

133rd EAAE Seminar

**Developing Integrated and Reliable
Modeling Tools for Agricultural and
Environmental Policy Analysis**

Book of Abstracts

European Association of the
Agricultural Economists
(EAAE)

Mediterranean Agronomic
Institute of Chania
(MAICh)

Mediterranean Agronomic Institute of Chania (MAICh)
Chania, Greece, 15 - 16 June, 2013

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This book was produced at MAICh, Chania, Greece

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ABSTRACTS

Development and application of economic and environmental models to greenhouse gas emissions from agriculture: Some difficult choices for policy makers

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This paper describes how economic models designed to examine agricultural policy can be adapted to explore environmental applications such as the greenhouse gas (GHG) emissions from agriculture. The tensions between environmental policy aimed at reducing GHG emissions, and policies promoting agricultural production to increase food security are explored.

The Irish case is used to explore an issue which has widescale EU implications. Ireland, as part of the EU Effort Sharing Agreement, must reduce its GHG emissions by 20 percent by 2020 and in the event of a successor to the Kyoto Protocol by 30 percent below the 2005 level of emissions. In Ireland emissions from agriculture account for a significant share of total GHG emissions. Any reduction in Irish national GHG emissions will require a reduction in the emissions from agriculture. The cost of GHG emissions abatement is examined with and without the use of technical abatement measures. It is found that the cost of some technical abatement measures is prohibitive and that the control of emissions via a reduction in the level of agricultural activity may be a cheaper option for society. However, controlling GHG emissions via a reduction in agricultural activity would have adverse implications for food exports and food security internationally.

This tension between environmental and food security is likely to be replicated at the European level and further afield given the significant contribution of agricultural production to anthropogenic climate change and the role of EU agriculture and that of other major food exporters in addressing emergent food security concerns globally.

Keywords: Greenhouse Gases, Modelling, Policy Analysis

The use of a Malmquist Index to assess the impacts of climate change in the East Anglian River Basin Catchment

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One of the main impacts of climate change on agriculture in England will be to change the availability of water (Department for Environment Food & Rural Affairs, 2009). Changes in rainfall distribution will potentially lead to an increase in drought frequency, magnitude and duration (Charlton et al., 2010).

In this research a Data Envelopment Analysis (DEA) and a Malmquist Index are combined with a double bootstrap methodology to measure changes in Total Factor Productivity (TFP) in East Anglia. More specifically, the DEA technique was used to measure the year by year efficiency score for the farms in the sample and the Malmquist Index and its components used to derive information on productivity over time and especially for 2011. Data for the input - output models would derive from the Farm Business Survey for the years 2008 - 2011. Climate change impacts are taken into consideration by introducing rainfall data into the input side of the model as well as data for water cost which is used as a proxy indicator of water consumption per farm. Results reveal changes in total, technical and scale efficiency and provide information on how the 2011 drought influenced the TFP of the farms in the sample.

Keywords: FBS, DEA, Malmquist Index, Technical efficiency change, climate change

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Using sector models as a planning tool for reducing greenhouse gas emissions

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The main target of Norway's climate policy is to reduce global greenhouse gas (GHG) emissions by the equivalent of 30 % from those in 1990 by 2020. A substantial proportion of Norway's emission reductions are to be achieved through domestic action rather than the use of purchased credits for reductions made in other countries. It has also been made clear that agriculture has to take its share of the planned domestic cut. So future climate change action in the sector must expect to be measured with respect to how it deals with its GHG emissions. This paper will focus how agriculture sector models can be used to evaluate options for emission reductions.

The planning model used in Norway is Jordmod. This is a price-endogenous, partial equilibrium model of the type described in McCarl and Spreen (1980). For given technology and demand functions, domestic market clearing prices and quantities are computed. Prices of goods produced outside the agricultural sector or abroad are taken as given, and domestic and imported products are assumed to be perfect substitutes. Domestic production takes place on "model farms" with fixed input and output coefficients. The model farms span 11 representative farm types (e.g., combined milk and beef farms; grain farms), distributed over 32 production regions (with varying yields and limited supply of different grades of land), supplying 22 outputs (e.g., wheat; potatoes; cow milk; eggs) by means of 12 intermediate products (e.g., different grades of concentrated feed and roughage) and 25 other production factors (e.g., land, capital; labour, seeds; pesticides). The produce of the model farms goes through processing plants before being offered on the market.

The model farms are optimized (in a separate module) for given prices, subsidy and tax rates, subject to functions for production technology (e.g., output and input coefficients per hectare or per animal), and biological or natural restrictions. To increase the scope for substitution, model farms are constructed for different sets of relative prices (depending on specific scenarios). The data are based on extensive farm surveys carried out by the Norwegian Agricultural Economics Research Institute.

We have incorporated functions and coefficients for production activities into the model to reflect GHG emissions, based on an approach developed by the Intergovernmental Panel on Climate Change (IPCC), adapted to Norwegian conditions and practices. For dairy cows, for example, emissions from enteric fermentation are reflected as a function of the amount and mixture of feed. The amount of manure, which leads to emissions of methane and nitrous oxide from manure management and nitrous oxide from the use of manure as fertilizer, is determined by fodder intake. Animal-specific emission parameters are incorporated to reflect differences in manure management systems. Constant parameters per hectare, which differ between the use of manure and synthetic fertilizer, are used to represent emission of nitrous oxide from the use of fertilizer. We also incorporate emissions released as a result of tillage, the deposition of ammonia and leaching and runoff of nitrogen. All emissions are translated into carbon dioxide equivalents.

In this paper we show how the model can be used to analyse policy options for the reduction of GHG emissions in Norwegian agriculture. These options include first best

measures such as carbon taxes, as well as second best options such as restrictions or taxes on agricultural output. We demonstrate how the model can determine the impacts of alternative policy approaches on the level and structure of production and their regional effects.

Reference

McCarl, B. A., and T. H. Spreen (1980). "Price Endogenous Mathematical Programming as a Tool for Sector Analysis", *American Journal of Agricultural Economics* (Vol. 62), pp.87-107.

The policy impact on farm and non-farm households of a reduction in GHG emissions in Ireland: A macro-micro simulation approach.

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Several approaches can be undertaken in designing scenarios to reduce GHG emissions in the agricultural sector. Most of the studies on GHG emission in Ireland propose changes in the farm management practices to achieve a reduction in emissions. This paper links a social accounting matrix (SAM) multiplier model with a micro-simulation model to simulate the impact of a 20 percent reduction in GHG emissions by 2020 in the agricultural sector in Ireland. According to the Donnellan and Hanrahan, (2011) estimates using the FAPRI-Ireland model, the 20 percent reduction in emission is achieved through a reduction in the numbers of livestock in the cattle sector. These results are used in the SAM multiplier model to simulate the economy-wide impact of a reduction in the output of cattle sector in Ireland. In order to model the farm level impact of changes at the aggregate level, we utilise a farm level micro-simulation model (O'Donoghue and Lennon, 2013) that contains farm level supply and demand functions, responsive to price changes, and calibrated to volume changes in the SAM. The model simulates resulting changes to farm level net margins (outputs, minus direct and indirect costs) and family farm income (net margin plus subsidies). As a micro model, the model generates the distributional impact, highlighting the types of farms likely to be affected, including system and income quantile as well as demographic characteristics.

Keywords: social accounting matrix, micro-simulation, econometrics, agriculture, GHG emissions, Ireland

Predicting the implications of CAP reform using a bio-economic modelling approach

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The next CAP reform (2014) may alter the situation for livestock farmers in the UK as historic payments give way to area-based payments. Such arrangements may have particular significance for both intensive and extensive sheep and suckler cattle farming systems in Scotland. We developed a linear programme model to explore how farmers might adapt to CAP reform. The objective was to predict the impact of CAP reform on flock size, stocking density, grazing management, profit per head and farm profit. Feed energy supply and demand as well as supply and demand of labour were matched to maximise farm gross margin (GM) or net margin (NM). Bio-physical and financial data (2011) from 40 specialised breeding suckler cattle, breeding sheep and mixed enterprises were analysed and used in the model.

Preliminary results of maximising farm GM show that for the majority of the farms the optimum stocking rates predicted by the model is equal or close to actual figures. However, maximising farm NM show that in most of the mixed and specialised suckler cattle farms the optimum stocking rates predicted by the model were lower than actual figures. When the appropriate proportion of subsidy was allocated to each enterprise, improvements in stocking rates and profit were predicted in mixed and sheep farms. Some of the cattle farms also returned a profit when CAP support was included. Results support the assumption that farmers may still consider the decoupled CAP support as a coupled payment. CAP reform (e.g. the stocking rate rules) may also encourage flock expansion on some farms that implies a potential for indirect re-coupling of subsidy to production. Such expansion may stretch scarce resources and hence negatively impact sustainable production.

Keywords: Bio-economic model, Linear Programming, CAP reform, Farm Management, Sheep, Cattle

REDD policy impacts on agri-food sector: scenario analysis with a CGE model

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Recent work shows that the combined contribution of deforestation, forest degradation and peatland emissions accounts for about 15% of greenhouse gas emissions. The REDD policy is suggested to provide substantial emission reductions. Since agricultural production and area expansion is a primary driver for tropical deforestation, REDD policies might limit the expansion possibilities of agricultural land use and therefore influence competitiveness, agricultural prices, trade, production and so the food security the world. In this paper, we investigate the impact of REDD policy on agri-food sector. The impact of REDD is assessed with an CGE model LEITAP using a scenario approach.

Our simulation results shows that REDD significantly affects the agri-food sector when more than 30% of global carbon rich areas are protected from deforestation. The protection of 90% of global carbon rich results in global real agricultural prices increase by 5.6% and agricultural production decreases by 2%. However, regional differences are large. In case of real agricultural prices, price changes ranging from 0.1% in North America to about 22% in Sub-Saharan Africa and South-East Asia.

Keywords: REDD, deforestation, land supply, agricultural prices and production, scenario analysis

A Spatially Explicit DEA to estimate Efficiency of Agricultural Land Use

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Agriculture provides commodities and has an influence on the environment. Even if the value of agricultural production is easily to evaluate, one can hardly estimate efficiency of agricultural production at site level. Additionally, evaluating environmental impact is complex. Non-parametric approaches such as the DEA allow for estimating environmental and economic performance. We suggest a plot-specific approach combining GIS and a two-stage DEA. This allows a spatially explicit assessment of agricultural land-use for different subjects. In the example of the "Rhön", a marginal region in Bavaria, the environment (θ_{env}) and economy (θ_{eco}) oriented technical efficiency is calculated on ca. 5,800 plots.

Comparing the results of the four DEA-Models one can state that the variation of the economy oriented efficiency scores is higher than the environment oriented ones. Regarding grassland, one can see a relation between location of the plot and θ_{env} , while on arable land plots efficiency scores are varying on a small scale. This indicates that, on arable land, other factors - for example, crop rotation or product prices - have an impact on external effects.

In the second stage of our DEA model we analyse the impact of farm- and site-specific characteristics on efficiency. These results show that on grassland, as well as on arable land, farm-specific attributes such as farm type have a higher impact on θ_{env} and θ_{eco} than site-specific attributes like productivity or slope.

Keywords: Agricultural land use, DEA, technical efficiency

A spatially explicit integrated assessment of trade policy and climate change impacts on Austrian land use and environment

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We assess the economic and environmental impacts of international trade policies and climate change on land use, crop management, and the regional environment in Austria. Previous analyses show that the impacts of both driving forces may differ substantially between regions and pollutant. Hence, we integrate spatially explicit biophysical impact data of agriculture and forestry into the spatially explicit economic bottom-up land use optimization model PAsMA_pixel (Positive Agricultural and Forestry Sector Model Austria). We use different trade policy (e.g. DDA) and climate change scenarios for the period 2005-2040. Trade liberalisation leads to more extensive production and lower nitrogen emissions on average, though regional differences are substantial with respect to magnitude and direction of impacts. Climate change can intensify pressure on water resources in semi-arid regions due to increased demand for irrigation measures. The results indicate that there may be a need to implement additional regional policies such as water pricing and better targeted agri-environmental payments that are in accordance with WTO rules. Special focus is put on the opportunities and challenges of integrated spatially explicit economic land use modelling.

Keywords: integrated modelling, spatial modelling, agricultural trade policies, climate change impacts, environment

CAP effects on agricultural investment demand in Europe

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The CAP coupled and decoupled subsidies might facilitate physical investment. This paper employs FADN data to extend the work of Serra et al. (2009) investigating the dynamic effect of CAP subsidies on the investment decisions of selected EU farms. The dynamics of capital stock and a synthetic measure of the farm's expected output prices are allowed to have a differential effect across 3 regimes: investment, disinvestment, no investment.

Estimates suggest investment behaviour mostly varies across the three regimes. The frequently negative capital adjustment rates hint that EU agriculture might be over-capitalised with respect to its long-run, regime specific, optimal value. Coupled subsidies seem to increase investment in Italy and Germany while exert an insignificant effect in France and the UK. Decoupled CAP support does not appear to have a significant effect on investment in Italy while it has a positive and negative one in Germany and France, respectively.

Keywords: Farm Investment, Threshold Models, FADN, CAP

JEL Codes: C24, Q12, Q18

Global land use response in agricultural sector models

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The response of an agricultural sector model to scenario shocks is only as good as the parameters steering its' equations. Recent developments raised special interest in future global land use response to rising global food demand, slowing yield growth and biofuel policy changes. Accordingly, the quality of land allocation response parameters of agricultural sector models is now more important than ever before.

The aim of our paper is twofold: (1) Since many agricultural sector models specify their parameters based on econometric studies, we will provide a systematic literature review comparing methods and results of studies estimating response parameters in terms of supply and land allocation. The literature review shows that many studies estimate yield and area changes independently of each other neglecting their undoubted interdependence. (2) Therefore, we set out to econometrically estimate supply elasticities simultaneously with yield and area response. This will be exemplarily done for Argentina's cereal and oilseed sectors. These sectors have shown drastic production increases in the last two decades, realized through productivity improvement as well as a significant expansion of agriculturally cultivated area replacing pastures and forests. Based on the methodological approach of Chambers and Just (1989) and the extension made by Arnade and Kelch (2007), profit functions will be estimated for soybean, wheat, corn, and sunflower production in Argentina based on data from 1995 to 2010.

