Territorial management contracts as a tool to enhance the sustainability of sloping and mountainous olive orchards: evidence from a case study in southern Spain

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Territorial Management Contracts as a tool to enhance the sustainability of sloping and mountainous olive orchards. Evidence from a case study in Southern Spain.

Keywords: organic farming, collective management, territorial management contracts, Sloping and Mountainous Olive Production Systems (SMOPS), Common Agricultural Policy (CAP).

Abstract

The continuity of farming in traditional sloping and mountainous olive production systems (SMOPS) is at risk, especially in marginally productive areas. The abandonment of olive production on sloping lands would have adverse economic, social, environmental and cultural effects. To tackle this risk of abandonment and to improve the sustainability of traditional SMOPS, we propose the Territorial Management Contracts of Rural Areas (TMC). The potential of this instrument to be specifically applied to organic olive production systems on sloping lands is assessed. The paper then summarises the results of a survey conducted with Andalusian farmers aimed at identifying key characteristics of this instrument to enhance uptake by farming communities. Results show that farmers are well-disposed toward TMC, and that issues such as flexibility and external advice need to be considered for its successful implementation. From a policy perspective, the instrument is well aligned with the objectives of the last reform of the EU Common Agricultural Policy.

1 Introduction

Agricultural abandonment is a complex multi-dimensional process driven by different economic, environmental and social factors (Verburg and Overmars, 2009; Renwick *et al*., 2013). Agricultural land abandonment poses severe threats to predominantly agricultural areas in the Mediterranean Region and is thus of high political interest (Weissteiner *et al*., 2011). Amongst other effects, agricultural land abandonment leads to a loss of income for farmers, impacts on the amenity value of agricultural landscapes, increases wildfire risk and contributes to migration from rural villages to cities. These effects in turn impact on tourism and recreation potentials of these areas, contributing to a reduction in the general economic viability of communities in agriculturally dominated areas. Mountainous agricultural systems are particularly vulnerable to the impacts of land abandonment, because they often entail high environmental value in areas where agriculture is at the heart of economic activity. According to García-Ruiz *et al*. (2011), farmland abandonment in Europe affects thousands of square kilometres[1], and is particularly concentrated in mountainous areas, where depopulation and difficulties with the mechanisation of agricultural production already resulted in the abandonment of fields on steep slopes. Abandonment can follow different patterns in response to policy drivers. For example, the various degrees of farmland abandonment characterized by DLG and EC-LNV (2005), Pointereau (2008) and Keenleyside and Tucker (2010), -"semi-abandonment" "partial abandonment" or "cessation of productive farming"- describe situations, in which the land is not formally abandoned and is subject to some form of management. One such form of management that stands out is minimum maintenance of the orchards necessary to meet Cross-Compliance requirements (i.e.: certain environmental conditions that must be met), so that the single farm payment and other Common Agricultural Policy (CAP) payments can be claimed. This intermediate level of abandonment, however, can be seen as one step towards complete abandonment driven by factors such as ageing population and associated lack of successors, and competition with producers in more favourable locations.

Traditional olive orchards on sloping terrain in the Mediterranean basin constitute a regionally important agricultural system that is particularly at risk of abandonment, because it is rarely economically sustainable (Duarte *et al*., 2008). The OLIVERO project investigated the environmental and socio-economic sustainability of Sloping and Mountainous Olive Production Systems (SMOPS) to assess, whether there is a future for olive production on sloping land, and identified actions that farmers and policy-makers could take (Fleskens and De Graaff, 2008). SMOPS generally encompass disadvantaged or marginal types of olive grove, in contrast to groves on flat terrain that usually are of greater productivity and economic viability (Beaufoy, 2008). Olive groves on sloping land tend to

[1] The ambiguity of this affirmation is due to the lack of consistent measurement across the EU to ascertain the current extent of abandonment (Pointereau *et al*., 2008).

have relatively low productivity, lack successors to ensure continued cultivation, suffer from soil erosion and wildfire risk and have limitations in access to markets (De Graaff *et al*., 2008). These characteristics are important determinants of abandonment, which, according to De Graaff *et al*. (2008), may affect almost 15 % of SMOPS in the medium term. However, heterogeneity also exists between SMOPS, which comprise traditional orchards, semi-intensive orchards, intensive orchards and/or organic systems (De Graaff *et al*., 2008). This heterogeneity implies that the different types of SMOPS face different pathways for future development. For example, some SMOPS may likely be subject to abandonment, while others may be further intensified or may give way to other production systems such as organic farming (Stroosnijder *et al*., 2008). Therefore, appropriate management strategies to prevent increasing abandonment need to consider both SMOPS' distinctive features and heterogeneity.

The Southern Spanish Region of Andalusia is a typical example of an area in which olive cultivation plays a major role in agricultural production, and where SMOPS are a characteristic part of the land use mosaic shaping territorial identity. Olive production is the main source of agrarian employment and constitutes the main economic activity of more than 300 municipalities (i.e. in the 39 % of the region's municipalities). In this research we focus on traditional, non-mechanised and rainfed SMOPS, which constitute the most vulnerable category among SMOPS in terms of abandonment risk. Andalusian traditional olive orchards occupy two thirds of the Region's olive area (Cubero and Penco, 2012), and 24 % of the orchards are located on mountainous land (with slope greater than 20 %). In addition to the economic and social role, traditional SMOPS in Andalusia also have a significant environmental dimension by overlapping considerably with Nature 2000 and High Nature Value Farmland (HNVF) (CAP, 2003).

According to Arriaza *et al*. (2002), in the South of Spain land abandonment is expected to affect more than one third of SMOPS in the next decades. Duarte *et al*. (2008) affirmed that the abandonment of traditional SMOPS would have negative environmental consequences such as a decrease in biodiversity, increase in soil erosion and major changes to the traditional Mediterranean landscape. It would also increase the fire risk associated with abandoned land (Moravek and Zemechis, 2007). In social terms, De Graaff and Eppink (1999) highlighted the historical role of olive trees in the development of rural communities in the Mediterranean's poor rainfed areas.

