IT2 (Eastern Lowlands of Ferrara, Italy):
Second order effects: Interactions between agri-environmental policies, farmers and "consumers"

Objective

The interaction between rural policy and the recreational use of rural landscapes can be a driver of indirect economic effects. This ad-hoc study provides a modelling framework focusing on the interactions among farmer decisions, landscape structures, rural tourism, and the sequencing of agri-environmental payments. The aim is to explore the conditions that would lead farmers to voluntarily efforts in favour of agricultural landscape conservation.

Methodology

We formulate a theoretical Agent Based Model (ABM) applied to the structural conditions (the spatial distribution of farming productivity, the perception and behaviour of tourists concerning landscape elements) of a rural case study area (Po Delta area, Emilia-Romagna, Italy).

Agent based models allow to explore the emergence of dynamic interactions between different actors and decision makers. The decision maker in the model is the patch. Think of the patch as an individual farm (or a homogeneous group of farms) that must decide between practicing either conventional farming or green farming (application of environmental measures devoted to landscape management). Green farming (here simplified in one hypothetical measure) is costly (due to a reduction in farm productivity), but is directly rewarded by an agri-environmental payment. The application of agri-environmental measures (AEM) increases the landscape quality of the relevant patch, as well as that of neighbouring patches (thus capturing positive environmental spill-overs). Consumers move around the landscape, being attracted by the landscape quality, and purchase local products on the patches where they stop, thus contributing to the farmers' gross margins. The farm decision is based on the expected gross margins of the two activities (selling of local agricultural products and landscape management practices). The outcome of farmers' decisions, however, is subject to uncertainty: In particular, the outcome is determined by the decisions of the surrounding farms, which affect the landscape quality of the farms, and by the expected sales to the consumers, which depend on the number of consumers stopping in the relevant patch.

Results

The results show that the interconnections between farmer choices, AEM, and the characteristics of consumer/tourists can determine the emergence of complex evolution of a landscape area, which is marked by path-dependence and positive feedback loops that, in certain conditions, can lead to self-sustained dynamics of landscape protection.

The model shows that, when there is an interested basin of consumers, an agri-environmental payment that is sufficiently high (at least initially) can trigger the movement of a consumer

population, and thus creates strong enough incentives for farmers to consider conserving natural landscape elements, even in the later absence of subsidies.
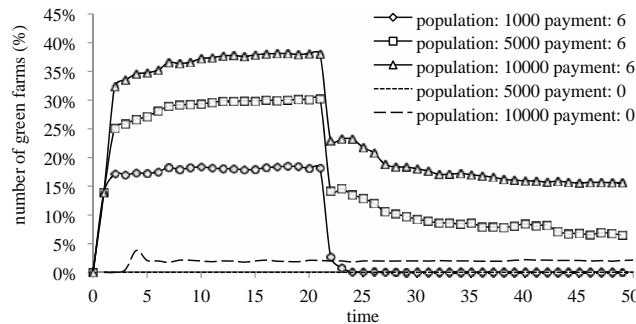

Figure 1. Percentage of green farms (farms that choose environmental-friendly practices) over time, for three level of consumer populations (1000, 5000, 10000) and a given level of initial payment (0 and 6). The figure shows that after the drop in the agri-environmental payment (time = 20) a number of farms still apply environmental protection measures, but that occurs only when a relatively large population of consumers is present.

The model also indicates that the evolution from conventional to green agriculture (and the related benefit associated with tourism) occurs in the most depressed area (the one characterised by the lowest mean productivity). Moreover, only clusters of green farms survive after the drop of the payment, the isolated green farms return to conventional farming (figure 2).
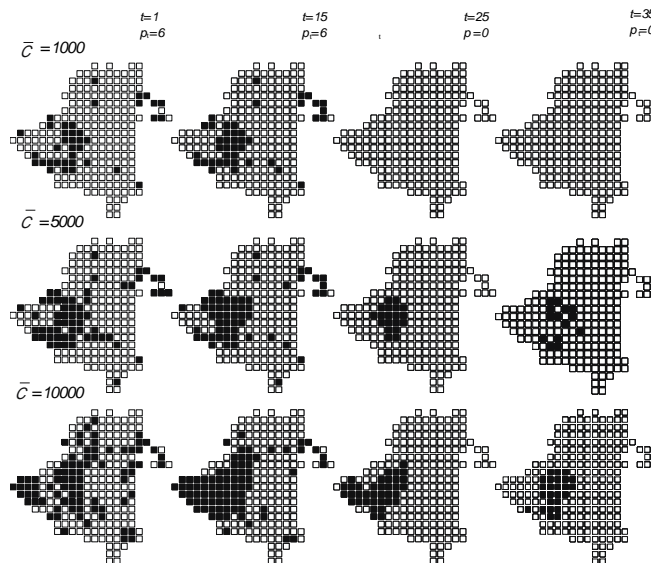

Figure 2. Spatial configuration of green farms (in black) and conventional farms (in grey) for selected times, and three level of consumer population. C = consumer population level; p = agri-environmental payment level; t = time.

Links connecting agents and causal connections through which landscape can potentially affect rural economies and societies

The focus of the analysis is explicitly the modelling of links and causal connections among agents, the effects of their decision on the landscape, and how the resulting landscape affects back the behaviour of the agents. The use of the ABM enables to explore a complex matter in a controlled environment.

Lesson learned & Policy Recommendations

The results seem to indicate three main implications for policy with regard to the conservation of natural elements in a rural landscape. First, in certain conditions a dynamic approach to the landscape/environmental conservation payments could be explored, in particular, taking into account the sequencing of the design of agri-environmental payments. Payments can be more explicitly considered as a temporary catalyst for the adoption of green technologies, aimed at launching activities that will later be self-sustainable on the market. This is partially embedded in the design of some EU AEMs, e.g. where maintenance involves a lower payment than at the introduction of such measures, but which could be made more explicit, for example, with connection to investment support for example in the agritourism sector.

Second, the coordination of farmers' efforts seems to be crucial for the adoption of environmental measures and green technologies over time, and for the creation of clusters of areas characterised by high landscape quality. This is in line with the increased attention of the CAP AEM on targeting and agri-environmental agreements. Yet, these options are poorly applied in practice. This work not only emphasises the relevance of policy action and the spatial consistency of these initiatives, but also the need to target areas with better potential for self-sustained exploitation of the green conversion and the need to consider not only the ecological spillover potential from clustering, but also the potential economic synergies and spill-overs.

Third, interactions with consumers (territorial marketing, environmental education, etc.) are key issue for the valorisation of landscapes and related choices by farmers. The results of this paper highlight that this can be a substitute for, or a complement to, direct payments to farmers. Hence, the combined design of consumer-targeted measures and agri-environmental payments could yield synergistic effects aimed at the adoption of green farm practices.

Reference

Zavalloni M., Targetti S., Raggi M., Viaggi D. (in review). Agricultural Policies, Second Order Effects, and the Development of Voluntary Landscape Protection Efforts: An explorative analysis using an Agent Based Model. *Journal of Environmental Planning and Management*.

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