser and Barrett, 2003), sustainable agricultural technologies in Brazil (De Souza Filho et al., 1999), introduction of technological inputs in Ethiopia (Dadi et al., 2004), no-tillage practices in Australia (D'Emden et al., 2006), or land use changes connected to deforestation in tropical America (Vance and Geoghegan, 2002), while it is still fragmented when it comes to Europe and AESs. Here, published research appears mostly concerned with organic production, specifically horticulture in the UK (Burton et al., 2003), vineyards in Spain (Kallas et al., 2010) and drystock in Ireland (Läßle, 2010). Rural Environment Protection Schemes (REPS) were studied by Hynes and Garvey (2009) and by Murphy et al. (2014), who explored how Irish farmers respond over time to improved scheme design. To our knowledge, very little is available specifically on landscape and habitat features such as hedgerows or buffer strips.

From a methodological perspective, most of the cited studies on adoption, continuation and disadoption dynamics (Marenja and Barrett, 2007; Neill and Lee, 2001; Kolawole et al., 2003; Moser and Barrett, 2003; Murphy et al., 2014) have relied on cross-sectional data and static models. For this reason, they fail to provide information on the temporal dynamics of the diffusion-abandon patterns among farmers (Moser and Barrett, 2006). Authors are generally conscious that the dynamics of innovation adoption 'rather than being an event, is best seen as a process, shaped by a multitude of changing factors and endowments' (Shields et al., 1993). However, the lack of adequate panel-data and the complexity of reconstructing the dataset from official archives at farm level (Marra et al., 2003) or through retrospective sample-based surveys recreating the participation history (Moser and Barrett, 2006), limit the diffusion of analyses specifically focused on the temporal dynamics of farmer participation (Ingram et al., 2013).

Nonetheless, a few papers have recently highlighted the crucial contribution that duration analysis, long used in biomedical, engineering and social research, can offer. Being based on longitudinal panel-data, duration analysis is a powerful tool for exploring temporal adoption dynamics: thanks to the simultaneous use of cross-sectional and time-varying data, duration analysis allows continuation or disadoption choices to be fully explored from a dynamic perspective, as well as to consider the impact of external variables, for example changes in policy design, and to link them to the moment in which the decision to leave or remain is taken (Läßle, 2010). However, because of the high complexity of data required, there have been few applications of duration analysis so far in agricultural economics, which include the already quoted works by De Souza Filho et al. (1999), Dadi et al. (2004), D'Emden et al. (2006), Hynes and Garvey (2009), Moser and Barrett (2006), Burton et al. (2003), Kallas et al. (2010), and Läßle (2010).

3. Case study and policy context

More than half of Veneto, a region in the north-east of Italy, consists of the Po Valley, a large, fertile, intensively farmed area. This vast flat territory has a long colonisation history with many changes to its landscape over time. Until the first third of the 20th century, the typical Veneto Po Valley landscape was formed by farming plots completely surrounded by rows of trees. In the last eighty years, with the expansion

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