Previous research has specifically proved the existence of social demand for ecosystem services provided by SMOPS. For example, Arriaza *et al*. (2008) found that social demand for non-commodity outputs from mountain olive groves in Andalusia exists, and discussed the implications that its consideration could have in the design of future agricultural policies. Colombo *et al*. (2005) identified a considerable social demand to alleviate the negative off-site effects of soil erosion on pollution of water resources and conservation of biodiversity obtained by appropriate management of SMOPS. The authors also found that Andalusian citizens not only cared about the environmental

dimension of soil erosion (surface and ground water quality, landscape desertification and flora and fauna), but also for the viability of rural communities, specifically in terms of rural employment. Finally, Kallas *et al*. (2007) observed that mountainous olive groves help to keep rural areas populated, and contribute to erosion prevention and the amenity value of landscapes.

Agri-environmental schemes are presumably nowadays a suitable policy instrument to tackle the problem of sustainability of SMOPS and, at the same time, to respond to the social demand for the ecosystem services provided by this system. However, previous policy responses have been proven to be inadequate to ensure sustainable SMOPS (Beaufoy, 2008). In this context, the lack of geographical targeting, which leads to the dispersion of contracts over large areas, emerges as an important feature (Hanley *et al*., 1999; ECA, 2011; Kuhfuss *et al*., 2013). This is because the environmental state does not improve significantly as long as the global environmental effort has not reached a minimum level of intensity, or has not been applied on a sufficient area in the zone of interest (Dupraz *et al*., 2009). Clearly, a jeopardised application of agri-environmental measures represents an impediment to the achievement of a minimum level of intensity in a specific area. Additionally, present agri-environmental schemes are often overly complex and include a very large number of objectives, complicating the measurement and corroboration of results (ECA, 2011).

The evidence of a current trend of SMOPS abandonment, together with the social demand for the services supplied by them and the low efficiency of the current agri-environmental schemes, motivate the development of novel institutional arrangements to tackle SMOPS abandonment and its associated negative impacts. This paper focuses on Territorial Management Contracts (TMC) in Rural Areas as a policy instrument, which has been previously coined in the Andalusian Act 5/2011 governing olive growing, but not yet operationalised in SMOPS. TMC are contracts between a group of farmers and the public administration, which require farmers to meet a number of commitments to improve both production-related conditions and ecological, cultural and socio-economic aspects of their farms. To the best of our knowledge, the use of collective arrangements in SMOPS has not previously been investigated in the literature, despite being an important topic in discussions regarding the CAP post 2013. Indeed, issues such as cooperation or the creation of producers' associations are considered throughout the design of regional RDPr and are endowed with higher co-financing rates (European Commission, 2011). Furthermore, in the new CAP policy framework, measures requiring cooperation have been significantly reinforced and extended to support a wide range of types of cooperation. This includes joint contracts as an additional element of the agri-environmental measures that explicitly also cover pilot projects (European Commission, 2013).

The first of objective of this paper is therefore to develop a conceptual framework for TMC associated with a switch to organic farming in the context of SMOPS[2], as an effective tool to increase the profitability of farming and, as a consequence, reduce the risk of abandonment. We then use data from a survey of olive farmers in Andalusian SMOPS areas to achieve our second objective: to identify likely facilitating factors and barriers to the adoption and proliferation of TMC associated with organic farming. Given the voluntary nature of TMC, participation of farmers is central to achieve policy objectives (Ruto and Garrod, 2009); therefore, a better understanding of farmers' views and preferences regarding TMC and its implementation in SMOPS is important to support its successful and effective implementation. Finally, we would like to emphasize that the focus of this paper is not to determine ways to achieve best practice in environmental management of SMOPS, which obviously depends on a wide range of specific on-farm conditions. Rather, the paper aims to shape TMC as a policy instrument that addresses the social, economic and environmental issues that threaten the sustainability of SMOPS.

The paper is structured as follows; in the next section, the main characteristics of TMC are described and it is outlined why they can be an effective tool to increase the profitability of SMOPS, particularly if implemented in association with organic farming. Section 3 introduces the case study and the questionnaire used to collect information on farmers and their views regarding TMC as proposed. Results are then discussed along with their policy implications in Section 4. Finally, Section 5 presents the main conclusions of the study.

2 Territorial Management Contracts in Rural Areas associated to organic farming: a new tool for the SMOPS' management

2.1 The structure of TMC

The first attempt to implement a TMC type arrangement was implemented in France, by means of the "*contrats d'aménagement du territoire*" (CTE)[3]. CTE were proposed as development tools in a territorial strategy of agri-rural development (Velasco and Moyano, 2007). The results achieved by these contracts with farmers were mixed. The great number of large farms which enrolled in CTE and the resulting increase in associated financial requirements hampered the accomplishment of the initial CTE's objectives, consolidating the interests of the existing production systems and models rather than promoting territorial development dynamics (Chia and Dulcire 2008; Viladomiu *et al*., 2007). Dulcire

[2] It should be clarified that the implementation of TMC does not have to be necessarily restrained to organic olive farming in SMOPS. Indeed, collective approaches have been suggested in the last reform of the CAP irrespective of the crop or the area considered as a tool to enhance a better performance of agri-environmental measures. However, in the current research we have confined its application to organic SMOPS because of several inherent characteristics of this system such as its high risk of abandonment, its cost structure and the relevance to small-scale farming.

[3] This concept was introduced in the French Act of July the 9th 1999, governing Agricultural Orientation.

et al. (2006) stated that CTE have rarely served to promote the participation of farmers in the sustainable and integrated management of the territory or to initiate new projects. Additionally, the long list of management actions that could be included in the CTE led to patchy outcomes that were barely visible at a territorial level. However, Arroyo (2008) affirms that, despite the lack of a successful implementation of CTE in France[4], the institutional framework and its legal basis could easily be transferred to other countries to integrate the concept of multifuncionality into farm management. This is what we believe applies to SMOPS.

The concept of TMC for SMOPS proposed here differs substantially from the CTE originally implemented in France and avoids their main barriers to success. Main differences are the collective character of the contracts, and the intrinsically small area of the farms in SMOPS. Collective approaches to agri-environmental schemes have also been implemented in the United Kingdom, the Netherlands or Finland. In the Netherlands, collective approaches have been successfully implemented over the past 15 years by agrarian nature associations, demonstrating that the delivery of agri-environmental measures by farmers' associations can be more effective than by individual farmers (Dutch Ministry of Economic Affairs, Agriculture and Innovation, 2011). One of the key factors to achieve this success has been to ground the associations on a coherent and integrated local programme defined by local farmers themselves (Dutch Ministry of Economic Affairs, Agriculture and Innovation, 2011). In the UK context, Davies *et al*. (2004) report various small scale projects for collective action in Scotland, which have demonstrated a potential for achieving environmental gains and improving the linkages among farmers and between farmers and other stakeholders. However, according to the authors, significant changes are needed in both farmers' attitudes and the incentive structures offered to them to achieve a successful implementation of collective action at a larger scale.

From a more general perspective, difficulties of finding support and advice, the eligibility of costs, the ownership of the land, the lack of trust in associative entities, the considerable administrative burden and the lack of clear environmental focus were found to be obstacles to TMC implementation (European Network for Rural Development, 2011). These aspects should, therefore, be taken into account in the design stage. Despite the existence of potential issues outlined below, the collective character of TMC supports territorial development objectives, avoids problems of dispersed uptake, and facilitates the monitoring and verification of outcomes. Likewise, focusing the implementation of TMC on small farms will avoid allocating a considerable budget to only a small set of beneficiaries, therefore contributing to distributional equity and enhancing the social legitimacy of the measure (Rocamora-Montiel *et al*., 2014).

[4] This author asserts that the implementation was determined by many external controversies, which reduced their efficiency.

In TMC, a group of farmers agree to meet a number of commitments, which are described in an action plan and serve as a benchmark for verification of expected outcomes by the contracting parties (administration and the group of farmers). The action plan will also serve as a means to cope with the inherent heterogeneity of SMOPS, since it will enable the alignment of the general TMC requirements and goals to the specific characteristics of the area of implementation. Figure 1 illustrates the basic structure of TMC.

Source: Own elaboration

FIGURE 1 ABOUT HERE

Figure 1: Diagram of the TMC's structure

Two aspects are crucial and distinctive characteristics of TMC for SMOPS: the collective character of the contracts, and the consideration of spatial connectivity. SMOPS are typically farmed on a small plot scale. For example, the average olive farm size in Andalusia is less than 5 hectares (Gómez-Limón and Arriaza, 2011). As such, individual micro-management of SMOPS creates a mixture of agricultural patches with different characteristics and environmental outcomes, where positive synergies arise only accidentally. Goldman *et al.* (2007) affirm that the potential of agricultural landscapes to provide ecosystem services often depends on the joint management[5] of farms. Collective and spatially connected management improves habitat connectivity through the creation of boundary features, which increase habitat edge effects, thus being beneficial for biodiversity, an issue of particular importance to high value environmental areas (Franks and McGloin, 2007).

Along the same line, the European Commission (2011) asserts that the synergies resulting from commitments undertaken jointly by a group of farmers multiply the environmental and climate benefits of agri-environmental payments. Collective approaches to agri-environmental contracts are considered to yield greater environmental benefits than separate actions of individual farmers. At the same time, collective management can improve cost-effectiveness and efficiency through targeted investments (European Network for Rural Development, 2011). From an economic perspective, collective management of small farms creates economies of scale, reducing production costs (Ruz, 2012). Likewise, it favours the centralization of supply, which facilitates commercialization and reduces the cost of distribution of the products (PAAE, 2007). In the case of olive orchards, Ruz (2012) suggests that collective management of about 50 perfectly connected hectares can achieve significant economic gains. Of course, the achievement of an 'optimal' degree of spatial connectivity may not be feasible in practice. However, suboptimal connections of SMOPS can still provide a

[5] *Joint management* and other terms such as *collective management* do refer to the same concept that aims to be achieved by TMC.

considerable improvement over the *status quo* with respect to the economic and environmental outcomes, and can be feasible to be achieved. For example, Colombo and Camacho-Castillo (2014) identified several areas in the study region where it would be possible to implement TMC involving 50 hectares of SMOPS out of 100 hectares of land.

According to Ciani *et al*. (2012), TMC give greater functionality to the role of the agricultural sector, improve liquidity of farm businesses and stimulate the use and dissemination of information and communication technologies for monitoring and control activities. From a social perspective, Ruz (2012) points out that TMC are an important instrument to tackle the problem of generational renewal, which is a common issue in a considerable proportion of SMOPS. In this case, the farmers' association created *ad hoc* for the implementation of the contracts could assume the management of those farms with owners who are not willing to continue with their farming activity. Finally, the European Commission (2011) predicts that support for small operators to organise joint work processes and share facilities and resources should help them to become economically viable, despite their small scale.

A third characteristic of the proposed TMC in SMOPS is the conversion to organic farming. That is, the collective and spatially connected SMOPS formed under a TMC should be organically farmed[6]. The transformation to organic farming represents an opportunity to strengthen the sustainability of traditional mountainous olive production systems (De Graaff *et al*., 2008), because of the higher financial profitability of organic olive oil compared to conventionally produced oil, the enhanced supply of ecosystem services and the similar production costs[7]. The benefits of organic farming in traditional mountainous olive production systems have been previously analysed by several authors. Rocamora-Montiel *et al*. (2013) found that organic farming in Andalusian traditional SMOPS delivers a wider set of environmental and social goods and services than conventional farming, on top of the implementation of Cross Compliance in CAP, which has led to an overall decrease in the negative environmental impact of conventional farming. De Graaff *et al*. (2008) observed that even after considering the reduced productivity and the higher risk of pests and diseases, organic farming offers opportunities to SMOPS due to the higher price of the products, the development of eco-tourism

[6] It is important to recognize that this requirement is not compulsory. In this paper we consider the conversion to organic farming, because on average the conversion to organic farming of SMOPS is expected to bring positive environmental, social and economic effects. However, TMC can be implemented in integrated and conventional agriculture where, under some specific conditions, they may even deliver larger benefits relative to the ones obtained through organic farming.

[7] The gap between the production costs of organic and traditional olive orchards narrowed considerably in the past decade due to the improvement of organic management of the orchards, the availability of more efficient inputs and the implementation of Cross Compliance. For example, De Graaff *et al*. (2011) observed that the latter increased the average cost of SMOPS' farming with between 1 % and 10 % (10% applying for traditional SMOPS and 1 % for the most intensive ones). Guzmán *et al*. (2010) found that on average the production costs of organic olive orchards are 1.4 % higher than in conventional systems, with an interval which goes from – 23 % to + 19 % .

activities and the availability of specific subsidies. Sanz and García (2013) affirm that the implementation of organic management in traditional SMOPS balances out the disadvantages that this system suffers in terms of productivity and costs. Moreover, according to the same authors, organic production in SMOPS generates a significantly higher profitability compared to conventional management due to the higher market prices for organic oil both in retail and wholesale markets. However, despite the above mentioned advantages, organic farming has been adopted on a relatively low share of the Andalusian olive growing area. According to Colombo and Sayadi (2010), this can be attributed to difficulties faced by producers to process organic products (e.g., the absence of organic oil mills); the lack of distribution channels and access to markets; and the insufficient information and knowledge regarding the management of organic production. Therefore, organic farming in traditional SMOPS is still controversial. According to the findings of Gómez *et al*. (2008), there is a large degree of heterogeneity in the outcomes of organic farming, which depend on a set of local environmental and structural conditions. However, the adoption of organic farming should be interpreted only as one basis for the implementation of TMC. The improved environmental performance of SMOPS fostered by TMC should go beyond organic farming commitments. For example, as pointed out by Gomez *et al.* (2008), financial support in SMOPS could be linked to specific additional soil and water conservation measures that go beyond organic management and that can be important to attain the environmental sustainability of these systems.

2.2 TMC and the agricultural policy

From a policy makers' perspective, it is essential to understand how TMC associated with organic farming can be embedded in the agricultural policy framework. Agri-environmental payments are typically used to encourage uptake of farming practices that enhance the environmental performance of farms. TMC associated with organic farming may qualify as an additional agri-environmental measure. In the forthcoming policy framework, collective agri-environmental schemes are likely to be adopted, providing the institutional basis for such implementation. However, given the large degree of heterogeneity of areas including SMOPS in terms of environmental and social conditions, the positive externalities generated by TMC are not expected to be generated homogeneously throughout the regions. Therefore, the expected outcomes and payments of TMC should be defined on the basis of the specific characteristics of the area they refer to (Ciani *et al*. 2012).

Such an approach would likely lead to an increase in transaction and verification costs for both private and public bodies. However, tailoring agri-environmental payments to local conditions (as, for example, in the case of TMC) may contribute to improving the effectiveness of the instruments in achieving environmental outcomes. This is supported by the mixed success of agri-environmental measures in achieving environmental conservation objectives (Kleijn and Sutherland, 2003; Kleijn *et al*., 2006; Batary *et al*., 2011). Additionally, recent research suggests that it may be worth bearing the additional costs avoided by policy simplification. Armsworth *et al*. (2012) find that it is likely to be

worth to pursue a more complicated policy that involves spatial targeting, even if the additional implementation costs of doing so would constitute a substantial proportion of the overall budget. Similarly Pannell *et al*. (2013) find that the additional transaction costs borne by the public administration in the process of applying more complex incentive designs would be easily outweighed by the additional environmental benefits generated.

Further, the spatial connectivity of SMOPS under TMC emerges as an important opportunity to reduce the costs associated with the verification of environmental outcomes. The public body no longer needs to inspect each single parcel, but can optimise the process of verification of outcomes on a larger scale. Therefore, a general increase in program efficiency is expected for the collective and spatially connected management of SMOPS: farmers receive payments that are proportional to outcomes provided, which differ between SMOPS areas, while the number of eligible projects is lower and the costs of monitoring and verification of the expected results are reduced through collective management.

Currently, all SMOPS receive some kind of public support in terms of single farm payment, or through rural development measures such as 'Less Favoured Areas' (LFA), or agri-environmental payments. Due to the collective structure of TMC, all of these support mechanisms may be joined into an overall support to the contracting farmers' association. Private landowners would face a trade-off between the extra costs incurred by being a member of the association (mainly transaction costs) and the benefits gained due to utilising economies of scale. In this context, the new CAP policy framework allows member states to pay a surplus of 30 % to support agri-environmental schemes that are collectively managed to compensate for the additional transaction costs.

3 Farmers' views on TMC

3.1 Survey design and study area

To gather information on farmers' attitudes towards the proposed TMC and organic farming, a sample of farmers[8] was interviewed between September 2011 and March 2012 in face-to-face interviews using a structured questionnaire. Two slightly different versions of questionnaires[9] were administered to organic and to conventional farmers. Both versions had four parts. In the first part, information about farmers' characteristics was gathered. The second part aimed at collecting information about the current management of the farms by inquiring farmers on aspects related to the farm's profitability, their views on the future of SMOPS, the importance of external advisers, and about the importance of several key factors in guiding farming decisions, including environmental concerns. In the third part

[8] The interviewees were selected considering whether they had the authority to take decisions concerning the management of the farms, regardless of whether they were full-time farmers or not.
[9] Translated versions of both questionnaires are available as supplementary material

farmers were firstly informed and then asked about their position towards a proposed TMC. An information package was used to describe the structure and functioning of TMC associated with organic management of SMOPS to farmers. They were informed that the hypothetical TMC required each of the members of the newly *ad hoc* formed association for collective management to follow the rules established by its steering panel. It was clearly explained that the association involved in the TMC has to create a management plan that details all the proposed actions that maintain or improve the productive, economic, social, environmental and cultural assets of the enrolled areas. Depending on the achieved outcomes related to these actions, the public administration would offer a certain payment. Several examples were provided to farmers to explain which actions may be covered, and how payments are tied to outcomes. We also summarised the advantages and drawbacks of a collective management of the olive orchards. Farmers were subsequently asked about their willingness to take part in a hypothetical TMC. If the response was positive, they were asked to rate a set of characteristics, which described the TMC's functioning. This information is useful for identifying features that could increase the likelihood of farmers' enrolment. Those farmers who agreed on taking part in the hypothetical TMC were further inquired about their willingness to pay for its establishment. Those who rejected the idea of participating were asked about their reasons and were subsequently asked to state their willingness to accept compensation to take part in the TMC. The questionnaire ends by asking respondents about their socio-demographic characteristics.

The survey was conducted in the municipalities Constantina and Cazalla de la Sierra, both belonging to the Province of Seville (Andalusia, Spain), as shown in Figure 2. Both municipalities are located in the North of the Province of Seville and belong to the "Sierra Norte" district. The selection of these municipalities is based on the findings of Colombo and Camacho-Castillo (2011), who applied a set of territorial and environmental indexes to determine the suitability of all municipalities of Andalusia to implement TMC in SMOPS. Based on this analysis, they conclude that these municipalities exhibit favourable conditions for an efficient implementation of TMC. The agricultural sector is the main economic sector in terms of employment in Constantina (61 % of employment). In addition, it represents the main activity for 47 % of the enterprises in the municipality. In Cazalla, 40 % of employment and 32 % of the enterprises are directly related to the agricultural sector (Caja España-Caja Duero, 2011).

