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Agri-environmental policy valuation: Farmers' contract design preferences for afforestation schemes

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ABSTRACT

Many regions in the EU aim to increase their forest cover in order to expand timber production, sequester CO_2 or to provide more opportunities for recreation. Despite funding opportunities to support afforestation on private land, some of these regions do not succeed in enhancing their forest area. The objective of this study is to explore the institutional, economic and ecological conditions that would encourage farmers to enrol in an agri-environmental scheme for afforestation in Saxony, Germany. Using choice experiments and qualitative interviews, farmers' demand for varying contract designs is estimated. The findings show that farmers have a strong disutility for large forests and long contracts and would be willing to receive less subsidy if they receive technical forest management advice and have the opportunity to return to agricultural land-uses after the contract ends. Biodiversity and ecosystem service related factors (species' diversity, timber production and recreational access) do not significantly influence farmers' choices.

Introduction and background

Afforestation on agricultural land is regarded as a suitable measure to enhance biodiversity and ecosystem services and prevent climate change. This has been recognised by the EU in 1992 when first afforestation action focussed on the conversion of agricultural land into forest in the frame of the Common Agricultural Policy. Currently the extension of woodland is one objective of the European Agricultural Fund for Rural Development (EARFD) (Court of Auditors, 2005). Motivations are "to contribute to the protection of the environment, the prevention of natural hazards and fires, as well as to mitigate climate change" (Council Regulation, 2005, p. 277/5). The Council stresses that afforestation measures "should be adapted to local conditions and be compatible with the environment and enhance biodiversity" (Council Regulation, 2005, p. 277/5).

In line with the EU, many member states as well as regional authorities are highly motivated to extent their forest resources. In Germany, the Forest Strategy 2020 states that "within the framework of regional possibilities, new forest sites, offering particularly advantageous climate benefits and positive effects on nature and the landscape, should be planted" (BMELV, 2011, p. 23). Furthermore, federal states with relatively low forest cover have set themselves the aim to enhance their forest area. For example, Saxony wants to increase its forest cover due to the positive impact of forests on human well-being and the provision of habitat for native species. The enhancement of forest-related ecosystem services, such as flood protection, erosion control, carbon sequestration, climate regulation and landscape aesthetics, further motivate Saxony's authorities to increase the forest area (RL AuW, 2007; LEP, 2003; RP, 2008, SächsWaldG).

Despite an abundance of policy instruments for afforestation the success rate of efforts to enhance forest cover is limited in many countries, including Germany. While regulatory instruments (legislation and planning) play an inferior role in afforestation efforts due to non-existing financial support, policy instruments providing financial incentives to landowners are regarded as highly efficient in reaching environmental aims. However, in practice the only incentive-based instrument for afforestation – an agri-environmental scheme – has so far hardly contributed to an increase in forest cover in Saxony (Padberg, 2013; SMUL, 2010a,b). A brief description of the scheme can be found in Box 1.

The main objective of this paper is to explore the conditions under which German landowners in regions with limited forest cover would be willing to afforest. Using choice experiments and qualitative follow-up interviews we assess the demand for different contract alternatives and thereby identify the

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Box 1
Main characteristics of the agri-environmental scheme for afforestation in Saxony

Eligibility

- Agricultural land with a soil fertility index ≤ 45.
- Non-agricultural lands.

Requirements

- Plant native tree species.
- Regular thinning.
- Take pest prevention measures.
- Replace dead trees.

Compensation

- Investment costs: 70% of investment costs are reimbursed.
- Forest management: 300 €/ha/year.
- Premium for income loss: 625 €/ha/year (agricultural and forestry businesses). 150 €/ha/year (individuals, partnership, juristic person governed by private law).Source: RL AuW (2007), adopted.

institutional-economic aspects that hamper and/or motivate landowners' to enrol in afforestation schemes. Exploring the conditions under which farmers would agree to participate and identifying conditions under which farmers would accept lower levels of subsidies is a valuable input for an efficient design of the agri-environmental scheme (AES) for afforestation.

Our study site is located in West Saxony, one of the least densely afforested areas in Germany (see Fig. 1). The area is dominated by agricultural land-uses and only 16% of the land is covered by forest, thus lying far below the German average with 31% forest cover (SMUL, 2007; Federal Statistical Office Germany, 2012).