Keywords: Supply elasticities, agricultural sector models, estimation

Stochastic Partial Equilibrium Modeling: An Application to Yield Variability

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EU agriculture has moved from a situation of stable, administratively determined prices and subsidies that are linked to production, to freely moving prices and decoupled subsidies. With rising world prices EU markets are less isolated than in the past. In addition, world commodity prices have become more volatile. Producers in the EU are therefore facing more uncertainty and are calling for policies that address these concerns. Policy impacts, even from traditional policy interventions, need to be evaluated in light of this new environment.

The FAPRI-UK model, with the EU-GOLD model, is a deterministic partial equilibrium model on the EU agricultural sector for ex-ante policy analysis. However, within a volatile market environment, a deterministic model is likely to miss important implications of potential policy changes, especially when the policy actions are dependent on market outcomes. In view of this, it is desirable to incorporate key uncertainties into the models. In the past, external uncertainties such as volatile world prices have been incorporated into the FAPRI-UK model (Moss et al., 2010). It will be important for the model to introduce internal uncertainties as welfare outcomes are ultimately determined by the interaction of both factors. For example, in 2012 wet weather meant that crop producers in the UK did not benefit from the high prices. This paper presents the first attempt to incorporate internal uncertainties to the FAPRI-UK model, using crop yield variability as an example.

Keywords: stochastic modeling; agricultural policy

Rationalizing calibration of agricultural programming models with a capacity constraint

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Without detailed motivation, Doole et al (2011) employ a variation of Positive Mathematical Programming (PMP) to calibrate farm models to observed milk production using a quadratic constraint replacing the typical non-linear PMP objective function. The objective of this paper is to analyse their approach conceptually and to offer an economic rationale including modifications.

We first investigate equivalency of their approach to PMP and show that it indeed holds for calibrating to base year activity levels, but demonstrate that equivalency to PMP is violated when simulating responses to changes in economic conditions, because the dual value of the constraint changes endogenously.

Secondly, we interpret their constraint as a Capacity Constraint (CC) i.e. representing a level technology where activities require resources from an aggregate and constant labour and capital stock. However, the simple quadratic form of the CC employed by Doole et al. does not allow for explicit specifications of returns to scale which might be highly relevant for modelling links to factor markets. Therefore, we present an alternative functional forms for the CC and demonstrate model calibration with examples.

Keywords: calibration, farm programming models, capacity constraint

Technical change in Alpine Farming - A Malmquist index approach

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In comparison to flatland agriculture, mountainous agriculture is often shaped by small plot sizes, unfavourable climatic conditions and heavy slopes. All those conditions make it extraordinarily expensive to implement new technologies and to modernise farms. Consequently our research hypothesis is that technical progress in mountainous regions is slower in comparison to flatland regions. In order to test this hypothesis, we developed a model combining a Malmquist index approach with a matching analysis. We apply our model in Austria, using a panel data set comprising the data of 1034 Austrian voluntary bookkeeping farms and ranging from 2003 to 2009. On basis of the Austrian Mountain Farm Cadastre, these farms are classified into five categories expressing the degree of disadvantage which farms experience from being in a mountainous area. Our results show that technical change in mountain regions is significantly lower than in flatland regions and that it is continuously decreasing with increasing disadvantage. Matching our results shows that this result is mainly based on farm grassland share, while farm size is of minor importance. With regard to efficiency change and change of total-factor productivity, we do not find any significant results.

Keywords: Data Envelopment Analysis, Matching, Alpine Agriculture, Technical Progress

Integrated Modelling of Payment for Ecosystem Services: Using Willingness to Pay and Accept for Nature Provision and Addressing Public Management in Cultural Landscape

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We model “Payment for Ecosystem Services” (PES) aiming at the public management of biodiversity provision schemes where citizens and land users have only a broad understanding of the ecology. The aim is to integrate ecological knowledge and shadow prices analysis into a simulation of scarcity in demand and supply of nature (biodiversity: BD) in order to get values for nature elements. Values for nature elements shall enable management by objectives as compared to current generic schemes. We outline an ecosystem service (ESS) provision problem in which biodiversity BD is at the core of establishing the service. The service can be nutrient recycling, pollination, pest control, etc., noticeable at a macro level (but done by species at the micro level), which is the issue for nature conservation in cultural landscapes (see “The Economics of Environment and Biodiversity”: TEEB). However, the typical problem is that, although there might exist an eventual vehicle for payment (land use, nutrient recycling, water retention, combating erosion), the underlying complexity of the ES and needed BD can not be easily presented in straightforward payment schemes. Managers of ecosystems need much more detailed information on priority setting than they usually find in PES based on simple negotiations. Especially, since landscapes/habitats need to be integrated and jointly modeled with farm land use for the provision of the ESS, natural science knowledge on habitats matter in scheme design. In order to solve this problem we suggest an approach in which the ES management is planned and conducted by ecologists who possess the knowledge of the pertinent functional relationships between species prevalence and ESS provision. Farmers are compensated based on priority setting and suitability of specific land acquisition. Another task is to find relative values (prices) for species in cases of an ES management in a cultural landscape as appreciated by citizens. Valuation (of species) is presented as a simulation (of a market-like process) of balancing value revelations, based on shadow prices of providers (farmers), users (citizens) and ecologists. We address the conflict with ecologists as managers, farmers as profit maximizers, and citizens as utility retrievers. The conflict between managers who argue ecologically for preferred species composition and land users who have limited knowledge, is solved by balancing interests. Our approach takes interest functions and it allows quasi market coordination.

Keywords: PES-Valuation, cultural landscape, species composition and nature provision by farms

Impact of growing costs on the profitability of crop production in Poland in the mid-term perspective

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In Poland, for several years there has been an increase in the use of mineral fertilizers. Its volume has already exceeded 100 kg NPK per 1 ha of arable land. Fertilization has a positive effect on yields, but negatively impacts on the environment. Farms with lower inputs, which were measured by the direct costs (I quartile) can obtain better results as compared to the technology of high inputs (IV quartile). Research of cereals (wheat, rye and barley), rape and sugar beet performed using statistical analysis of classic trend models have shown stronger growth of the cost than the value of production in mid-term perspective. This will result in lower production efficiency. In this situation, farmers should focus on the low production costs strategy, which is confirmed by projection made for 2014. In farms from the I quartile of direct costs – compared to IV quartile – the economic efficiency of production was much higher – in the case of cereals from 27.4 to 64.5 point. percent., rape – 41.1, and sugar beet – 30.4. The role of costs as a factor influencing the efficiency of production is evident.

Keywords: classic trend models, mid-term projection, direct costs, economic efficiency, crop production.

Potential effects of the Income Stabilization Tool in Swiss agriculture

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Increasing market price volatility and climate change are expected to increase farmers' income risks. In order to support farmers in managing these risks, whole-farm income insurance schemes are currently considered by agricultural policy makers in Europe. The EC (2011) proposed an Income Stabilization tool (IST) that can be used by EU Member States to prevent severe farm income losses. The goal of this study is to analyze which farmers would be supported most by the IST and to approximate its costs. We use FADN data of 1037 Swiss farms over the time period 2003-2009. We estimate double hurdle models to assess how farm and farmers' characteristics contribute to a) the probability of indemnification through the IST, and b) the amount of indemnities received. We find farmers located in the mountain regions to be more likely to receive a payment. Furthermore, especially part-time farmers with low income levels would be supported most by the IST in terms of frequency and amount received. Area-based direct payments were found to reduce and animal-based direct payments were found to increase the probability of indemnification. Our results suggest that the IST in the here assumed design is not an appropriate tool to support production orientated farmers who are most exposed to price and production risks. In contrast, part-time farmers would profit most. To design a targeted IST and increase the risk management ability of farmers, farm characteristics should be considered.

Keywords: Income Stabilization Tool, double hurdle model, Switzerland

Investigating the price transmission mechanism of fresh potato, tomato and cucumber in the Greek Agricultural Markets

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For many years, a major concern in Greece is the allegation that the consumer price is much higher than producer's in agricultural markets. This is usually attributed to rigidities of the Greek agricultural markets. Therefore, this study attempts to investigate the forces that govern the price transmission mechanism between producer and consumer for three major products of Greek agriculture: fresh potato, tomato and cucumber. These three products constitute a major part of Greek consumers' diet in quantity as well as in value. The assumption that, Greek agricultural markets are characterized by rigidities indicates that there should be high transactions costs. Therefore, for this analysis a Markov Switching Vector Error Corection (MSVEC) model is selected as it can account for a difficult to measure and difficult to observe variable, like transaction costs. Moreover, the MSVEC model that is utilized allows for asymmetric adjustment to positive and negative asymmetric shocks in order to account for the differences that are observed between the prices of producer and consumer. The results so far show that in the case of potato asymmetries are prevalent. However, for tomato symmetry is the main finding. Finally, for cucumber asymmetry depends on the state of the price mechanism and the direction of causality.

Keywords: prices, asymmetry, markov

Convergence in Total Factor Productivity and Farm Income at the Sectoral, Regional and National levels in the EU

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The main objectives of Common Agricultural Policy (CAP) as stated in the Article 39 of the Treaty of Rome were: first, to provide an essential framework to increase productivity and second, to ensure a fair standard of living in agricultural Community. However, even after more than half a century of the implementation of CAP, farm income and productivity disparities across regions, sectors and countries in EU continue to exist.

This paper measures farm-level agricultural productivity using a transitive Total Factor Productivity (TFP) Törnqvist index for farms from all EU Member States and for the period 1990-2008. Next, farm-level results are aggregated and tested for the presence of β -convergence and σ -convergence to examine whether productivity gaps are shrinking or widening over time across regions, sectors and countries in EU. The same convergence tests are carried out also for Net Farm Income (NFI) and Family Farm Income (FFI), defined as the net income from farm production as well as rent and wages paid per annual working unit and family labour income remunerated per holding, respectively.

Regarding σ -convergence the results suggest an increasing dispersion for NFI and FFI, but a decreasing dispersion for TFP over time. Absence of σ -convergence in farm income calls for policies to stimulate growth among the least-developed countries in the EU. The results of the β -convergence tests suggest that in the long run all regions, sectors and countries in EU converge to the same steady state for NFI, FFI and TFP.

Keywords: convergence, Total Factor Productivity, farm income

Modelling the effects of farm specific policy measures with CAPRI and AGMEMOD models

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EC JRC-IPTS

Since 2003 CAP reform there are policy instruments applied at particular farm level: decoupled historical single area payment and modulation of direct payments at farms. After 2013 at least voluntary reduction of payments for big farms should be foreseen while historical payments should be gradually transformed into regional payments as it has been already discussed. Partial equilibrium (PE) models use to address a wide range of policy measures at country or sector aggregated level, but there is problematically to tackle properly a farm specific policy measures. The models deal with this issue by using different approaches where the differences are not only based on the level of disaggregation of farm types inside the model. The objective of this paper is to examine and compare approaches applied in two PE models: CAPRI and AGMEMOD, with a particular attention on reduction of direct payment amounts after their assignment at farms as well as on switching from farm historical to regional decoupled payments. The results of comparison are discussed in terms of models' capacity to catch out the effects in different levels of aggregation, a reliability of complexity of the approach and assumptions used behind the modelling of farm specific policy measures. Preliminary results show that the effects on production are simulated stronger with AGMEMOD than with CAPRI model. Conclusions regarding possible improvement of modelling by integration of approaches from two models CAPRI and AGMEMOD will also be suggested as the results of the study indicate relative advantages depending on different discussion points in both models.

Keywords: PE models, agricultural policy, farm specific measures

Joint assessment of water and agricultural policies: a Pan-European multidimensional modelling approach

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Irrigation water use by agriculture has been identified as one of the major sustainable water management issues in the implementation of the Water Framework Directive in Europe. While the strong linkages between water, food, and the environment call for an integrated and multidisciplinary modelling approach, a complete and consistent modelling system to evaluate food-water relationships in Europe was missing so far. This paper therefore develops a simulation framework to jointly assess agricultural and water policies and discusses first result. The partial equilibrium model for agriculture CAPRI, combining a global market model with regionalized supply side models for European administrative regions, has been extended with a module for irrigated agriculture to complement its existing environmental indicators and agri-environmental modelling capabilities.

This modelling framework enables analyzing the likely impacts of increasing water stress on agricultural production at the level of administrative NUTS2 regions, as well as looking at the sustainable use of water, the implementation of water policies or the integration of water issues in the Common Agricultural Policy. This innovative approach has been tested in a pilot case study including two regions (Andalucia in Spain and Midi-Pyrenees in France), selected according to data availability. The paper discusses the methodological and data issues, and presents preliminary results, highlighting the interrelations between water and agricultural developments in Europe. We find that incorporating water issues in EU-wide agro-economic models is crucial to analyse future agricultural policies in a context of climate change and increasing pressure on water resources.

Keywords: agricultural policy, agro-economic modelling, food-water linkages, bioeconomy.

JEL classification: C60, Q11, Q18.

Modelling structural change in ex-ante policy impact analysis

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Model-based ex-ante policy impact analyses are nowadays widely used in agricultural policy consulting. However, so far very few existing applications try to assess the impact on farm numbers and the re-allocation of resources between farms, and due to data availability, these studies generally use normative or ad-hoc decision rules on farm exits. In this paper, we fill this gap, combining an empirically-based estimation of profit-dependent farm exit probabilities with prospective modelling of farm adjustments and factor and product markets.

This study combines farm-individual information from farm structural surveys for 1999, 2003 and 2007 and economic information from farm accountancy data for Germany. The estimated model explains farm exit probabilities depending on current and expected future profits, the expected development of competitors (e.g., neighbouring farms competing on the land market), and farm and regional structural characteristics influencing farms' strategic decision making. The econometric exit model is iteratively coupled to a representative farm group model for Germany and a partial equilibrium market model, facilitating the ex-ante analysis of complex policy reforms. A first application on dairy market reform scenarios (e.g., a restrictive quota scheme, investment subsidies, or different price scenarios), highlights the diverging impacts these may have on the developments of the number dairy farms of different size or regions, and their income and output.