The "Sierra Norte" district is an example of a typical mixture of Mediterranean mountainous and agricultural areas, where olive orchards coexist with forestry, pasture, holm and cork oaks. In the chosen municipalities, almost all of the SMOPS lie in Natura 2000 designated areas, underscoring the importance of organic management. The population of the area has been decreasing since the middle of the 20^{th} century. Currently, this trend appears to have stabilised. The average yearly change in the population rate in Constantina and Cazalla has been -0.55 % between 2003 and 2010 (Caja España-Caja Duero, 2011). The farmers' population is aging. 70 % of farmers in Cazalla and 64 % in

353 Constantina are older than 55 years. This may constitute a threat to the future of SMOPS, especially if
354 the generational renewal of the farmers is limited.

355 *Source: Own elaboration*

356 FIGURE 2 ABOUT HERE

357 Figure 2: Situation of the studied area

358 *3.2* Sample features

359 Farmers to be interviewed were selected from the list of farmers who belong to the main commercial
360 local cooperatives, which comprise most of the olive production of the area. In the sampling procedure
361 we considered representativeness in terms of gender and age. It was not possible to consider
362 representativeness with respect to other socioeconomic aspects (such educational level), because the
363 agrarian population data are not disaggregated for other variables at municipal level. The final sample
364 includes 187 farmers, amongst which 100 use conventional and 87 organic production systems. The
365 main socio-demographic characteristics are described in Table 1. The majority has a low education
366 level and has been working as a farmer for the last 30 years. The mean age is almost 60 years,
367 reflecting the ageing of the farming population in the area. The sample is representative of the
368 population of farmers in terms of the age (χ^2_4=4.7, P = 0.31), but differs in terms of gender (χ^2_1= 13.1,
369 P=0.00) with a higher proportion of male farmers in the sample.

370 TABLE 1 ABOUT HERE

371 Table 1: Sample features

372 *3.3 Survey results*

373 **3.3.1 Opinions about the farm's management**

374 An important element associated with effective collective management of SMOPS is the sharing of
375 knowledge and information between farmers, and the consultation of agricultural extension services.
376 Parra-López *et al*. (2007) observed that the transmission of knowledge amongst organic farmers in
377 SMOPS is an effective tool for the diffusion and adoption of organic farming, where often the
378 producers need advice on their management from either the government's agricultural service or, if
379 unavailable, from other (organic) farmers. The questionnaire inquired farmers about the frequency of
380 contacting their neighbours or the technicians of the agricultural extension service to resolve problems
381 related to farming (questions 2.7 and 2.8). Results indicate that farmers barely take advice from the
382 agricultural extension service and even less so from other farmers. Only 17.6 % of the interviewees
383 make use of the extension service at least twice a year, while 63 % of the sample stated to have never
384 contacted a neighbour to solve doubts regarding farming-related issues. To scrutinize whether the

willingness to take external advises is linked to either farmers' characteristics or production systems, a binary logistic regression is carried out, where the binary dependent variable takes the value 1 if the farmers have taken advice during the past year from the agricultural extension service, and 0 if they have not. The independent variables are a set of socio-economic and farm characteristics. Results indicate that the farmers' age and the type of production system are key determining factors in distinguishing those farmers who never consult the agricultural extension service from those who do, revealing that young and organic farmers are more likely to ask for external advice.

Organic farmers were also inquired about their willingness to advise other farmers about the organic management (question 3.4.a). A clear division was found between those farmers who do not perceive themselves to be sufficiently qualified to offer advice to other farmers (52.9 %); and those who are willing to advise other farmers concerning organic farming (43.5 %). The latter could complement the work of the extension service, currently understaffed to cope to cope with the demand for advice.

When asked to rate the main aspects guiding farming decisions (question 2.9; results shown in Table 2), conventional farmers, on average, indicated the commercialization of the olives as being the most important, whilst the majority of organic farmers quoted the protection of the environment as a key aspect. Both groups agreed that minimising production risks is of the least importance. Interestingly, maximising economic profit was not amongst the most important aspects considered in production decisions[10]. This is possibly due to the fact that farming in SMOPS often only constitutes a small share of farmers' overall income. Indeed, 35.3 % of the interviewed farmers affirm that agriculture constitutes a secondary activity for income generation. This percentage rises to 54.5 % for those farmers conducting agriculture as a marginal economic activity. Thus, farming may mainly be kept up for cultural and bequest reasons by a majority of land owners. This is also observed by Renwick and Revoredo-Giha (2013), who state that landowners often continue uneconomic farming for a variety of cultural and social reasons.

TABLE 2 ABOUT HERE

Table 2: Main aspects guiding farming decisions

Non-organic farmers were asked if they had ever considered a switch to organic farming (question 2.21). 60 % answered negatively, most of them simply stating that they had never thought about changing their production system. 35 % of farmers stated that they had considered switching to organic farming but had not changed their production system yet; noteworthy, the majority of these

[10] This comment does not apply to the small portion of farmers (5%) for whom agriculture is the exclusive economic activity. As it may be expected they scored the maximization of economic profit as the most important aspect.

farmers state the small surface of their farms as one of the main impediments for the transformation to organic. This is particularly interesting in the case of collective management, because this constraint would not apply anymore. Finally, the remaining 5 % stated that they were farming organically in the past, but had abandoned it.

3.3.2 Profitability and future of the exploitations

The sampled farmers' views regarding profitability, production costs and perceived risk of organic olive cultivation in SMOPS are reported in Table 3 for organic and conventional farmers (questions 2.13, 2.14, 2.15, 2.16 and 2.18).

TABLE 3 ABOUT HERE

Table 3: Organic vs. conventional farmers' views concerning the economic profitability of organic farming.