Since the 1990s choice experiments have become popular in the field of environmental economics to assist the design of environmental policies or to facilitate consideration of environmental impacts in decision-making (Garrod and Willis, 1999; Birol and Koundouri, 2008). The vast majority of these studies focus on the demand for policy and project scenarios in terms of public preferences and the public's willingness to pay (WTP). With respect to environmental measures on agricultural land, such as the AES, choice experiments mainly assess the public's preferences for various environmental benefits associated with such measures (Duke et al., 2012; Garrod et al., 2012; Hynes et al., 2011). Only recently choice experiments have also been used to optimise policies by targeting stakeholders supplying the environment goods and services under investigation and asking them for their willingness to accept in compensation (WTA) to take environmental measures. Some of these studies focus on farmers' willingness to enrol in AES in general (Ruto and Garrod, 2009; Hudson and Lusk, 2004) or specific AES, such as support for nitrogen fixing crops (Espinosa-Goded et al., 2010), pesticide free buffer zones (Christensen et al., 2011), no-till cropping, expanding riparian buffer zones and applying non-commercial fertiliser (Duke et al., 2012). One study evaluates farmers' preferences for afforestation contracts (Vedel et al., 2010; Broch et al., 2012; Broch and Vedel, 2012).

For the successful design and development of environmental measures solid understanding about the conditions under which farmers would be willing to participate in such schemes is essential. Authorities designing environmental programmes often focus on cost-efficiency from the authorities' perspective, thus neglecting some of the landowners' needs. Many studies argue that the economic incentive is the main factor influencing a farmer's decision to enrol in an environmental measure (e.g. OECD, 1998). This makes sense since farmers rely on sufficient income from their farm. However, Siebert et al. (2006) clarify that economic interests are not merely expressed as profit-maximisation, but also as long-term farm viability and risk minimisation. Although economic arguments play a predominant role in interviews, farmers also attend to various ecological and social reasons, such as interest in the environment or maintaining the farm for their successor (Wilson and Hart, 2000; Siebert et al., 2006). Knowledge about farmers needs is also important for choice experiment design as to make sure that it addresses the relevant aspects, including economic and non-economic motives for participation in environmental measures (Siebert et al., 2006). Previous choice experiments among farmers have selected contract design attributes that authorities can adjust (e.g. average time spent on paper work and flexibility over which part of the farm enters the scheme in Ruto and Garrod, 2009), that create conflicts between farmers' and authority's preferences (e.g. monitoring and early contract termination, see Broch and Vedel, 2012), that have been used in similar studies investigating AES (e.g. flexibility over the land size and availability of technical training and advisory service in Espinosa-Goded et al., 2010) or that are induced from theories on risk and transaction costs (e.g. price risk shifted to buyer, required investment in specific assets in Hudson and Lusk, 2004). In this study a number of contract design features (attributes) are selected, including aspects that can be altered by authorities, that are likely to cause conflict between farmers and authorities as well as economic and land-use related factors. Since biodiversity and ecosystem service enhancement is one of the main motivators for the scheme, we also included the provision of certain ecosystem services, i.e. recreational access and forest for timber production vs species diversity (see section "The choice experiment").

Methodology

Choice experiments are particularly suited to explore the conditions that enhance or reduce motivation to enrol in AES afforestation. In this study we supplemented the choice experiment with semi-structured qualitative follow-up interviews conducted after the main survey. This interview format helps to better illustrate farmers' motivation regarding the AES afforestation and to support choice experiment results.

The choice experiment

The choice experiment presented here aims to provide policy-makers with the constraints that hamper farmers from changing land use and the institutional-economic conditions needed to convince them to participate in afforestation schemes. The trade-off is to give up agricultural production on part of the farmland in return for financial compensation in the form of subsidies. Furthermore, the choice experiment design gives insight into the importance farmers attach to species diversity as provided by non-commercial rather than commercial forests (EFA, 2007) and forest-related ecosystem services (recreation, timber production). The contract design features were selected on the basis of interviews with forest authorities, authorities responsible for the AES as well as planning authorities that promote afforestation to increase provision of ecosystem services. Furthermore, attribute selection was inspired by a mid-term evaluation of the current AES programme revealing farmers' needs and conflicts between authorities and farmers. The contract design features were explained to farmers in the following way prior to the choice experiment: