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Effects of CAP policy on farm household behaviour and social sustainability

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ABSTRACT

This paper aims to assess the effects of Common Agricultural Policy (CAP) on farm household behaviour and social sustainability by estimating main labour and employment indicators. The methodology used is scenario analysis based on multicriteria decision making in order to estimate and compare the impacts of different CAP scenarios on social indicators. A Multicriteria Mathematical Programming model was developed at farm household level and five future scenarios were used. The model estimates the farmers' utility function taking in account various conflicting criteria that can explain the farmers' behaviour. Then the model is used to simulate the impacts on social sustainability by estimating the social indicators mentioned above. The methodology was implemented to farm households in three case study areas, located in Macedonia Thrace (Greece), Guadalquivir Valley Andalusia (Spain) and Southern Eastern Planning Region (Bulgaria).

Introduction

A traditional argument connected to Common Agricultural Policy is the issue of maintaining economically vital rural communities, particularly in disadvantaged regions where alternative income opportunities were limited (Manos et al., 2011). However, in the last decades, a full range of new issues has emerged. Ageing of population in rural areas, raise the issue of "greying" society in connection to liveliness of rural areas and residential use of farms. Intra and extra EU migration has led to important changes in agricultural labour market and in non-agricultural residential communities in rural areas. While particularly in southern Europe immigrant labour has brought a major contribution to economic survival of agriculture and created new opportunities for labour allocation outside farming for local families, it also has generated new social inclusion problems (Kasimis et al., 2003). This, together with the movement of population outside towns renews the issue of rural–urban interaction. The role of the farm household as the core of the independent farm tenants is changing with the increasing labour opportunities for the youth and this also changes the profile of gender issues in rural areas. For this reason the changes in agricultural policy can have great relevance in the evolution of the rural areas. Policy can play an important role to balance the multiple functions of agriculture and support sustainable development (Reilly and Schimmelpfennig, 1999).

The analysis of employment and unemployment in rural areas also presents specific issues. The estimation of farm employment and especially family labour can be very difficult, especially in the case of work in small and very small agricultural holdings (EC, 2008). Gender issues are also a typical aspect of agriculture labour division. Though it may be argued that they have a strong social rather than biological foundation (Shortall, 2002) they are attached to both technology changes and modes of governance and social vision (Prugl, 2004). Altogether, these strong changes ask for a revision of problems connected with the management of social capital and social inclusion. On the one hand, exclusion is an issue with a long story in rural areas, though the study of mechanisms and the relations with policy have been for a long time insufficient in spite of its relevance (Shortall, 2004; Shucksmith and Chapman, 1998). On the other, social capital, individual skills and knowledge is an increasing factor in productivity and competitiveness, particularly in an enlarged and liberalised economy. Interactions with policy are not always straightforward, but certainly important (Winter, 1997). New perspectives in rural development include consideration of local as well as EU wide issues. For example, the international cooperation between rural areas reveals an increasing connectivity within and with outside the EU space (Ray, 2001).

This paper aims to assess the CAP impacts on social sustainability by measuring farm household behaviour in future scenarios

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(extended to 2020) according to European Union Common Agricultural Policy. This study also takes into account the issues raised by the Communication 672/2010 (EC/COM, 2010) entitled "The CAP towards 2020", in which one of the main recommended strategic aims is to maintain viable rural communities. For this reason, a multicriteria decision making model was formulated at farm household level in order to measure the social impacts of the CAP policies using different scenarios. The data resulted from a farm household survey carried out in the context of the research project entitled CAP-IRE (Assessing the multiple Impacts of the Common Agricultural Policy on Rural Economies), which is a European FP7 funded project. The model estimates the farmers' utility function taking in account various conflicting criteria such as maximization of gross margin, risk and labour minimization. Finally the model is further used to simulate the impacts on social sustainability by estimating main social indicators. The same model was applied in 3 Case Study Areas (CSAs) in Greece, Spain and Bulgaria.

Methodology – scenario analysis

The methodology used was scenario analysis based on multicriteria decision making in order to measure and compare the impacts of different CAP policies on basic social indicators (e.g. employment, labour use, etc.) and to achieve the more realistic simulation of the decision process. The chosen model was a multicriteria decision making (MCDM) model at farm household level. The MCDM model was chosen because of the variety of criteria taken into account by farmers when they plan their crop plans, broadening in this way the traditional assumption of gross margin maximization. It also assembles the multifuntionality of agriculture involving variables related with economic, social and environmental aspects.