Overall, a majority of both organic and conventional farmers agreed that organic farming is the most profitable system in this area. Both groups asserted that this is due to the agri-environmental subsidies paid to organic farms and the higher market price of organic olive oil relative to conventionally produced oil. However, at the same time, more organic farmers than conventional ones (21.8 % vs. 9.0 %) declared that the organic system is less profitable than the conventional one, indicating that there is a large heterogeneity in the farmers' expectation about the profitability of organic farming. Almost a fifth of the conventional farmers were unable to state an opinion about the relative profitability, production costs and risks associated with organic farming. The majority of farmers agreed that both systems have similar production costs, which likely reflects the fact that costs are mainly determined by the inherent characteristics of SMOPS rather than by the production system itself. This is also confirmed by Guzmán *et al.* (2010) and Rocamora-Montiel *et al*. (2013), who report similar production costs for the two production systems. Finally, both groups concurred with each other that production risks do not differ much between conventional and organic farming. The most noteworthy observation, despite the observed heterogeneity, is that conventional farmers tend to consider organic farming in SMOPS the more profitable production system, a fact that should facilitate the conversion of their farms to organic production within the TMC.

3.3.3 Attitudes and preferences toward TMC

After introducing the TMC concept, farmers were asked about their willingness to take part in a producers' association linked to TMC implementation (question 3.1). 18 % of farmers were willing to take part in the association unconditionally, whilst 77 % declared to be interested in participating depending on the commitments required. The rest of the sample (5 %) was not interested to participate. We found a large correlation between the general willingness to take part in a TMC and farmers' income. All the farmers whose income relies principally or entirely on agriculture declared to

449 be interested in participating[11]. On the contrary, the 5 % of the sample not willing to participate are
450 farmers for whom agriculture only represents a marginal share of their total income.

451 Table 4 summarises the farmers' views regarding a set of defining characteristics of the
452 TMC (questions 3.2.a and 3.2.b). The feature rated highest by both organic and conventional farmers
453 is the possibility of leaving the association without being penalised, which clearly indicates a need for
454 a "flexible" design of TMC. Of course, it would not be practical to implement TMC at a large scale, if
455 participants can leave the agreement without any penalty. However, to include a penalty for leaving
456 the TMC would drastically reduce the willingness of farmers to participate. As such, the
457 implementation of the instrument should be tested in the field at local scale first to identify the
458 minimum requirements to guarantee the functioning of the TMC. Such field tests could be set-up
459 experimentally, i.e. by varying the contracting requirements, to assess the implications for
460 participation and performance of the TMC. The second most important characteristic was the
461 bureaucracy and paperwork to be administered by the association involved in the TMC. This
462 illustrates the difficulties faced by farmers to cope with the increasing administrative burden
463 associated with farming, and advocates for a design of a TMC which eases this burden to farmers as
464 much as possible.

465 The presence of a technician is also rated highly. Here, a statistical difference[12] is observed
466 between organic and conventional farmers ($t=2.43$, $p=0.016$), revealing that organic farmers consider
467 the presence of an external adviser more important. This may be expected given that organic
468 management is a relatively "new" concept, where erroneous management decisions can have serious
469 implications on the profitability of the farm. The commercialization of the olives or the olive oil
470 follows in the order of importance. Organic and conventional farmers differ statistically significantly
471 in their response to all questions regarding the role of the association in the harvest and the
472 commercialization of the olive oil (characteristics 4, 6 and 7 in Table 4); organic farmers assign
473 greater importance to the fact that the association supports the harvest of olives and, subsequently, acts
474 as seller of the organic olive oil, preferably using its own brand. This reflects the concerns of organic
475 farmers to not be able to trade all the oil as organic and, as such, to not benefit from the added value
476 associated with organic oil. Conventional farmers assign less importance to this aspect of the
477 association, whilst they place greater importance on the freedom of managing the farm in a self-
478 determined way. Statistical tests reveal that, compared to conventional farmers, organic farmers show
479 a greater willingness to forgo the freedom of managing the farm in a self-determined way, and as a
480 consequence, to follow the association's directives. Both groups consider it very important to have a

[11] On average, producers whose incomes rely entirely or principally on agriculture hold larger SMOPS areas compared to the rest of producers, for whom agriculture is not their main economic activity. Therefore, their willingness to participate in the association would ease the achievement of the minimum area required to obtain the expected benefits from collective management.

[12] t-tests were used in the analysis.

certain degree of flexibility in the management of the orchards regarding the working dates imposed by the association. Concretely, a time window of two weeks was indicated as suitable for initiating the soil preparation, applying weeding and entering the harvesting stage.

TABLE 4 ABOUT HERE

Table 4: TMC's characteristics valued by respondents.

Those farmers who accepted to take part in the TMC either unconditionally or conditionally were subsequently inquired about their willingness to transfer the entire management of their SMOPS to the association (question 3.5). A transfer of management responsibilities to the association can help to address the problem of ageing farmers and the lack of generational renewal. Ruz (2012) points out that the association can constitute a "professional farmer" and thus optimise the collective management of the orchards. It was explained that farmers who subscribe to a complete transfer of management to the association will in return receive either a previously determined payment, or a payment that depends on the financial profit made by the association.

The majority of farmers refused the proposal of an integral management of orchards by the association. However, 19 % stated that the possibility of transferring management responsibilities to the association is a good idea. Of these farmers, 61 % declared that they required a minimum payment of 550 € per hectare to transfer management of their orchards to the association[13], whilst the remaining farmers were willing to accept a payment proportional to the financial results of the association.

Finally, those farmers who accepted to participate in the TMC were asked about the sum of money they are prepared to pay to have the association created (questions 3.6 and 3.7). 32 % of respondents were willing to pay an average sum of 22.6 €/ha (std. deviation= 2.0). The remaining 68 % reported that they cannot afford a payment, although they are generally interested in participating. Those farmers who were not willing to join to the association were asked about their willingness to accept compensation in return for enrolling their farms into the association (question 3.8). Paying a compensation for participation may be justified, because a "minimum" level of spatial connectivity is required to maximise the environmental benefits resulting from the association. Amongst the group of farmers not interested in joining the association, 75 % rejected to be paid for including their farms in it. The average compensation demanded by the remaining 25 % is 341 € per hectare.

4 Discussion and policy implications

The new Common Agricultural Policy (CAP) emerges as a decisive benchmark for the analysis of the results of this study, since the definitive agreement post 2013 is going to significantly influence both

[13] In the studied area, farmers are currently receiving an average of 250 €/ha through the Single Farm Payment Scheme. The agri-environmental subsidy for organic farms sums up to 370 €/ha.

the future of SMOPS and the evolution of TMC. Therefore, it is useful to link the results of this study to key issues of the new CAP, which is going to affect the public financial support for SMOPS. This joint analysis will shed light on suitable ways to define promising instruments that can be used to enhance the sustainability of SMOPS.