Keywords: farm model, ex-ante analysis, structural change, market model

Accounting for Agent Heterogeneity in Policy Analysis

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The proposed presentation will discuss the importance of agent heterogeneity in the increasingly industrialized agri-food system and will present a novel, empirically relevant, integrated, multi-market framework of policy analysis that explicitly accounts for consumer and producer heterogeneity.

In particular, this new policy analysis framework accounts for heterogeneity in consumer preferences or/and incomes; heterogeneous producers (producers differing in education, experience, location and quality of land, management skills, technology adopted etc.); imperfectly competitive input suppliers, processors or/and retailers; and links and interactions between the agri-food supply channels of interest (i.e., markets of the regulated product and its relevant substitutes and complement products and services).

The new policy analysis framework is based on various models developed by the presenter and his colleagues and students over the past decade to analyze the market and welfare effects of genetically modified products under different regulatory and labeling regimes [Giannakas & Fulton, 2002; Fulton & Giannakas, 2004; Giannakas & Yiannaka, 2004, 2006, 2008; Veyssiere & Giannakas, 2006; Plastina & Giannakas, 2007; Lassoued & Giannakas, 2010], the enforcement of intellectual property rights [Giannakas, 2002a], the market for organic products [Giannakas, 2002b; Giannakas & Yiannaka, 2006], the economic effects of purity standards in food labeling laws [Giannakas et al., 2011], the effect of cooperatives in agricultural markets [Fulton & Giannakas, 2001; Giannakas & Fulton, 2005; Drivas & Giannakas, 2009, 2010], conservation compliance on highly erodible lands [Giannakas & Kaplan, 2005], the market and welfare impacts of country-of-origin-labeling [Plastina, Giannakas & Pick, 2011], and consumer demand for quality-differentiated products [Giannakas, 2011].

The proposed presentation will integrate this accumulated knowledge and experience into an empirically relevant policy analysis framework that can be adapted to encompass all relevant segments/participants in the agri-food system.

Justification of the Topic (Novelty, Relevance & Significance):

The explicit consideration of consumer and producer heterogeneity in policy research represents a significant departure from the “representative consumer” and “representative producer” that have been the foundation of most of the literature on policy analysis. Indeed, through its reliance on the conventional models of representative consumers and producers, traditional agricultural policy analysis has (implicitly or explicitly) assumed a homogeneous response to, and impacts from, various policies affecting the agri-food marketing system.

It is well-known, however, that both consumers and producers are highly heterogeneous groups and that this heterogeneity is expressed through highly diverse demands for and supplies of products, programs, services, and policies. In this context, the traditional focus on representative consumers and/or producers prevents both the determination of the effects of different policies on different consumer and producer groups as well as the understanding of the widely different positions held by seemingly similar groups in policy negotiations.

In addition to enhancing the empirical relevance of policy analysis by allowing the research to account for key elements of the increasingly industrialized agri-food

system, the explicit consideration of consumer and producer heterogeneity will enable the analysis to disaggregate these interest groups and *determine the effects of different policies on different consumers and producers* (e.g., consumers of different products, low- versus high-income consumers, more- versus less-efficient producers, etc.). *Better measures (and understanding) of the effects of a policy can lead to improved policy design, enhanced efficiency, increased effectiveness, and reduced policy failures.*

Before concluding this part, it is important to note that the focus on the links and interactions between the regulated products and their close but imperfect substitutes is a departure from both the general equilibrium and the partial equilibrium approaches employed extensively in policy analysis. Specifically, the proposed framework is neither a general equilibrium nor a partial equilibrium in the sense that it does not focus either on the whole economy or a single market. Instead, *it is a flexible, multi-market framework that can be adapted to analyze any number of supply channels of interest - i.e., any number of regulated products along with their substitutes and/or complement products.*

* The development of this new policy analysis framework has been funded by the U.S. Department of Agriculture's Policy Research Centers Program.

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Danish Global Farmers: Factors affecting investment behaviour in Central and Eastern Europe

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In this paper, we investigate the phenomenon of the global farmer by looking at Danish farmers in Central and Eastern European countries. We use a sample of Danish farmers with activities abroad and find that there are two groups of global farmer: *Expansion* and *investor*. The *expansion* global farmers tend to expand to a relatively small number of activities abroad while maintaining their home farm business, while the *investor* global farmers tend to spread to several activities abroad, and most often rely on hired management. We investigate push and pull factors that may determine the decision to increase the level of activity abroad using frequency analyses and split-sample comparisons. Additionally we empirically analyse which respondent and farm characteristics affect the level of activity abroad by use of a count data (Poisson) model. The results indicate that some of the important motivations for Danish global farmers to extend overseas are cheap land, institutional governance and image with regard to farming. Labour cost does not seem to be an overwhelming issue whereas the quality of labour in the host country is of importance. Our findings generally are in line with the limited existing literature.

Keywords: Danish global farmer; Central and Eastern Europe; Investment; Expansion

Bio-economic modeling of winegrape protection strategies for environmental policy assessment

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The objective is to assess cost-effective environmental policy instruments to reduce pesticide use in viticulture. As the farm household-level is appropriate to integrate bio-economic linkages, we model the decision of a winegrower maximizing expected utility under constraints - considering the production effect of different strategies targeting downy mildew (*Plasmopara viticola*), the main grape disease in European Atlantic vineyards. VINEPA (Vineyard model for Environmental Policy Analysis) is a multi-periodic discrete stochastic model based on panel-data of 105 representative winegrowing farms from the Farm Accountancy Data Network in the Bordeaux region. Grape yield response function to fungicide treatments is simulated through *Potentiel Système*, an epidemiologic model initially developed for decision support - using parameters from multiple weather stations and untreated vine plots weekly monitored over a ten years period. The model accurately reproduces the current chemical protection strategies. Simulations are then carried out for increasing level of pesticide taxes and capital subsidies for variable rate equipment. Cost-effectiveness is assessed through environmental indicators (Quantity of active ingredient, treatment frequency index, and environmental impact quotient). Shortcomings and further development of the model are discussed.

Keywords: Stochastic Programming, Wine grape growing, Downy Mildew (*Plasmopara viticola*), Environmental Policy, Bordeaux

Can the inspection procedures in organic certification be improved? Evidence from a case study in Italy

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Adaptation to climate change: a structural Ricardian analysis of the choice of farm type in Germany

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Introduction and background

The consensus that greenhouse gas emissions alter temperature and precipitation levels has grown strikingly during the last two decades. From arguing on the existence of climate change in the '90s, the principal focus of science has evolved to the daunting challenge of understanding if and how society adapts on it, in the 2000s. Within this scientific arena, agriculture has gained its fair share of investigation as possibly the most vulnerable economic sector to climatic disturbances.

It is usually argued that the best way to prepare for a change is to adapt to it. The literature argues that the agricultural sector is generally adaptable to climate change in the sense that management, technological, and resource-use changes can be undertaken expeditiously. Intrinsically driven by this commonplace assumption, a number of empirical investigations on adaptation measures have emerged. Examples include the choice between crops or livestock species, the resilience of mixed, specialized crop, or specialized livestock farms, and the choice to irrigate or not. A comprehensive literature review on the toolkit of proactive adaptation measures at the farm level can be found in Kurukulasuriya and Rosenthal (2003), and on empirical applications in Mendelsohn and Dinar (2009).

Research questions

How is the current incidence of farm types associated with past climate? Can land value differentials for the various farm types be identified due to climate differentials? Will potential climate change be beneficial or harmful for certain farm types, and for the farm sector as a whole? Based on a probabilistic exploration of the climate-dependent incidence of various farm types in Germany, our case study attempts to answer these questions. Empirical assessment is pursued by means of the so called structural Ricardian approach, which is an econometrics-based impact assessment methodology that aims at the investigation of the effects of changing climate on long-run accumulated land values. Theoretical perspectives and extensive reviews are offered in Mendelsohn and Dinar (2009).

The work underlying this paper adopts a number of innovations. From a general point of view, this is the first structural (see Sec. 4) Ricardian model for an EU country. Previous Ricardian studies covering EU countries have focused on description (e.g., Maddison, 2000, Lang, 2007) or estimation of economic impacts (e.g., Lippert et al., 2009) by assuming endogenous adaptation. With this study, we complement previous related work by attempting to open the "black box" of adaptation in Europe.

Second, from a data availability point of view, and to the best of our knowledge, this is the first application of an impact assessment with national coverage. In contrast to previous studies, which have relied mainly on (random) sampling or representative farms, our analysis draws on census microdata that cover the whole farm population (i.e., more than 450,000 farms).

Third, from an agronomic-interest point of view, our farm-type setup deviates from the typical classification of farms into specialized crop, specialized livestock, and mixed. Instead, we use a more detailed spectrum of agricultural operations that is based on the calculation of standardized gross margins (see Sec. 3).

Materials

Through a contract with the Research Data Center of the Federal Statistical Office and the statistical offices of the Länder, farm data come from the official census of 1999. These data cover all farms above certain thresholds (e.g., 2 hectares of UAA) that were interviewed at the end of 1999.

Data on past climate come from the National Meteorological Service, and are based on measurements by ground monitoring stations. Data on future microclimate projections originate from a regional weather model. In either case, climate is operationalized by means of climatological normals (i.e., 30-year averages) for temperature and precipitation.

The apparent scale mismatch between the spatial support of the farm data (farm level) and the climate information (station level) requires spatial interpolation operations. However, prediction of climate at the farm level is both impracticable (the 1999 census data are not geocoded) and unreasonable (farms are not points, but exhibit scattering in space). For this reason, we aggregate the data at the highest scale for which identifiers exist in the census – that of communities ($n = 10,900$). Such aggregation does not only allow the assignment of climate values, which we approximate by means of raster cell values that result from a nearest neighbor interpolator coupled with inverse distance weighting, but it also has additional advantages over complete disaggregation. First, the final dataset becomes much more manageable than its disaggregated counterpart. Second, the use of small-area aggregates indubitably increases the range of the response for a group over that for individuals. And third, potential measurement errors in any variable are partly dampened by averaging. Ultimately, without neglecting the importance of inferring climate-dependent relationships from farm-level data, it could also be argued that policy analysis does not usually require explicit links to individual farms.

In the census microdata, the derivation of the farming system is based on the relative contribution of the standardized gross margin per hectare of 40 farming activities. Based on these activities, the following farm holdings are derived: cash crop, permanent crop, forage, fattening, horticultural (vegetables, floriculture, tree nursery), forest, and mixed/combined holdings. The use of individual farm data in the form of communities within a multinomial modeling framework (see Sec. 4) necessitates the generation of a dominant farm type per community, which we base on a simple comparison of the frequencies of each type.

Additional data on edaphic quality, topographic characteristics and further socioeconomic attributes that are likely to influence farm-type selection and land values are also used. Data on soil productivity and land steepness are handled using zonal statistics to include only agriculturally managed areas. Distance variables are handled with geodesics. Socioeconomic data come from the census. After matching these data with the farm and climate information, testable variables emerging from economic theory and past literature can be formularized.

Methods

The analytical framework of the structural Ricardian approach is multivariate regression. The modeling procedure takes off with a descriptive analysis of the climate-dependent setting of the extant farm types (polycategorical model) and their land values (conditional models), and concludes with a marginal impact analysis and a future simulation exercise.

At a first step, we investigate the association of the incidence of farm types with past climate. The choice of the farm type can be seen as a distinct choice on which the impacts of climate can be estimated by means of selection probabilities. For example, if cropping were less profitable than livestock production for warmer areas, lower choice probabilities would be expected for cropping, and higher ones for livestock production, *ceteris paribus*. In such a case, a limited dependent variable perspective

can be taken, within which farm-type selection is regressed against a set of climatic and other, control attributes.

At a second step, an indicator of land value is derived, and the direct influence of climate on the economic performance of farms of each farm type is conditionally estimated. As such, land values (in our case: reported land rental prices) are partitioned into groups according to the persistent farm types, and each group is regressed against the same set of climatic and other variables.

Our base choice and conditional regression models are the result of careful specification testing, and take into account a number of methodological and analytical aspects that have gained little or no attention in previous empirical applications (e.g., sample selection, measurement errors due to interpolation, spatial autocorrelation).

At a third step, the simulation of possible impacts of future climate change is achieved via substitution of spatially processed microclimate projections into our base models. In principal, climate forecasts from various sources could be plugged into the base models (e.g., for comparison purposes).

The entire analysis is carried out through an iterative remote data analysis system between the authors and the Research Data Center (FDZ) in Kiel. This special contract gives us access to the census database but, due to data privacy restrictions, without obtaining the data. As such, coding programs that are written by us are implemented in FDZ, and only the results are sent to us.

Expected results and upcoming work

The output of this ongoing case study comprises useful numeric and graphical information mainly via the so called climate response functions. In multinomial-model setup, these functions schematize a probability-based ranking of the various farm types for different levels of climatic attribute(s). In standard-regression setup, the climate response functions portray the association of land rental prices (jointly for all farms, or grouped by the farm type) with climate. The simulation exercise allows assertions on the potential incidence of future farm types and future economic impacts. Detailed results will be presented in the seminar and the full version of the paper.

Our ongoing/future work related to the Ricardian approach pertains to (i) the post hoc correction of measurement errors due to the interpolation of climate variables (e.g., Chatzopoulos and Lippert, 2013), (ii) the incorporation of extreme weather events, and (iii) the implementation of more sophisticated spatial interpolators. We hope to elaborate on these issues with the utilization of more recent farm data (2010 census), and more recent (1980-2009) and selective climate data.