The data required for this model resulted from CAP-IRE questionnaire called survey B (small survey of farm-household, with face to face interviews). We also used additional data from CAP-IRE questionnaire called survey A (data from 300 farms in each case study area) in order to support our analysis. The methodology implemented in a small number of farm households (five in each one of the three selected case study areas). The three selected case study areas were Macedonia Thrace (Greece), Guadalquivir Valley Andalusia (Spain) and Southern Eastern Planning Region (Bulgaria). These case studies were selected in order to present a balanced sample of different geographical regions of European Union and social models.

In order to analyse how Common Agriculture Policy may influence farm production decisions we extend (Amador et al., 1998; Sumpsi et al., 1997) methodologies for the analysis and simulation of agricultural systems based upon multicriteria techniques. These authors propose weighted goal programming as a methodology for the analysis of decision making. This methodology has been successfully implemented on real agricultural systems for assessing the CAP impacts for decoupling (Arriaza and Gomez-Limon, 2006; Manos et al., 2009, 2010b), for water agricultural policy (Bartolini et al., 2007; Bazzani et al., 2005; Berbel and Gomez-Limon, 2000; Manos et al., 2006), for farm planning (Gómez-Limón and Riesgo, 2004; Manos et al., 2010d) and for environmental management (Manos et al., 2010c). We employ this methodology to estimate a surrogate utility function in order to simulate farmers' decision-making processes. For this purpose:

1 We establish a set of objectives which may be supposed to be the most important for farmers and represent the real objectives of the farmers.
2 We determine the pay-off matrix of the above set of objectives.
3 We use this matrix to estimate a set of weights that optimally reflect farmers' preferences.

Objectives

The three objectives that we have used in order to express the farmer's decision-making process were as follows.

Profit maximisation

Profit is measured by a linear function defined as follows:

$$Max\, GM = \Sigma\, GMi \times Xi \quad (1)$$

where GM is the total gross margin, Xi is crop i and GMi is the gross margin of crop i.

Risk minimisation

In our model risk is measured as the variance of the total gross margin. The risk is computed by the following quadratic function that makes the total MCDM model a quadratic programming model:

$$Min\, total\, risk = \bar{X}i^{t}[Cov]\bar{X}i \quad (2)$$

where $[Cov]$ is the variance/covariance matrix of gross margins during the period of reference and Xi is the crop decision vector.

Minimisation of labour inputs

In this objective labour is computed as the sum of labour for all farming activities (TL), and its objective function is defined as follows:

$$Min\, TL = \Sigma TLi \times Xi \quad (3)$$

No other objectives are proposed. We assume that these three objectives mentioned above are enough to explain farmers' behaviour.

Constraints

In order to analyse CAP's social impacts we used several constraints. Some of them resulted from the implementation of the new CAP. The main constraints are:

- CAP Production Rights are the sum of production rights (PR) according to CAP for crops (Xi) following CAP regulations. $PR = \Sigma\, PRi \times Xi$
- CAP Quotas are the sum of Quotas according (QP) to CAP for all crops (Xi) following CAP regulations. $QP = \Sigma QPi \times Xi$
- CAP Crop rotations. They are referred to the crops that participate in Agri-environmental Schemes (AS). A rotational constraint limits the cultivated area for a crop according to the AS rules in each country.
- Land Total is the sum of total available land for all crops (Xi).
- Land Irrigated is the sum of irrigable available land for irrigated crops (Xi).
- Market Constraints are defined from the available farm household data and are different in each CSA.
- Available Capital is the sum of farmers' available capital in each farm household for all crops (Xi).
- Variable costs are calculated as the sum of the six categories of variable costs: 1. Seeds, 2. Fertilisers, 3. Chemicals, 4. Machinery, 5. Labour, 6. Cost of water.

The above constraints are the used with the same format when we implement the scenario analysis.

Attributes – indicators

Attributes are values of interest for the analysts that are deduced as functions of decision variables. In this sense, we have considered attributes that are relevant to policy makers and measure the