The European Commission, the European Parliament and the Council have reached a political agreement concerning the definitive CAP post 2013. However several points are left to be set at national level and are still pending agreement. In the Commission's initial Legal Proposals published in October 2011, the main changes were clearly taking shape: the forthcoming policy was likely to contain a greener and more equitably distributed first pillar and a second pillar focusing more on competitiveness, climate change and the environment. In these proposals, various references were made to the importance of LFA and of HNVF, where SMOPS could be positioned. The definitive agreement has maintained these early proposals, but several changes and specifications have been introduced. In the first pillar, the definition of the Greening Payment, which will represent 30 % of the national envelope, will finally not affect permanent crops (Ministerio de Agricultura Pesca y Alimentación, 2014). Also, the schemes regarding LFA and Small Farmers (both optional for Member States), emerge as key issues for SMOPS. In the second pillar, the possibility of designing thematic sub-programmes that could be awarded with higher rates of support was included for thematic areas such as small farms, mountain areas, climate change mitigation / adaptation or biodiversity. Collaboration between farmers is considered in several instruments, for example in the measure termed "co-operation", which offers possibilities to support technological, environmental and commercial cooperation; in the measure "producer groups / organisations offering support for setting up groups / organisations of small and medium-sized enterprises on the basis of a business plan"; or in the "agri-environment - climate payments", where joint contracts are likely to play an important role. The importance of organic farming is reinforced. It has been separated from the "agri-environment - climate payments" in order to achieve greater visibility (European Commission, 2013).

At national level, the Spanish Ministry of Agriculture (Ministerio de Agricultura Pesca y Alimentación, 2013) has stressed that the conversion to organic farming in some mountainous areas will bring important benefits to the environment and aid in the maintenance of a viable population in these areas. The SMOPS sector published a manifesto in December 2012 (Olivar de Sierra, 2012), which highlights the importance of olive farming in mountainous areas and provides evidence that achieving a sound rural development in Andalusia is not possible without the recognition of SMOPS in development programmes. In the manifesto, specific support is demanded for TMC, greening measures and for a specific scheme for HNVF. The sector also demands the inclusion of a special programme for SMOPS in the Rural Development Policy that would sit alongside Natura 2000 areas, organic farming and the HNVF. They also called for the establishment of new criteria for a fairer

budget distribution, with additional payments made based on the environmental and social services provided.

From a social perspective, it was expected that the CAP post 2013 would have moved from an action-oriented policy to a target-oriented scheme (Rutz and Schramek, 2013), recognising that actions do not always guarantee the desired results (Kleijn and Sutherland, 2003; Whittingham, 2007). Although the current reform has not performed a categorical shift toward this target-oriented approach, the inclusion of alternative instruments promoting cooperation, the spatial concentration of the farms and the collective management in search of a better performance of agri-environmental payments have to be considered as the beginning of a new path toward the paradigm change expected for the future CAP post 2020.

Within this policy context, TMC associated with the conversion to organic farming are well aligned with the main elements of the CAP reform and the observed needs at European, national and regional level. The proposed instrument is expected to improve the sustainability of SMOPS by increasing their economic, social and environmental performance. Under the CAP structure, the most likely way to put TMC into practise would be through the Region's RDPr, and especially through agri-environmental schemes and measures aimed at promoting cooperation. The RDPr's measures should provide the general framework, where the definitive instruments (action plan of the association and resulting TMC) have to be designed. For example, the RDPr's measures could define which actions are compulsory (e.g., adoption of organic farming, minimum area of joint management of X hectares, minimum number of members, etc.), and which are left to for the association to decide (e.g., which management or trading scheme to follow). Following this approach, the inherent characteristics of the territory where TMC are rolled out can be taken into account through the actions and measures that the association is free to decide upon. Indeed, according to Espinosa-Goded *et al*. (2010), a regional approach to the design of agri-environmental measures is appropriate both from the perspective of potential savings that can be achieved and based on cost-effectiveness. As such, it is possible that TMC lead to different final implementations in terms of management and organisation, depending on the characteristics of the areas where they are performed.

Importantly, and different to the current "action-oriented" agri-environmental schemes, the payments will be proportional to the benefits generated. As such, it is necessary that the parties involved in TMC (the public administration and the farmers' associations) agree on the *status quo* conditions and on the approach to verification of the results. These conditions can be met by involving currently active certification agencies for organic agriculture, which have the best knowledge and technology required for verifying the environmental impacts from agriculture. For example, for measures focused on the maintenance of the ecological value of SMOPS landscape, the payment could be based on the accumulation of bonus points for specific actions and outcomes carried out in the different farm habitats (Niederösterreichischer Oekopunte Verein, 2011). The measurement of these

583 outcomes requires the development of effective indicators (Burton and Schwarz, 2013), that, among
584 other requirements, have to necessarily be clearly attributable to specific management actions (Zabel
585 and Roe, 2009). For example, for those measures aimed at improving biodiversity, the indicator list
586 should contain a number of species groups (Roth *et al*., 2008) that should be spatially comparable for
587 any given agricultural unit (Matzdorf *et al*., 2008) and represent the variety of habitats in the
588 programme area (Wittig *et al*., 2006; Haaren and Bathke, 2008). The public administrator could set up
589 a stepwise payment system with tranches proportional to the achievement of the anticipated results.
590 This payment should cover the costs borne by farmers to implement the required measures, including
591 transaction costs, and include a surplus to incentivise the farmers' enrolment in TMC[14]. The final
592 value should be proportional to the social demand for the provision of the environmental and social
593 services generated by SMOPS. Future research may identify the maximum amount of payment that is
594 socially legitimised by quantifying the citizens' maximum willingness to pay for the provision of these
595 externalities by SMOPS.

596 The collective character of TMC reduces the costs associated with the monitoring and
597 verification of outcomes. As pointed out by Schwarz *et al*. (2008), the lack of economies of scale is
598 considered as a key aspect of the high administration and transaction costs of both the current action-
599 based agri-environmental schemes and alternative result-based approaches. Under TMC, the public
600 body no longer needs to inspect each single parcel, and optimises the process of verification of
601 outcomes on a larger scale. By means of an adequate experimental design, it will be possible to outline
602 a representative sampling that would allow reducing the number of farms needed to be inspected
603 within a TMC.