Keywords: climate change, adaptation, structural Ricardian analysis, farm type

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Adapting to Extreme Climate Events? - The Case of Agriculture and Floods

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The consideration of adaptation responses taken by farmers is crucial in order to realistically assess potential impacts of climatic extreme events on agriculture and to design effective policy measures. However, if and how adaptation is actually taking place at farm-level is still highly controversial based on very limited empirical evidence. We aim to fill this gap by identifying adaptation strategies followed by farmers in the UK to cope with climate related extreme events. Our analysis is based on a comprehensive farm-level data set covering the period 1990-2011 comprising about 15,000 observations. We enrich this business data by site-specific information on environmental conditions and dynamics. In particular, we account for the timing and severity of flood events and their impact on farmers' decision making. We consider a wide range on farm-level adaptation measures covering adjustments in land use, off-farm occupation as well as physical flood protection measures such as drainage systems. More specifically, we focus on adaptation measures taken by the farmer after they have suffered from a flood. The research setup is based on previous findings that the occurrence of extreme events influences farmers' perception of climate risks; triggering thus also adaptation responses taken by farmers. We employ a panel estimation approach using a random-effects SUR technique controlling for potential endogeneity and selection bias.

Keywords: Climate extreme events, adaptation, floods, panel regression

Producer and consumer food price volatility. A Hungarian - EU15 comparison

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The worldwide commodity price increases (commonly referred as price spikes), of 2007 and 2009 shocked the general public, politically and socially wrecked some developing countries, whilst raising considerable concern among researchers and policy makers about the impact of high world market prices upon domestic food price inflation. An interesting feature of this global price surge was the very different impact it had on domestic prices across countries. Whilst the European Union (EU) food price increase between 2007 - 2008 averaged 5-6%, in some member states (e.g. Hungary) domestic price change was 3-5 times the EU average. This experience, partly explains the popularity of volatility analysis. Most of these papers however, including ground-breaking new studies (e.g. Rezitis and Stavropoulos, 2010, 2011; Roache 2010) are however set in a single country context. The purpose of this empirical paper is the comparative assessment of Hungarian price volatility with some EU15 results.

Indeed, it is difficult to overestimate the importance of commodity and food price volatility upon emerging economies. As Kharas (2011) argues 'the crux of the food price challenge is about price volatility, rather than high prices per se'. Perhaps that's the reason, most comparative studies (e.g. Huh et al., 2012) focused on developing countries.

Market shock of various kinds, internal or external may lead to increased price volatility. Most often price volatility is assessed against the background of various food scares, (e.g. Serra 2010), policy changes (e.g. Rezitis et al. 2010 on the implications of Common Agricultural Policy reforms) or market structural breaks (e.g. Ciaian et al. 2011 on the increasing demand of crops for bioenergy purposes). The recent global agricultural commodity price surges affected most countries, and quickly found their way into the consumer prices. The pass through was however of different extent. Even within the EU, where the average food price inflation during the price spike was 4-5%, there are major differences depending on member states and whether producer or consumer level prices are assessed. There is a wealth of recent literature exploring the cause of the price surge (shifts for bioenergy purposes, increasing demand on behalf of developing countries, most importantly China, weather conditions etc.), see for example the review paper of Piesse and Thirtle, (2008). In this paper we analyse the volatility of some Hungarian agri-food prices on two levels, producer and consumer, and contrast it with same product and level results for EU15.

Empirical analysis builds upon producer and retailer price data for the selected commodities and food items. The empirical methodology draws upon the latest time series analysis procedures. Previous researches have underlined the importance of proper treatment of time series data employed. Classical OLS and VAR approaches often lead to inconclusive results and biased test statistics. Thus stationarity properties of data will be assessed using KPSS (1992), Elliott et al. (1996) and Ng and Perron (2001) unit root tests. Volatility analysis is carried out using Generalised Autoregressive Heteroskedasticity (GARCH) models. Empirical papers show that multivariate GARCH models are specially well suited to assess price volatility when prices are interrelated. Within the GARCH family models, there are a large number of continuously expanding specific models. First introduced by Bollerslev (1996), non-linear symmetric models (NGARCH) were developed by Engle and Bollerslev (1986),

GARCH in mean (MGARCH) developed by Engle et al. (1987), asymmetric GARCH (AGARCH) developed by Engle (1990), non-linear asymmetric GARCH (NAGARCH) developed by Engle and Ng (1993), quadratic asymmetric GARCH model (QGARCH) developed by Sentana (1995), TS-GARCH symmetric model proposed by Taylor (1986) and Schwert (1989), threshold asymmetric GARCH (GJR-GARCH) proposed by Glosten et al. (1993), non-linear asymmetric VGARCH developed by Engle and Ng (1993) and exponential asymmetric GARCH model (EGARCH) developed by Nelson (1991). The nature and behaviour of the underlying Data Generation Process will of course greatly influence the actual choice of the empirical model. Sequential Maximum Likelihood testing procedures should help the selection of GARCH model to be applied. Following the empirical estimation the results are first discussed on the background of existing research, and then, we make an attempt to explain the significantly different results obtained against a background of socio-economic characteristics. The paper closes with a discussion of results highlighting policy implications.

It is our belief, that a comparative analysis between an EU15 country, using the common currency and a New Member State (NMS), with a national currency may shed light into the nature of volatility, explain the recorded rather large differences between seemingly similar economies, and provide valuable policy conclusions.

Changes in the Attitudes of Polish Farmers Towards Risk After Poland's Accession to the EU

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This paper presents the econometric estimation of risk attitudes of Polish farmers. For that purpose, a model of production under risk is employed. The research is based on data from Polish FADN, from the years 2004 - 2010.

The problem of farmers' risk attitudes has been studied by several researchers (Antle, 1987, 1989, Chavas and Holt, 1996, Kumbhar and Tveterås, 2003, Koundouri at al. 2009, Antle, 2010). For the Polish farming sector risk related considerations became increasingly important after the accession of Poland to the EU in 2004. After the accession, Polish agriculture was affected by market liberalisation, which was somewhat mitigated by the CAP support. To examine the risk aversion of Polish farmers an estimation procedure based on Antle's (1987) approach was applied. It consists of the following steps:

- Estimation of first 3 moments of profit conditional distribution as functions of inputs,
- Calculation of marginal effects of each input on the mean, variance and skewness of profit conditional distribution,
- Use of marginal effects for construction of the system of first order condition and calculation of the coefficients of absolute risk aversion and downside risk aversion.

Most studies for other countries report a decrease of risk aversion after EU accession (Koundouri at al. 2009). Analysis conducted for the Polish farming sector leads to similar conclusions. Arrow-Pratt measure of absolute risk aversion, based on producers of winter wheat and rape systematically decreases over the analysed period while downside risk aversion remains unchanged.

Keywords: risk preferences, econometric estimation, Common Agricultural Policy, Poland

Bayesian network as a modelling tool for risk management

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The importance of risk management increases as farmers become more exposed to risk. But risk management is a difficult topic because income risk is the result of the complex interaction of multiple risk factors combined with the effect of an increasing array of possible risk management tools.

This paper includes the first results from an on-going research project on the use of Bayesian networks as an integrated modelling approach for representing uncertainty and analysing risk management in agriculture. It shows how the Bayesian network model RiBAY is used for stochastic simulation of farm income, and demonstrates how RiBAY can be used to simulate risk management at the farm level.

The Bayesian network modelling approach provides an efficient framework for integrating different sources of information into a single knowledge base utilizing both expert knowledge and databases of farms accounts and price statistics for estimation of the complex stochastic relationships in agricultural production and markets. RiBAY uses historical data to estimate the conditional probabilities, which are the core elements in Bayesian network models. The paper shows how RiBAY may be used as a simulation tool for risk management and as a tool for policy analysis. The paper shows that the Bayesian network modelling approach is a powerful tool for integrating stakeholders in the process and for assessing the consequences of using existing and new risk management tools in the agricultural sector.

Keywords: risk, stochastic simulation, database, farm account, Bayesian network, policy analysis

A Supply response model under invariant risk preferences

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Assess the evolution of Technical Efficiency of agriculture in EU countries. Is there a role for the Agenda 2000?

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One of the major goals of the Agenda 2000 for the EU agriculture was to increase its market orientation and improve the competitiveness level of the primary sector of member states. In order to evaluate if this goal has been reached, both Stochastic Frontier Analysis (SFA) and Data Envelopment Analysis (DEA) models have been applied. This research focuses on the 2003-2011 period. Inputs include agricultural land, labour and fixed capital consumption and output is the total agricultural output of each country. Both models prove that there is an increasing trend on mean efficiency levels of the primary sector of member states of the EU.

Keywords: Agricultural output, Stochastic Frontier Analysis, Data Envelopment Analysis, Efficiency.

Integrated modelling of water use in agriculture at the basin scale considering climate and policy change: the Trebbia River experience

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The paper describes a tool (DS) designed to support irrigation boards in water planning and management at the basin scale considering climate and policy change and different economic conditions. The DS can be visualized as a scenario manager for a mathematical programming model. Different data are integrated: land use at cadastral level, crop irrigation requirements, water derived from the river. The irrigation network is linked to the cadastral units to calculate water balances, including farmers' provision by the aquifer, by periods lasting ten days. Economic data from FADN and other sources quantify cost and benefit of the agricultural activity.

The case study considers the Trebbia Basin, in the Po valley in Italy, an important irrigated area, where the tool is currently used to support the preparation of the water conservation plan in accordance with Water Blueprint recommendations.

The study analyses the impact of management options under different scenarios. Results show that water reallocation among sub-basins and a different scheduling can have positive environmental effects lowering the pressure on the aquifer. A reduction of water supply is also considered and the impact of emerging water scarcity assessed. The tool favoured the identification of accompanying measures necessary to implement balanced solutions preserving water and agriculture activity.

Keywords: Modelling, Decision Support, Water, Agriculture, Economic analysis, Climate change

FADN data mining tool for FADNTOOL to examine and process farm accountancy data for mathematical programming models

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The objective of this paper is to give an overview how the Farm Accountancy Data Network data base (FADN) can be used for building mathematical farm group models and to present the data tool that process the raw data to derive the necessary information. The data tool extracts physical and financial indicators necessary to derive farm gross income and allocates positions like subsidies to a production activity format, needed for the mathematical programming models. This is done by applying a developed set of extraction rules. In addition, the data tool calculates the standard results on the accounting positions. The extraction rules are applied at the single farm account and aggregated at Nuts II and member state level for all positions. Both tasks can be applied for several years and countries. For examination, the extracted indicators at all regional levels can be viewed in tables and figures and compared for time- or regional-specific differences.

Keywords: FADN, FADNTOOL, data processing, mathematical programming

Optimization of Cropping-Plan with Combination of Linear and Weighted-goal Programming approach

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The aim of the paper is to represent the developed model CRPM (Crop-Rotation Planning Model) for solving several multi-objective problems: maximization financial results and minimization production costs on agricultural holdings. The model is structured from two sub-models which are based on two different mathematical approaches (linear programming - LP and weighted-goal programming - WGP with penalty functions). The CRPM was tested on crop rotation with combination of different fields and vegetable crops in two different scenarios (WGPS_{C1} and WGPS_{C2}). The results show that WGP combines better crop rotation from economic perspective than LP and gives better solution for diversified and economically feasible crops that are included into crop-rotation.

Keywords: Crop rotation, linear programming, weighted goal programming, CRPM

Analysing climate-induced risks in crop production

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Climate-induced agricultural production risk may play an important role in the next decades in Austria and elsewhere. Several questions arise: How does climate change affect the level and variability of crop yields and farm income? How do site characteristics (e.g. soil type) affect climate-induced production risks? Which crop management practices have the potential to moderate these risks and what are their environmental impacts? We employ an integrated modelling approach and tools of finance theory to identify crop management practices suitable for quantifying crop yield and farm income risks as well as environmental impacts. The bio-physical process model EPIC is applied to simulate crop yield impacts from regional climate change scenarios until 2040 for alternative crop management practices, i.e. crop rotation, fertilization, irrigation, tillage. The risk metrics consists of mean, standard deviation, Value at Risk (VaR) and Conditional Value at Risk (CVaR), which are computed for all management options and in spatially explicit manner for Austria. The analysis reveals vulnerabilities in Austrian crop production as well as management practices that have the potential to reduce crop production risks. Furthermore, trade-offs are made visible between farm income and environmental impacts. Results show that both a decrease in annual precipitation sums and a seasonal shift of the distribution of precipitation to winter may lead to lower mean crop yields and higher interannual variability for standard management practices.

Keywords: climate change impacts, climate-induced risk, adaptation, EPIC, CVaR, VaR

Catastrophic Shifts in Mismanaged Grazing Systems under a Changing Climate

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The effects of the foreseen change in precipitation and temperature on dynamic grazing systems that are managed under the hypothesis of the Maximum Sustainable Yield (MSY) are assessed. The standard Gordon Schaefer approach that relates the rate of above ground vegetation production to biomass consumption by herbivores is adopted to simulate the grazing system. In order to account for future climate variability, the model is modified using principles from water balance hydrology, thus introducing vegetation growth limitations due to climatic aridity. The model is applied for an equilibrium established under the much criticized MSY hypothesis that assumes the optimum herbivore density for maximum biomass removal. Sensitivity analysis results indicate that as climate changes towards a warmer and dryer future, the probability of a low ecological stability grazing system to collapse increases, especially in arid environments where water is a limited resource. Such sudden shifts that lead to undesirable stable states of arid ecosystems are investigated by the CASCADE EU project.

Keywords: catastrophic shifts; Maximum Sustainable Yield; grazing; climate change; desertification; drylands

Farm-Level Linear Programming Model to Compare the Atmospheric Impact of Conventional and Organic Farming

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We model the opportunities provided by organic agriculture in the Emilia-Romagna region (Italy) in order to mitigate emissions of greenhouse gases in the atmosphere. The sources of farm-based emissions are identified and compared with a recent work by Schneider *et al* (2007). A distinction is made between direct and indirect sources of emissions and besides carbon dioxide two other gases are examined, which are relevant in agriculture, namely methane (CH₄) and nitrous oxide (N₂O). A linear programming model based on a set of equations that allows identifying the optimal rotation among those available in the Emilia-Romagna region is run for a representative farm, thus quantifying the amount of carbon which can be stored permanently in that farm under different scenarios. Finally, suggestions are given for the design of public policies that aim to reward low inputs systems, for which organic agriculture can be considered as a prototype. Results of the compared simulations show that the alleged benefits of organic agriculture in terms of less emissions and more sequestration basically hold but they can be conditional upon using the same cropping pattern for the two systems and under certain conditions the consideration of labour inputs can make conventional systems more efficient.