604 The survey results point to aspects that are important for a successful design and
605 implementation of TMC in the SMOPS. First, TMC must be set up in a way that allows dissatisfied
606 farmers to abandon the contract without penalties, and in a way that reduces administration efforts.
607 The positive influence of contract termination possibilities on farmers' willingness to enrol in a
608 scheme is corroborated by several studies (Christensen *et al*., 2011; Espinosa-Goded *et al*., 2010;
609 Broch and Vedel, 2012; Wilson and Hart, 2001). For example, Broch and Vedel (2012) found that the
610 introduction of an option to cancel an agri-environmental contract within a limited period of time can
611 greatly improve farmers' willingness to accept contracts at lower cost for society. In the specific case
612 of TMC, this may be achieved by incorporating payments in tranches according to the achieved
613 results. In case a farmer leaves the association before the end of the contract term, s/he will not be
614 penalised, but s/he will not receive the full payment established in the contract. Farmers would also
615 reject any new instrument that would increase the administrative burden. As such, TMC should be
616 administered by a representative of the farmers' association, and farmers would directly interact with

[14] It is worth to note that the forthcoming policy, in the context of collective agri-environmental measures, increased the share of the payments used to cover transaction costs from 20 % to 30 % of the total payments.

this representative and thus avoid any extra administrative work. The reduction of administrative burden, and hence farmers' transaction costs, has been observed crucial for the success of TMC in previous cases (European Network for Rural Development, 2011).

Second, TMC should incentivise the presence of an adviser, who serves as a reference for all members to address the farmers' potential lack of confidence in the organic and collective management of olive orchards. In this context, according the current Regulation on Rural Development, the association could benefit from the measure termed *Advisory services, farm management and farm relief services*. This measure seeks the improvement of the sustainable management and overall performance of the farms. Support can be claimed by individual farmers, groups and small and medium-sized enterprises, as long as it is focused on attaining clearly determined objectives, which include: climate change mitigation and adaptation, improvements of biodiversity, the protection of water, the development of short supply chains or organic farming. These objectives are clearly in line with those of the proposed TMC in SMOPS. Therefore, this measure seems quite appropriate to prevent that the costs associated with advisory services act as a barrier (European Network for Rural Development, 2011) for joining collective management approaches.

TMC promote the collective management of the harvest, transport and commercialization of the product. Harvests can be carried out by hiring a squad of professional workers. The subsidies included in the RDPr paid for cooperation can be used to buy machinery to be used by farmers enrolled in TMC. This may enhance the efficiency of the collectively managed farming operation. New financial instruments such as credits with low interest rates are also considered in the new European Strategic Framework; these credits could also be used for acquiring the necessary machinery, or to support the infrastructure required to improve the marketing of the oil as a high quality product.

The Thematic Working Group of the European Network for Rural Development (2011) analysed collective approaches to agri-environmental contracts. It identified that the existence of a legal entity, the existence of a clear action plan, the involvement of local authorities, the clear definition of control functions or the existence of an adequate advisory service are pre-conditions for the successful realisation of collective contracts. The relevance of all of these aspects is confirmed by this study. However, it should be underscored that our empirical findings have to be interpreted within their specific context before being generalised. In particular, we did not consider the application of TMC in alternative farming systems, for example in integrated production systems. Our results therefore apply only to SMOPS areas where organic farming is proved to be more beneficial relative to other systems, and the transfer of results to such systems should be made with caution.

Future research is needed to identify the most efficient way in cost-benefit terms to implement the instrument. Building upon the results of this study, and focusing on a pilot case, future

research should investigate the impacts of different ways of implementing TMC, and aim at determining the characteristics of the area of implementation that play a key role in the functioning of TMC. The effect of, for example, the allocation of association memberships (directly or via public auctions), the impact of different spatial structures of the land that belongs to an association, the importance of the area's physical (soil, climate, etc.) and social (ageing population, level of abandonment, etc.) characteristics, the effects of penalties, the effects of an integral management of the plots, or the resulting economies of scale could be subject of further analysis. The possibility of funding pilot studies under the Pillar II budget of the forthcoming CAP undoubtedly represents a good opportunity in this regard.

5 Conclusions

SMOPS are under a high risk of abandonment, which threatens the supply of a variety of ecosystem and social services highly valued by society. It is therefore important to develop alternative strategies aimed at preventing abandonment and its associated consequences. The conservation and enhancement of the sustainability of farming operations in less productive or disadvantaged areas, where many SMOPS are located, is also a priority in the forthcoming RDPr. In this study we analyse these two interlinked issues and propose the use of TMC associated with organic farming as an alternative management system to transform SMOPS into a more profitable and sustainable production system, with the goal of reducing land abandonment. The information generated can be used to design specific measures under the forthcoming regional RDPr to promote the cooperation between farmers to increase the profitability of their farms.

According to the opinions of a sample of 187 farmers based in a characteristic Andalusian SMOPS area, almost the entire sample considers the instrument of TMC associated with organic farming a useful tool to increase the sustainability of SMOPS and would be willing to take part in an organic producers' association aimed at implementing TMC in their area. However, 77 % of the farmers made the participation conditional on the commitments required by the association.

The agreement reached at European level for the CAP 2013-2020 has retained the importance of collective contracts and the collaboration between farmers; indeed, cooperation and the creation of producers' associations are considered cross-cutting aspects in the design of future RDPr, and joint contracts are considered one of the main elements of future "agri-environment - climate payments". In the design of future agri-environmental policy instruments, specific attention should be given to flexibility of the agreements, the reduction of administrative burden and access to advisory services.

Considering both the results of the paper and the current political framework, TMC may be introduced under the Rural Development Policy and, particularly, through the agri-environmental schemes. The characteristics that are likely to influence the successful implementation of TMC include

687 the existence of a legal entity (producers' association), the existence of a clear action plan, the
688 involvement of local authorities, the clear definition of control functions and the existence of an
689 adequate advisory service. A territorial approach is indispensable, and should be introduced through
690 the action plan, which has to be designed based on the locally specific characteristics of the territory
691 and the farmers.

692 Future research is needed to identify of the most efficient way to implement the proposed
693 instruments. In this context, the use of procurement auctions in a pilot study setting to establish the
694 most efficient way to create the spatial agglomeration of farmers should be considered.

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