Keywords: organic farming, mathematical programming, farm-level modelling, carbon sequestration, greenhouse gas emissions.

Sampling and selection bias in internet panels used for Contingent Valuation surveys - an empirical investigation concerning an environmental non-market good

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There are disadvantages of using internet surveys with regards to the sampling procedure, in particular when using pre-recruited internet panels. Problems concerning sample coverage and sample representativeness may be expected. Additional selection biases may be introduced since people can choose whether or not to be part of an internet panel and secondly also whether they wish to participate in the survey, thereby introducing two levels of potential selection bias. The decision to be part of an internet panel and subsequently respond to a survey may be correlated with people's preferences, thus making the respondents a non-random and non-representative sample with regard to preferences in the population, ultimately biasing results from the survey. Included in this paper is an analysis investigating the representativeness of a sample used for an internet Contingent Valuation survey eliciting preferences for improvements in water quality of a river in Denmark. Additionally, we empirically analyse differences between those respondents choosing to participate in the survey and those choosing not to. A probit model is run to identify the factors that affect the probability of answering. We additionally find that some of the variables that affect the decision to participate also affect the Willingness-To-Pay (WTP). This would suggest that those who choose not to participate could have a different WTP than those who choose to participate and state a WTP (i.e. WTP estimates are likely to suffer from selection bias).

Keywords: Stated Preference; Contingent Valuation; Sampling Bias; Selection Bias; Internet Panel

Economic efficiency of alternative nitrogen regulation schemes - a spatial sector economic modelling approach

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Regulating agricultural use of nitrogen is a crucial issue in agri-environmental policy in most European countries. In Denmark, nitrogen use is regulated by farm-level quotas, which depend on crop composition, livestock density and soil quality. The farm quota is determined as 85% of a calculated economically optimal application in the farms' crops. Further tightening of the nitrogen regulation is under consideration.

The objective of the present paper is to compare the economic efficiency of two alternative approaches to such tightening: quota based on nitrogen application norms in different crops, versus an aggregate, transferable quota on total nitrogen leaching.

The analysis is carried out on a partial equilibrium simulation model of the Danish agricultural sector - ESMERALDA. The model is based on farm-level production and economic data for all Danish farms, which allow the analysis of spatial aspects related to the alternative regulations, in terms of environmental (in terms of nitrogen use) and economic effects.

Results of the model analyses suggest that replacing the current flat-rate quota on nitrogen input on all farms with a quota on nitrogen leaching (corresponding to the leaching effect of the input quota) reduces the average abatement cost per tonne of nitrogen leaching by 54 per cent, with some redistribution of value-added from livestock to crop farms.

Keywords: Partial equilibrium, agricultural sector model, nitrogen quota

Common cycles, trends, seasonal and forecasting agricultural products through unobserved component models

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This paper uses the structural trend methodology proposed by Koopman et al. (2009) to analyze the evolution of international monthly prices of agricultural commodities such as wheat, maize, barley and rice for the period 1983 (1)-2012(12) and to provide forecasts for the period 2013 (1)-2014(12). The data series are obtained from the World Bank and they are decomposed into trend, cycle, seasonal and irregular components. The empirical results indicate that the price series of the aforementioned commodities present seasonality and cyclicity. Furthermore, the empirical findings identify certain structural breaks in the agricultural commodity prices as well as outliers. These structural breaks seem to capture the trend component of the price series well, while the outliers take account of temporal effects, i.e. short-lived spikes. Finally, the presented forecasts show high and volatile prices of the aforementioned agricultural commodities.

Keywords: trend component, cycle component, structural time series analysis

Accounting for agronomic rotations in crop production: A theoretical investigation and an empirical modeling framework

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As far as crop acreage choices are concerned, a consensus seems to exist among agricultural scientists and extension agents: crop rotation effects and the related constraints are major determinants of farmers' crop choices. Crop rotation effects are inherently dynamic. They are generally ignored in multicrop models with land as an allocable input found in the literature since most of these models are developed within a static framework.

The aim of this paper is twofold (*i*) to propose a new approach and tools for investigating dynamic crop acreage choices accounting for crop rotation benefits and constraints, and (*ii*) to illustrate the impacts of crop rotation effects and constraints on farmers' acreage choices through simulation examples. The models proposed in this paper are sufficiently simple for being empirically tractable either in simulation studies or in econometric and mathematical programming analyses.

Our simulation results tend to show responses of the optimal dynamic acreages to simple price shocks which are much more complex than those implied by static models. They also demonstrate that farmers' perceptions of the future economic context are crucial determinants of their acreage choices.

Keywords: Acreage choice, crop rotation, dynamic programming, econometrics

Modeling of structural change related shifts in labor input in an agent-based sector model

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Most agent-based models focus on the modeling of land trade and farm size growth, whereas the modeling of on-farm and off-farm labor resource input or outsourcing of work processes and their shifts over time is of less priority due to lack of data. An empirical analysis of a Swiss FADN farm-sample showed for half of all family farms substantial shifts in the allocation of labor resources over a period of 5 years and a significant correlation to farm size growth. To identify the most common changes in the past, a k-means clustering was carried out, which obtained 8 different strategies regarding labor input shifts. The results showed that those clusters which increased off-farm work or offered more machinery services to neighbor farms achieved the highest family income increase over time. The cluster results were assigned to the FADN-based agent population of the sector model SWISSland in order to model scenarios with minor policy changes like in the past (baseline). Each agent's labor input is optimized taking into account the assigned labor strategies and farm size growth. In case of a more substantial policy change a higher degree of freedom in selecting the best labor allocation strategy was assumed. The contribution will present the cluster analysis in detail and the implementation of the cluster results in the agent-based model. Model results will be shown for three scenarios: a baseline, a partial and a full liberalization scenario in Switzerland.

Keyword: agent-based sector model; farm labor input; cluster-analysis; structural change

Sustainability of extra-virgin olive oil production in Emilia Romagna region

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Sustainability of the origin-based production and promotion system of a geographical indication (GI) depends on the remuneration from the market and the reproduction of the local resources. This paper aims to show the development of extra-virgin olive oil production in Emilia Romagna region (Northern Italy) using the origin-based quality virtuous circle developed by FAO (2009) as a theoretical framework. We made personal interviews and one focus group with olive producers to evaluate the local awareness and assessment of the product potential, and willingness to setting up the rules for the value creation and preservation of local resources. We also performed a survey on 100 extra-virgin olive oil consumers to estimate the perception and product remuneration linked to marketing aspects. Results show that the value creation and preservation process of extra-virgin olive oil production in Emilia Romagna has great sustainability potential, although many problems exist, e.g. lack of technical and agronomic competences at farm level. In this context, the creation of a GI organization, such as a Consortium, may have a central role in coordinating collective action such as providing technical assistance, managing the internal rules and controls system along the supply chain, as well as the marketing and communication strategies.

Keywords: extra-virgin olive oil, geographical indication (GI), sustainability, local resources.

Assessing Impacts of Land Management Practices on Soil Fertility

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A vital factor of soil fertility is the content of organic matter measured by the share of carbon in the soil. Many conventional land management practices negatively affect the carbon content. As a result, soil fertility declines slowly but steadily over time. Understanding this effect requires modeling of individual farms because their individual land use decisions differently affect the carbon content. This is possible with the agent-based model AgriPoliS, which allows the simulation of regional structural change resulting from behaviors and interactions of individual farms. The original model has been extended by adding yield functions for different crops taking into account the nitrogen input and the soil's carbon content. Furthermore, it is considered that the carbon content increases or decreases depending on a farm's management practices. Conservation of the carbon content only pays off in the long run. Thus, farmers are reluctant to apply appropriate conservation measures. We therefore implemented three scenarios where farms are obliged to devote 7%, 15% or 25% of their agricultural area to ecological focus. This area is assumed to be rotated each year. The simulation results show that under the 7%-scenario carbon loss continues, but at a slower pace. To completely stop the carbon loss, 25% of the land needs be set aside. Thereby caused income losses cannot be compensated by the conservation of carbon, even after 20 years. Nevertheless, soils with more carbon help plants to survive droughts, which become more frequent with global climate change.

Keywords: Agent-based modelling, soil fertility, CAP, set aside, land use

The tomato industry in Algeria: factors explaining the difference of the production cost?

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After an efficient economic development of tomato canning factory in the late 1980s, the sector experienced a crisis in 2004, when sales prices declined on the market following a tomato production growth. Faced with an abundance of product, processing plants were unable to absorb the surplus, due to financial difficulties. The crisis worsened thereafter, when the state decided to open the market to imports of double and triple tomato concentrate. As result, 12 production units of the 17 existing closed.

To encourage farmers who gave up the cultivation of industrial tomato after the closure of canning factories, a bonus of 4 Algerian Dinars per kg was given during the four production years 2008-2012. Despite this subsidy, the agricultural production has not grown. The aim of this paper is to answer the following questions: why do the subsidy policy conducted by the State and the sale price set by the canning factories fail to cover all production costs for farmers? What explains the difference in production costs from one farmer to another?

A survey was conducted among 150 farmers in the province of Guelma, an area of high industrial production of tomato, due to the installation of the largest cannery in Algeria (Ben Amor Amor canning), it absorbs the production of 300 farmers.

A multiple regression was used to explain the discrepancy between the different production costs for a kilogram of an industrial tomato. The variables used are: the status of the farmers, the yield, the varieties of seeds, ownership of the production equipment, costs of labour, costs of soil labour and the cost of fertilizers and pesticides.

Keywords: Production cost, industrial tomato, subsidy

Irrigation water resource in a rice-growing area: economic evaluation under different pricing conditions

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Water Framework Directive (60/20000/EC), in order to assign an appropriate cost to irrigation water resource, urges member states to introduce the concept of full cost and to adopt economic instruments to improve the efficiency of its allocation. The option to apply a volumetric supply fee promoting the rationalization of the resource, could thus play a role in addressing emerging and future problems of water scarcity.

The study aims to evaluate economic performances of farms and estimate water irrigation costs in a typical Lombard rice-cultivated area through a simple non-linear programming model. It returns the current structural features of farms, their productive inputs and performances. Secondly, different scenarios are considered, related both to a different water government, in terms of price, quantity and distribution method, and crop water requirements; in this way it is possible to analyze the observable consequences on supply and compare the output data of different scenarios.

Obtained results allow to identify critical points in water management and incentivize interventions for a better resource allocation, and their evaluation represents a useful instrument for supporting future policies on water resource.

Keywords: full cost, scenario analysis, pricing methods

Economic efficiency of production systems in the Gharb irrigated area (Morocco) affected by access to water resources

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Today, in the new context of water scarcity and climate change, governments limit the overexploitation of water resources and encourage the use of alternative resources (re-use of sewage, desalination, etc.). Groundwater merits particular attention due to its relative importance, especially in the coastal zone of the Gharb (Morocco). Indeed, due to the many different purposes for which they are used, groundwater resources and aquifers in different parts of the world are increasingly over-exploited.

It is consequently important to consider another system of resource management and to move away from supply management to demand management. This will make it possible to reduce total water demand by diversifying crops and sources of income and by introducing crops and activities with a higher added value, lower water requirements, higher income potential and more significant financial capacities. Farmers thus need to be encouraged to make more efficient use of irrigation water in growing crops. Demand management, particularly of large irrigation areas, offers considerable potential for water saving and conservation in the context of limited water resources and increasing mobilization costs.

This study was conducted in the Gharb irrigated area and was based on a survey of a sample of 50 farms with different crop systems (vegetables, citrus crops, cereals, fodder, sugar beet and sugar cane) and different irrigation systems (drip, sprinkler and gravity-fed), with the aim of calculating and comparing the economic efficiency indices of irrigated farms and the level of optimisation of irrigation water used for the main crops of the Gharb area. To this end, a Data Envelopment Analysis (DEA) model was used to calculate efficiency indices.

The results show that the most efficient farms are both those affected by water stress and those with "unlimited" access to water resources (private pumping). On the other hand, 73% of the farms are inefficient, indicating that the majority of farmers do not have a good grasp of the available technology.

The next step will be to confirm these results and to obtain partial efficiencies for each input. These partial efficiencies will enable us to explain why a particular crop is inefficient. It will then be possible to formulate more appropriate recommendations for farmers.

This approach should enable us to start by evaluating negative externalities such as environmental aspects (leaching of nitrates on a farm scale), and then to evaluate the efficiency of environmental outputs and to compare them with economic outputs.

Keywords: efficiency, water optimisation, Data Envelopment Analysis, production system, irrigation.

The Tunisia wheat market in the context of world price volatility: A stochastic partial equilibrium approach

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Food security is a key objective of agricultural and food policy in Tunisia. The 2007-2008 food crisis highlighted the impact of price volatility on international markets, and this problem is both in terms of food security and budget exposure. Food subsidy expenditures have ranged from \$180 mil to \$710 mil from 2006 to 2010, so volatile world prices mean volatile subsidy costs. Cereals production in Tunisia still has much instability due to climate conditions, which also influences imports and consequently subsidy expenditures.

This study applies a structural model to conduct stochastic analyses of trade and policy impacts in the Tunisian wheat market to assess impacts on food security and budget expenditures. The methodology disaggregates Durum wheat and soft wheat markets and generates projections of import prices of durum wheat and soft wheat, using projections of world prices provided by FAPRI. The key innovation is to generate stochastic analyses of subsidy costs based on stochastic world price projections and stochastic domestic wheat yields based on historic yield variances. The analysis highlights the sensitivity of subsidy costs to world prices, volumes imported, and domestic production so alternative policy tools can be considered.

Keywords: Tunisia, wheat sector, price volatility, stochastic analysis, partial equilibrium model, subsidy cost.

Production of chair chicken in Algeria: Explanatory factors of the difference of the produced quantities

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The objective of this paper is to understand wich kind of relation exists between the quantities of flesh chicken produced at the level of the breeding and the decision to choose the suppliers of intrants poultries (in particular the suppliers of the food of cattle and the chick) and outlets for the selling of their production.

To reach this goal, a fieldwork was made during the period of March an April 2012 beside a hundred of breeders of flesh chicken at the level of Médéa; wich is considered as a pond of production of flesh chicken and who contributes at the level of 5% of national production.

The factorial model of the variance will allow to answer this question. It tries to model a quantitative variable according to the explanatory variables in « i » levels. The variable to be explained being the quantity of flesh chicken produced .The explanatory variables (of control) are the suppliers of the cattle food and the chick as well as the various outlets chosen by the poultry farmers

Keywords: breeding of flesh chicken, suppliers of the food of cattle, suppliers of the chick, factorial model of the variance

Wastewater usage in Agriculture: a consumer perspective

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The need for wastewater usage is increasing, especially in coastal regions with limited freshwater supply. In Greece, the only applications of water reuse projects concern irrigation purposes in agricultural sector. One of the key issues concerning the adaptation of such projects and further expansion of such initiatives is the consumer perception. To that end, the aim of the current paper is to explore consumer awareness about reuse of wastewater for agricultural purposes and more specifically investigation of their willingness to accept such a policy. The study reveals a positive attitude of the public towards water reuse for irrigation purposes.

Keywords: Wastewater; agriculture; consumer; willingness to accept; Greater Thessaloniki Area.

Acknowledgements: This research has received funding from the European Union's Seventh Framework Programme (FP7-REGPOT-2012-2013-1) under Grant Agreement No. 316167 (Project Acronym: GREEN-AgriChains). Moreover, the present scientific research is partially conducted in the context of the project entitled "International Hellenic University (Operation - Development)", which is part of the Operational Programme "Education and Lifelong Learning" of the Ministry of Education, Lifelong Learning and Religious affairs and is funded by the European Commission (European Social Fund - ESF) and from national resources.

Destination choice of raw milk from dairy farmers in the region of Sétif A multinomial logit model

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Recently, farmers from the region of Sétif are increasingly coveted by dairy companies to purchase their products. This change was encouraged by the government subsidies for the integration of raw milk in the dairy industry on one side, and another to stop the growing imports of dried powdered milk.

These breeders are characterized by two criteria, working individually and the second is that they lack professionalism.

In this study we try to understand and explain the determinant factors of the market of raw milk produced in the farm. A survey was conducted of approximately 100 breeders in the region of Sétif, as a scope to determine the criteria of market destination choice of their production (to the dairy cooperative, the unit public collection centers or private companies are not present on the territory of the region).

Multinomial logistic regression was used to determine the factors that influence the final choice of dairy farmers. The most important factors are: the proximity of the unit or collection center; relationship with the collector (family relationship, vicinity, reputation...), and the payment method (milk and the production bonus).

Finally, we propose a participatory approach to help these farmers to a better choice of their market for more profitable sales.

Keywords: raw milk, market choice, contract, collector, multinomial logit.

Is milk price volatility reduction a sufficient motivation to install EU price intervention mechanisms?

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Numerous analyses have been conducted on the economic and welfare impacts of EU dairy quota abolition. Modelling results show that quota abolition increases overall welfare effects, however while decreasing producer surplus. Up to now, the cost of raw milk price volatility has not been taken into account in those models. This study will estimate the volatility cost and compare the results with the pre-dairy reform situation. As outcome, the study aims to answer the question whether or not policy makers should maintain price intervention as a mechanism to reduce price volatility. The study is innovative in the way that it will estimate the cost of volatility using methods from financial economics combined with farm decision models, i.e. mathematical programming. The combination of the two is a stochastic dynamic optimisation model that simulates the farm cash flow management. The model uses generated milk price series based on a Vasicek model calibrated against world prices of whole milk powder of 2001-2011. The results of the model illustrate that cash flow management is indeed cheaper in the case of higher intervention prices, but it is not a sufficient reason to sustain very high intervention prices.

Keywords: CAP, greening, tradable permit

Milk commercialization in the Wilaya of Medea. The social construction of quality

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The province of Medea is considered among the regions of a high dairy potential, it comes in fifth position in terms of quantity of milk production. However, collection may not surpass the 5%, and this is because of lack of dairies in its territory, herd cattle owned by small farmers scattered across the Wilaya, but also a customer preference for supply from producers or through short circuits. Dozens of milk-bars and retail producers have emerged through the Wilaya, creameries are both places of tasting traditional dishes with dairy products (couscous with grapes and Lben (whey) Raib (curdled milk)), and places of sale.

Quality in this method of marketing is a social construct; the selection criteria for products are others than the standards and certifications. The proximity of the place of production limit cognitive distance to customers, who are thus getting different information on the origin, processes, culture conditions and animal health.

The method of Kohonen neural networks provided us with a visualization of classes of customers; it has the consistency degree of customer familiarity with the origin of the product and the level of knowledge of the product.

Keywords: Milk quality, Convention theory, Kohonen method.

Responsible Investment as a Mediator to Food Security

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The topics of this study are institutional investors, responsible investment, price volatility of agricultural products and food security. The motivation for our study is that each topic of this study is well covered in literature, but it appears that no studies have made attempts to systematically combine these topics for the benefit of food security. This is the core of our study. Combining these topics is worthwhile, as 870 million people are chronically undernourished. Existing literature shows that especially price volatility and its relation to food security have been common topics. Price volatility is a problem for many rural economies, and lower price volatility, also impacted by speculative activity, is welcomed to guarantee decent living. There is also an increasing body of literature that calls for more (responsible) investments to agriculture to improve food security, as well as to decrease land grabbing. Furthermore, responsible investment by institutional investors shows a strong growth in Europe.

Via four hypotheses and by using a large European dataset, we investigate *whether responsible investment can mediate food security* and arrive at a conclusion that this is the case. We also prompt that three cross-cutting themes, namely transparency, good governance and regulations, and long-term perspective are common for improving food security and for the rationale to engage in responsible investment. The findings of our study extend the literature of food security and responsible investment in four ways.

Keywords: food security, responsible investment, institutional investors

R&D Investments, Technology spillovers and Agricultural Productivity, Case of the Czech Republic

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With the Europe 2020 Strategy's emphasis on smart and sustainable growth there is an increasing concern about R&D activities in the Czech Republic. Both public and private gross expenditures on R&D doubled in the last decade. Particularly in agriculture, the public expenditure increased by 91% and it is about twice larger than the private ones. At the same time the Czech government looks for a proper assessment of the effectiveness and the efficiency of the public R&D outlays as well as for evidence that the R&D policy has also stimulated the private sector investment in R&D. The objective of this paper is to contribute to this assessment in the area of agriculture in the Czech Republic.

Many empirical studies on agricultural R&D (e.g. Alston et al. (2000), Esposti (2000), Sheng, Gray and Mullen (2010) etc.) show that there are evident productivity gains from the public R&D spending. To capture the lags between R&D activities and their response in practice, authors like Alston et al. (2010) or Thirtle et al. (2008) examined long time series on agricultural productivity and R&D expenditures. Unlike to the rather continuous evolution in the UK and US, the Czech economy has experienced dramatic changes induced by economic reforms since 1990. These changes include a rapid productivity growth in agriculture. While it can be accounted to institutional reforms in the early 1990s, later it should be attributed to the knowledge and technology transfer. Since the Czech Republic is a small open economy, a substantial share of R&D may come from abroad. As Esposti (2002) pointed out, under significant international spillovers the national agricultural research acts as free-rider, which is a realistic assumption in the Czech case.

Our approach draws from the fact that in the particular Czech context agricultural R&D is perceived as very applied aiming at transfer of technologies with a strong extension component. Therefore we use econometric approach following (Alston et al. (2010) or Thirtle et al. (2008)), however, considering short lag. The import of agricultural technologies is taken a proxy for foreign R&D inflow, following the assumption that the international trade is a vehicle of knowledge spillovers (Van Meijl and Van Tongeren, 1999).

Keywords: Research and development, technology spillovers, TFP, agriculture, Czech Republic

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Cross-Atlantic differences in public acceptance of GMOs

A Media Content Analysis

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Over the past decade, the United States (US) and the European Union (EU) have implemented widely divergent regulatory systems to govern the production and consumption of genetically modified organisms (GMO) used in agriculture (Vogel, 2001). The regulation of agricultural products produced by biotechnology in spite of the fact that it began almost simultaneously on both sides of the Atlantic, quickly took different paths. It has been argued that the divergence in regulatory approaches between the United States and the EU stems mainly from fundamental differences in consumer attitudes and expectations (Bernauer & Miens, 2001). It has been argued that different histories of media coverage and regulation go together with different patterns of public perceptions, which in turn are reflected in the media (Bauer, Gaskell, p. 373, 2002)

We put forward the hypothesis that the differences in acceptance of GMOs are reflected in the media and that the media can depict how the public feels for a particular issue on a specific time. Many different theories on the role of the media are found in the literature (Gutelling, etal, 2002). According to one approach, journalism is seen as a mirror to reality. Others argue that since construction of meaning necessarily involves selection and framing, the media construct the meaning by presenting a mediated world, rather than mirroring an 'objective' reality.

If the media reflect what the public feels and believes, they are indicators of the wider public concern and as such represent the public opinion. Then, and since we have such profound differences between the two countries in terms of regulating/accepting GMOs, the media should likewise differ at some points between them. We systemically compare the press coverage of GMOs in the UK and the USA over the period 2011-2013 and investigate how the public controversy over GMOs has been reported in the mass media across the Atlantic. How can GM food technology products, depending on the language and the framings by which they are presented, be socially "manufactured"? The main focus of our analysis is journalistic framing and journalistic selection, which can be considered as indicators of wider societal concerns, representing the public opinion. This is the path of the overall research destination. The differences of the public altitude in the UK and the USA should be depicted in the media of the two countries, since the journalists, in the context of increased competition in the information market, struggle to "eavesdrop" what the public thinks and what the society feels in order to get closer to the pulse of the society and hold their audience and consumers' attention; hence, the media coverage regarding GMOs should differ in the two countries.

For the U.K. the newspaper "The Guardian" is implemented, while for the USA "The Washington Post". Our study of media coverage spans a two-year period, starting on February 2011 and ending on February 2013. The basic questions that we investigate are "What is reported?" and "How is it reported?" referring to selection and framing processes.

The analysis is being done in two phases: Descriptive and deductive

On the first phase it is descriptive and is used to classify and quantify a rather quantitative set of data. Content analysis of media frames is the method that we apply at this stage, and the unit of analysis is any article containing references to GM in any

part of the two opinion-leading newspapers of the two countries. The articles are then subdivided and coded accordingly. The articles addressing diverse themes are coded and the information incorporated in a cross-Atlantic comparative database. This step includes a quantitative discovering of our data, including the format of the articles referring to GMOs (size, format, focus), and a qualitative one, including the themes, frames and actors.

The second phase of the analysis is deductive. Working with different quantitative and qualitative data, we faced the problem of depicting and comparing complex repertoires of arguments. Thus, in order to ensure the intelligible interpretation of the results, we had to focus on the inter-relations between specific contents (quantitative reference) and discourses (qualitative reference). For this reason, we employ a more discursive approach, targeting on detecting who the actors are appearing in the coverage of GMOs in the media with reference to the frames that they mobilize and how/whether do they praise or doom the overall consequences of the employment of GM products in terms of risks and benefits. This is a deductive cross-referring step in which variables (i.e. actors) who are found to hold a relevance to other variables (i.e. risk and benefit distribution) are being classified together in order to give us an in-depth interpretation of the plot and background of the GM 'scene and filming', which also provides us with the big picture of the prevailing biotechnological map as it appears today. Finally, an overall comparison is employed over the biotechnological collage in terms of how the reportage seems to have changed since the previous study of 2002 carried out by Bauer, Gaskell and their team (Bauer, Gaskell, 2002) and our results of the two year scale research.

The overall aim of the project is to shed an up-to-date light on the information that is contested in public space by the media, in a sense that being the mediators between the message and the consumers, they contribute to a social shaping of the reality (Gamson and Modigliani, 1989). Furthermore, it is important to emphasize that technology implementation is dynamic, and likely to change. So, by analyzing the opinion-leading press, we can expect to gain an accurate impression of the social dynamics of information processing relating to GMOs and modern biotechnology.

Keywords: GMO, media, content analysis, UK, USA

Outreach: The paper will be presented and then the results published at the 133rd EAAE Seminar 2013, Maich, Chania, Crete, Greece, 14-16 June '13. Furthermore, the paper will be presented at the ECPR General Conference 2013, at Vincent Hoffmann-Martinot, Institut D'Etudes Politiques de Bordeaux, France, 4-7 September '13

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Mass media and the food crisis: An analysis of media discourse

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In 2006-2008, when food prices started to increase dramatically, purchasing power parity of consumers, especially the urban poor, started to decrease automatically. This was named the “*food crisis*”. In contrast, it was not named a “*crisis*” when the agricultural producers were suffering from low food prices exactly before “*the food crisis*”. The question is under which circumstances we consider a fact as crisis in favour of one’s side. Major objectives of our work are to illustrate how media frames interact to shape the perception of the ‘food crisis’ concept and also to show whether this perception corresponds to the economic theory or not.

Many different theories on the role of the media are found in the literature (Gutelling, et al, 2002). According to one approach, journalism is seen as a mirror to reality. Others argue that the media construct meaning by presenting a mediated world, rather than mirroring a more or less ‘objective’ reality. The framing of news can be understood as the process through which complex issues are reduced to journalistically manageable dimensions, resulting in a particular focus on a certain issue (Gutelling, et al, 2002). The researcher then can analyse the discourse in the media in order to infer the public perceptions of GMOs in the society

A common method of empirical media discourse analysis is the analysis of so-called frames (Keller, 1998; Ferree et al., 2002). Frames are ‘schemata of interpretation that enable individuals to locate, perceive, identify, and label occurrences within their life space and the world at large. By rendering events or occurrences meaningful, frames function to organize experience and guide action, whether individual or collective’ (Goffman, 1974, p. 21).

Conducting a discourse analysis based on media reports can be useful within applied economic research. In this way hypotheses can be tested that are otherwise, e.g. with conventional surveys, hard to test. For instance, surveys may not be feasible because a relevant group of respondents cannot be reached for interviews and secondary data about prices, etc. might in a specific case be uninformative. Clearly, such information has to be handled with care within empirical analyses. However, utilizing such information may in some cases be the only feasible way to obtain a comprehensive panel of stakeholder opinions over a longer period of time. Furthermore, one may argue that newspapers tend to transport only those views that their typical readers would expect.

In this study, international newspaper articles from 2000 to 2012 are investigated and the news before and after 2008 are compared in terms of numbers of articles which had been written about the food crisis and their degrees of defense. Political Economy of the Media and Critical Discourse Analysis (CDA), are used to identify what media say. Furthermore, we use a simple model with welfare function of society in terms of consumer and producer surpluses to identify what happens in reality. With its discourse focus, our study, aims to make a contribution to the further applied economics researche

Keywords: food crisis; mass media; critical discourse analysis

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Global land use change: Intensification or expansion?

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Agricultural production is bound to increase over the next decades in order to satisfy the growing global demand for food. However, the right balance between food production and environmental protection should be achieved. Agricultural production may be increased by land expansion or land intensification with the environmental impacts of these two strategies being very different (Foley et al, 2011). Modeling the linkages between global agricultural supply and land use changes therefore has to acknowledge explicitly these extensive and intensive margins.

In our paper, we aim at systematically addressing these linkages between food supply and the environment by developing a conceptual framework for a global but regionally differentiated agricultural supply model and discussing implementation options to link this supply side framework to the CAPRI global market model as an example for a partial equilibrium multi-commodity model. The proposed framework includes the most relevant bio-economic supply side drivers for crop and livestock production such as water availability, irrigation potential, land availability by type, land conversion possibilities, potential yields and yield response to price changes, fertilizer requirements as well as livestock production systems requirements. An illustrative model application analyzing the medium-term impacts of increased global food demand on land supply will be used to test the functionality.

Keywords: agricultural supply modeling, CAPRI, global food demand

Could mathematical programming and spatial analysis improve the Agri-Environmental payments design? A resource allocation model for Emilia Romagna (Italy)

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The optimization of EU Agri-Environmental Schemes (AES) in connection with Agri-Environmental payments is still a major challenge. Several studies have analyzed the efficiency of flat rate compensation schemes compared with the possibility of introducing auction mechanism, to reveal farmer compliance cost, in order to reduce information rents and increase policy cost-effectiveness. The aim of this paper is to contribute to this debate by modeling farmer's characteristics and compliance cost in their spatial dimension. Given that both the cost and the compensation payments are subject to spatial variation, this study develops a resource allocation model and simulates the potential contribution of spatially differentiated compensation payments to efficient targeting of Agri-Environmental measures in Emilia Romagna (Italy). The model combines information about farmer's behaviour and participation with compliance cost taken from a previous study. The methodology, which is based on mathematical programming, uses data from spatial econometric. Moreover a case study is derived from Rural Development Programme 2007-2013 of Emilia Romagna. The results show that the differentiate payment scheme gives a significant cost saving over flat rate mechanism by reducing farmer's rents and consequently the deadweight loss for cost effectiveness of the measures. The method used, which improves the acknowledgement of the spatial information, may have a potential for the design process of Agri-Environmental Schemes (AES).

Keywords: agri-environmental policy, compensation payments, economic efficiency, spatial econometric, mathematical programming

USING ALTERNATIVE RESEARCH METHODS TO FORESEE THE CHANGING FINNISH AGRIFOOD SECTOR

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This study is conducted to anticipate the future of the Finnish agrifood sector in the realm of the changing EU Common Agricultural Policy (CAP) in conjunction with the global agricultural, trade and climate policy. The goal is to support the process of policy planning and decision making in a rapidly changing environment. Two methods are utilised and combined in this study - the Delphi method based on panels of expert opinions and quantitative method based on a computable general equilibrium model called the GTAP (Global Trade Analysis Project). The Delphi method with panels of experts is used to forecast the short term (e.g. 5-10 years), and the quantitative "what if" modelling with the GTAP is used to forecast the long term (e.g. 20 years) until 2030. The methods compliment each other in understanding the future developments of the Finnish agrifood sector. The interviewed food supply chain experts stress that the success of Finnish agriculture and food economy is highly dependent on the development of the CAP. The results of the GTAP-analysis confirm this by suggesting that the measures taken by the EU will have an essential impact on the Finnish agricultural production possibilities.

Keywords: Delphi method, GTAP model, Finnish agrifood sector, agricultural policy, trade policy, climate policy

Assessing the efficiency of agricultural farms with different production profiles using data envelopment analysis

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This paper addresses the difficulties that arise in the assessment of efficiency of farms that produce different profiles of crops and other output. A particular case arises if some outputs are produced by a small number of farms, which limits the sample of farms to which these specialist farms can be compared. It is known that standard methods of efficiency analysis, in particular, data envelopment analysis (DEA), produce poor results in the above cases and usually show highly specialised farms as being efficient. In this paper we show that the above problem with specialist farms can be overcome by the incorporation of additional information in the DEA model that reflects production trade-offs between different outputs. In particular, we show how the trade-offs can be assessed and incorporated in an automated workflow used in the efficiency evaluation. This methodology is validated by our work involving FADN data.

Impacts of Agricultural Trade Liberalization Between the EU and Mediterranean Partner Countries

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In this study, using the Armington trade model, impacts of agricultural trade liberalization between the EU and Mediterranean partner countries including Turkey are analyzed. For this purpose, EU's agricultural trade data at 8 digit level (Combined Nomenclature, CN) is used which totally includes 207 separate agricultural sub-chapters (goods) of CN. Agricultural commodities are defined as intermediate and final products accordingly with CN. In the model, 27 regions are constructed in order to distinguish between regional impacts. All Mediterranean partner countries including Turkey are explicitly included. In order to model imports of the EU, a nested constant elasticity of substitution function consisting of 27 import sources (regions) is employed. Similarly, exports of the EU is modelled by a nested constant elasticity of transformation function aggregator. The structure of the model assumes perfectly elastic export supply for EU imports. Therefore, given a set of import demand and substitution elasticities, the model simulates the maximum change possible in the EU's imports for each goods. Likewise, the model assumes perfectly elastic import demands for EU exports, hence again given a set of import demand and substitution elasticities, the model calculates the maximum change possible in the EU's exports.

An Ex-ante Impact Assessment of the Common Agricultural Policy Reform. An Application in the North-Western Romania

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The paper aims to assess the impact of the Common Agricultural Policy reform (post 2013) in the environmental vulnerable areas from Romania. It proposes a bio-economic dynamic farm model calibrated with positive mathematical programming (PMP). The standard PMP approach was extended to calibrate the mixed farming systems through the introduction of a livestock renting activity in the first calibration step. Then, it allows incorporating activities not available in the base year, but that can be performed after future policy reforms. The model, Simulator of the Common Agricultural Policy, provides supply-responses for both crop and livestock farms according to the agriculture and financial policy changes. It maximizes the farm net financial flows subject to the resource, livestock, financial and agriculture policy constraints. The initialisation data were gathered from a face-to face stratified survey applied on mixed-sheep farms that have used grasslands areas under the Agri Environment Schemes (AES) in the North-Western Romania (Transylvania). Results show that the most vulnerable group to the policy shifts is represented by the small farms, to which the AES are very important economic drivers. Thus, diversification and off-farm employments possibilities should be integrated in the future rural development plans as a premise for their survival.

Keywords: PMP; bio-economic model; Common Agricultural Policy; Romania.

Impact of second Pillar funding in Germany - Validation from a modelling- and an evaluation perspective

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To estimate the effect of the second pillar of the Common Agricultural Policy the model CAPRI was extended by a regional Computational General Equilibrium model, which covers the other sectors in the EU at the NUST2 level. The aim of this paper is to assess the model approach by comparing scenario results with the observations from the evaluation reports for rural development (RD). For this purpose an ex-post scenario is developed for Germany, which models the effect of the RD measures in 2006. We observe a moderate impact: an increase in agric. income (5%) and agricultural land use (0.1%), especially grassland, and a substitution from arable land to grassland. This leads to an increase of agricultural production, especially of beef meat, and to an increase of greenhouse gas emissions and consequently an increase of nitrogen surplus. We found this effect especially for farm types which receive a comparable high share of payments for agri-environment and LFA. We also observed that particular farm investment programs displace private investments. Although a comparison of the scenario result with the evaluation reports is difficult, due to the difference of the definition of indicator and program and also because many assessments were done in a qualitative way partially derived from case studies, they confirm the moderate impact. But we also found different conclusions with respect to the agri-environment measures and its impact on the total factor productivity between the evaluation reports and the assumption in the modeling approach. Also the environmental effects are evaluated positively in contrast to our findings.

Keywords: Impact assessment of the second pillar, CAP, regional CGE, CAPRI, partial equilibrium model

Using Market Share and Multiplicative Competitive Interaction models to explain structural change in the German agricultural sector

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Structural change, often defined as change in farm size or farm entry and in the number of farms entering and exiting the sector, is analyzed in this article as change in farm specialization. Changes of specialization are expressed by changes of the standard gross margin. The paper explains the concepts of Market Share and Multiplicative Competitive Interaction (MCI) -models and how this concept is applied to analyze the development of farm specialization over time. The model is applied and validated using a dataset from the German Farm Accountancy Data Network (FADN) for the years 1989-2008. Conducting an in sample prediction for the years 1989-2003 compared to observed shares in the same years, the MCI approach correctly predicts farm specialization for over 86% of the farms, but the additional benefit of introducing explanatory variables, like subsidies or commodity prices, is small. A sensitivity analysis shows commodity prices influence farm specialization. Future approaches need to better account for FADN specificities, like the stratification, which often has a bias towards farms which are less dynamic or like the issue, that non-monetary information of each farmer is not updated annually.

Keywords: Market share models, multiplicative competitive interaction models, structural change, FADN

Land use change effects of biofuel use in the EU: an uncertainty analysis

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Biofuel policy makers in the EU are confronted with the task of designing effective and efficient biofuel promoting policies, including policies that deal with the (very uncertain) ILUC effects (defined as the indirect results of increased demand for biomass and land for energy crop production) of biofuel use in the EU. The goal of this paper is twofold: (a) to gain a more detailed insight in the ILUC effects of biofuel use in the EU using the MAGNET CGE model of LEI to create a better understanding of the dynamics of land use change; (b) to evaluate some of the inherent uncertainties related to ILUC effects of biofuel use in the EU. The results are compared with other studies, and especially the ILUC study of the International Food Policy Research Institute (Laborde 2011). The preliminary results shows that ILUC effect varies significantly depending on biofuel mandate, yield changes and type of biofuels produced. For example, 6.3% higher yields lead to 5.5% lower ILUC effect. Also, different world regions are differently affected. The calculated ILUC effects are linearly correlated with the biofuel blending mandate for the 5% to 10% range in the mandate considered in the analysis. The results clearly show both the need for biofuel policies that address ILUC as well as the impact analysis of some of the inherent uncertainties related to predicting future land use change effects of biofuels.

Keywords: Biofuel policies, biofuels, ILUC

Distributional Impacts of Agricultural Policy in West Germany - from the Macro Level to the Single Farm

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There is a growing interest in income and transfer distribution within the agricultural sector (Moreddu, 2011). So far, most analyses of distributional effects of agricultural policy are ex-post analyses, not taking into account behavioural adjustment effects.

Simulation models account for behavioural effects. But the measurement of inequality is highly sensitive to the aggregation of individual data and the traditional approach of applying few representative groups within a simulation model turned out to be inadequate due to unobservable changes in inner-group inequality (Savard, 2005).

In this paper we establish a tool for conducting an ex-ante analysis of distributional changes of different liberalization scenarios of European agricultural policy on the West German agricultural sector. We introduce a model chain consisting of a partial equilibrium model, a farm level programming model of the German agricultural sector and a micro accounting model based on farm survey data. With this model we are able to assess income changes at single farm level. Based on the model output, inequality indices are calculated for the counterfactual scenarios and compared to a benchmark scenario.

Keywords: farm model, market model, micro accounting, income distribution

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Analysis of factors affecting production expansion behaviour of Dutch dairy farmers

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A highly discussed topic in European policy is the impact of milk quota abolishment on the behaviour of dairy farmers. When milk quotas are abolished in 2014, it is expected that the overall milk production in the Netherlands will increase. Our research question is 'What factors influence the production expansion behaviour of Dutch dairy farmers?' Most studies only consider economic variables. However, neglecting social variables may bias the assessment of potential production growth after quota abolition. Using both types of variables, this study shows which farms are more likely to expand in production than others. A complementary log-log binary choice panel data model is used to estimate the effects of several variables on the expansion behaviour of Dutch dairy farmers. Assuming random farm effects, the model is estimated using the quadrature method. Panel data for estimating the model was obtained from the Dutch Farm Accountancy Network Data (FADN) for 2001-2010. Preliminary results show that farm's continuity, labour productivity and external finance positively influence the expansion behaviour of Dutch dairy farmers. To a lesser extent excess capacity also positively affects the decision whether or not to expand in production. We conclude that in research on possible scenarios of production expansion by Dutch dairy farmers, it is important to take social as well as economic variables into account.

Keywords: Production expansion, Dutch dairy sector, Complementary log log model, Panel data

The CAP reform post-2013: an impact assessment on the Italian processed tomato sector

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The objective of the paper is to evaluate the effect of the Commission proposal for the CAP Post-2013 on the Italian farms with a particular emphasis on the processed tomato sector. The paper focuses on the effect of the “convergence” and regionalisation of the direct payments as well as the three greening obligations provided by the reform proposal: the diversification of crops, the preservation of permanent grassland and the establishment of the ecological focus areas. In particular, the evaluation will concern different hypothesis of regionalisation and greening implementation according to both the Commission proposal and the COMAGRI report.

The assessment of the CAP reform post-2013 with respect to the processed tomato production will be developed by applying a quantitative model based on the Positive Mathematical Programming (PMP). The farms concerned by the assessment are collected by the Italian FADN database and they are localised in the main production basins of processed tomato. The evaluation will be carried out at farm level using the FADN weighting system, in order to make the simulation results more consistent with the production structure of the analysed areas.

The PMP model will provide a wide set of information, concerning the modification of the land use and the effect on the main farm economic variables, useful to policy makers and stakeholders for understanding the dynamics induced by the revision of the actual CAP mechanisms on processed tomato sector. Furthermore, the supply curve of the processed tomato will be evaluated in order to estimate the impact of the CAP reform on the tomato supply chain in Italy.

Keywords: CAP reform post-2013, Greening, Positive Mathematical Programming, Processed tomato sector, Farmers Behaviour

Innovation acceptance in low input and organic dairy supply chains: A Q-methodological study

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Understanding dairy supply chain members' viewpoints on acceptable innovation is important to improve organic and low input dairy supply chain. This study employs Stephenson's Q methodology to investigate the expectations and objectives of organic and low input dairy supply chain members in relation to innovation in the dairy sector. A sample of dairy supply chain members (consumers, farmers, retailers and processors) was involved in the study in Italy. Participants were recruited including "Consumers", "Farmers" and "Retailers & Processors".

Results show a high degree of consensus across all participants within the supply chain to which innovations were deemed to be unacceptable in organic (from an ethical and/or regulatory perspective) and low-input dairy systems (i.e.: GMO). Milk quality, through a better use of forage is also an important aspect, for improving animal welfare but also for the market. Consumers' views of acceptable dairy innovation were specifically centred around animal welfare, while farmers and processors/retailers preferred feed quality, feed efficiency and soil management. The study shows the value of Q methodology in eliciting subjectivities about food policy related

Keywords: dairy supply chain, organic, Q-method; Italy.

Modeling farm-household decisions under imperfect markets: a case study in Sierra Leone

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This paper presents a generic farm-household model for use in the context of low income economies to gain knowledge on food security and rural poverty alleviation under different policy options. This model, named FSSIM-Dev (Farming System Simulator for Developing Countries), is based on the extension of an existing model, Farm System Simulator (Louhichi et al., 2010), that has been developed in the framework of SEAMLESS project (Van Ittersum et al., 2008) and applied to several EU countries.

FSSIM-Dev is a farm-household model for use in the specific context where farm household production, consumption and labour allocation decisions are non-separable due to market imperfections. As long as markets are perfect for all goods, households are indifferent between consuming own-produced and market-purchased goods, and allocating production between consumption and market sales. However, if market fails for a household, separability does not hold any more and the household's decision problem of production and consumption must be solved simultaneously (Singh et al., 1986).

Contrary to most well-known household models which are econometric based, FSSIM-Dev is a non-linear optimization model which relies on both the general household's utility framework and the farm's production technical constraints, in a non-separable regime. It is referred to as a static-comparative Positive Mathematical Programming (PMP) which simultaneously solves a set of microeconomic farm models reproducing the behaviour of representative farm households. The main strength of this modelling approach are: (i) very detailed representation of farm household production process in terms of commodities coverage, land heterogeneity and technology choices; (ii) capture endogenously the inter-linkage between transaction costs and market participation decision; (iii) takes into account farm household heterogeneity with respect to their both consumption baskets (demand side) and resource endowments (supply side); (iv) capture the interaction among farm households for factor markets as well as the seasonality of farming activities and resource use; and (iv) lastly but not least, smoothly integrate results from bio-physical models needed to assess the environmental effects of production process. From technical perspective, FSSIM-Dev was designed sufficiently generic and modular to be re-usable, adaptable and easily extendable to achieve different modelling goals.

Model use is illustrated in this paper by simulating the impact of rice seed policy on the livelihood of representative smallholder farmers in Sierra Leone and, more specifically, on land use, production and consumption of basic food commodities, farm-household's welfare and poverty level. Results show that the seed policy would improve farm productivity and boost household income but it is not sufficient to fight poverty since 90% of the surveyed farm households would continue to live below the extreme poverty line of 1 USD-equivalent per day.

Keywords: Farm household model, Transaction costs, Agricultural Policy, Poverty, Sierra Leone

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Climate change impacts on derived economic values from river uses. Case study in a mountainous area of Greece

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Introduction

Mountains are critical reservoirs of natural assets and particularly of water resources. Half of the global population depends on the water that is gathered, purified and stored in mountainous areas (Gret-Regamey et al. 2012). Nevertheless, mountains are highly vulnerable to climate change and limited alterations in temperature and precipitation can severely affect the hydrological cycle. In Southern Europe and especially in the Mediterranean region, the impacts of climate change on water reserves are anticipated to accrue from the decrease of annual precipitation (Bates et al. 2008; Philandras et al. 2011). These impacts are largely linked to a decrease in the water use potential, which has already emerged due to the present high demand for water resources.

In Greece, over the last five decades the precipitation patterns have been altered indicating a decrease of 30mm to 150mm per decade. Respectively, the rivers' runoff has dropped between 5% and 10% during the last century in the Greek territory (Milly et al 2005). Additionally, the application of different scenarios (e.g. A1B, A2, B2) recommended by the IPCC for the future climate trends, implies that the precipitation will drop 3-7% and 14%-22% for the periods 2021-2050 and 2071-2100. Consequently, a decline is predicted for the total water potential from 7-20% to 30-50% for the respective time periods, for the entire country (Bank of Greece 2011).

Bearing in mind the above remarks, the present study aims at investigating the economic impacts of climate change the forthcoming decades on different uses of the Aaos River in Epirus, Greece. Although precise downscaling prediction models of climate change impacts water resources are not available up to now for the study area, the climate scenarios for the broader area indicate 10-15% precipitation reduction and 15-20% loss of the total water potential by 2100 (Giannakopoulos et al. 2011). The potential impacts of climate change on water provision of the Aaos River could significantly affect a wide range of economic sectors in the neighboring mountainous town of Konitsa. Thus, the main focus of the study relies on Konitsa residents' willingness to pay for adaptation interventions to climate change impacts on the local water resources to avoid welfare losses due to possible complications on river water uses.

Study area and methodology

The mountainous town of Konitsa (40°21'N 20°44'56"E) is situated in the Northern Pindos mountain range and lies at an altitude of 700 m. The location of the town is at the southern exit of Vikos-Aaos canyon, which has been designated as a national park. The Aaosriver flows through the homonymous canyon and crosses the town at its southwestern part. The river is 260km long, 70km of which are found in the Greek territory. The average flow of the river is 52m³s⁻¹ and is not characterized by major modifications. In its spring there is a hydroelectric plant that produces an average of 10³ MWh electric energy per year. The town has about 3000 inhabitants, living in 750 households (Papageorgiou, K., 2005). Over the years the local economy was based on the primary sector inasmuch the southern part of the town is an irrigated plain area. Currently, the interest is also turned to the touristic industry due

to the national park, in which there are many hiking and rafting possibilities supported by the services of the Aaos River. In particular, the most characteristic direct and indirect river uses in Konitsa are: (a) irrigation of 10,000 acres of the plain area; (b) rafting in efficient flow conditions for 7 months per year; (c) Electricity production upstream of the town of 10^3 MWh/year. Additionally, the present situation of the Aaos River ecology is "good" and thus meets the requirements of the European water directive 2000/60. Under climate change pressures (expecting a 20% decrease in river runoff) and no adaptation measures the Aaos River services will significantly decline (expected changes are: irrigation 7000 acres, rafting 4 months per year, electricity production decreasing by 25%, ecological state considered as poor). However, moderate adaptation could alleviate the climate change impacts on the Aaosriver, while more intense adaptation could maintain the present river status in the future.

In order to estimate the economic impacts of climate change on river services, a Choice Experiment survey will be performed. Choice experiments have considerable merit in measuring use and non-use values because they provide a richer description of the attribute trade-offs that individuals are willing to make (Adamowicz et al. 1998). As a result many recent studies, consider choice experiments as the most suitable technique for environmental valuation (e.g. Adamowicz et al. 1998; Alriksson and Oberg 2008; Hoyos 2010). The underlying basis of a choice experiment is the idea that "any good can be described in terms of its attributes, or characteristics, and the levels that these take" (Bateman et al. 2002). In a choice experiment, respondents are presented with a series of alternative resource use options and are asked to choose their most preferred one. In the present study the Aaos river uses are assigned as the attributes of the choice experiment, while the levels are defined by the "amount" of services provided prior and posterior the consideration of climate change effects.

Expected results and discussion

In the context of this study, one of the few that attempts to assess the economic impacts of climate change on river uses in mountainous communities, an effort is put to understand the impacts of climate change on fresh water resources and the derivative consequences in critical sectors of the local economy and prosperity. The application of the choice experiment method will provide information about public preferences and unobserved behavior elicitation in regard to the Aaos River uses under climate change impacts and adaptation scenarios. Trade-offs and part worth utilities between the selected uses of the river, which are strongly interrelated with leading economic activities like agriculture, tourism and energy production as well as environmental values (non-use value), will be obtained. The integration of the main economic sectors in addition with the ecological value that derive from Aaos River will reflect the total economic value of the river, assessed under the risk of insufficient water provision in the forthcoming decades.

In parallel, the output of the choice experiment will provide an estimation about residents' willingness to pay for adaptation measures that should be implemented towards moderation, if not elimination, of climate change impacts on welfare that people thrive from the current provision of fresh water ecosystem services. The estimation of the willingness to pay of Konitsas' residents for the part worth utilities will be also used for valuing the compensating surplus of three different scenarios concerning the adaptation strategies (No action scenario, Moderation scenario, Adaptation scenario) to climate change alterations. The latter valuation of the three different scenarios can be a useful input for a social cost-benefit analysis of climate change impacts on the local scale, considering also people's perception and willingness to pay for adaptation strategies. Thus, the survey is anticipated to have powerful and various policy implications about the water resources of the broader area and help mountainous communities to integrate adaptation strategies towards sustainable water management over time. Specifically the part-worth utilities of the

river use and the upcoming priorities given by the respondents comprise a useful tool for adopting certain interventions such as, cultivation adjustments, modernization of irrigation system, preservation of riparian vegetation, modernization of the hydroelectric plant equipment. Users' preferences will provide essential information about which and in what level from the aforementioned interventions are needed. As a result an informed and integrated environmental and socioeconomic decision making is achieved. In this direction the economic analysis as performed in this study fulfills the needs of efficient management policies emphasized in the Water Framework Directive (2000/60/EC), the first legislative action in which the interrelation between water aquifers and socioeconomic values has been acknowledged (Birol et al. 2006).

Keywords: climate-change, river-uses, choice-experiment

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The capitalisation of area payments into land rental prices: micro-evidence from Italy

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Agricultural subsidies decoupled from production and attached to land used in production are likely capitalized in land rental prices. Such an effect is documented for the US and only to a minor extent for the EU. Existing studies in the EU are, in addition, heterogeneous in terms of spatial and temporal coverage and none provides comparative evidence for the periods before and after the 2005 CAP reform, which introduced decoupled payments through the Single Payment Scheme. Furthermore, in estimating capitalisation effect, existing studies seem to neglect endogeneity bias due to both unobserved individual heterogeneity and selectivity, the latter arising from only some farms using rented land for production. This paper contributes to the existing literature a) estimating the capitalization effect with panel data estimators controlling for both individual heterogeneity and selectivity, b) providing comparative evidence for both the periods before and after the decoupling reform and c) focusing on Italy where this effect has not been investigated, yet. Our results are based on FADN data and consider a sample of 64,706 observations over a 15-year period. The actual incidence of non-renting farms is approximately 51%, and this indicates the potential magnitude of the selection bias. Preliminary results indicate evidence of the capitalization effect in both periods in Italy. Contrary to expectations, a significant decrease in the magnitude of this effect occurs after the introduction of the SFP.

Keywords: Land Markets, Subsidies Capitalisation; FADN Data; Unbalanced Panel; Sample Selection

An ecological-economic modeling tool for the design of cost-effective agri-environment schemes for biodiversity conservation in grassland

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In the EU each year several billion Euros are spent on payment schemes which compensate farmers for carrying out land use measures which are costly to them but have a positive impact on biodiversity conservation. It is of great importance to design such agri-environment schemes ecologically- and cost-effective. For this purpose, ecological-economic models are needed that (1) are suitable to design agri-environment schemes on a sufficiently large spatial scale, (2) considers a wide range of species and habitats as well as alternative land use measures and (3) are adaptive to changing ecological and economic circumstances. We present an ecological-economic modeling tool applied to design cost-effective agri-environment schemes for grassland conservation in the German Federal State of Saxony. At present its database encompasses 37 species and habitat types as well as 976 different land use measures (different mowing and grazing regimes). The tool contains an ecological model to assess the impact of measures on biodiversity, a cost assessment module to estimate the spatially differentiated costs of the measures and is adaptive to changes in data. We used the modeling tool to evaluate the existing grassland programs in Saxony and found that significant improvements can be made in terms of their cost-effectiveness.

Keywords: Biodiversity conservation, cost-effectiveness, ecological-economic modeling, agri-environment schemes, grassland, payments for environmental services

An obsolete tradable permit system in the greening of the CAP?

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An intensively debated element in the upcoming revision of the CAP is the greening. The greening of the first pillar of the CAP is about to be implemented and encloses the requirement of farms to have: i) crop diversity, ii) maintain permanent grassland and iii) have a minimum proportion of agro-ecological focus area (EFA). This paper discusses this last requirement because it is assumed to have the greatest potential to deliver additional environmental benefit (Hart and Little, 2012). Farm level analysis shows that the current distribution of EFA among farms is very heterogenous. Some farms have much more than the required minimum while others have almost none. Our paper argues that this heterogeneity might possibly create trade in EFA among farms to allow that each farm satisfies the minimum target. Based on this observation, a multi agent simulation illustrates the impact of transaction costs related to trade of EFA and how this affects the contribution to the general policy objective of the greening of the CAP. The model simulates bilateral trade of EFA between individual agents. The general conclusion is that setting minimum requirements is not an efficient policy mechanism and creates undesired and unexpected side effects.

Keywords: CAP, greening, tradable permit

Impacts of climate change on agriculture water management: application of an integrated hydrological-economic modelling tool in a semi-arid region

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An integrated hydrological-economic modelling tool - applied to the Apulia region (Southern Italy) - is proposed to define water balance components and water use in the agricultural sector. The hydrological model allowed to assess the crop irrigation requirements and the water availability, expressed in terms of river flow, groundwater recharge and abstraction, while the integration with the economic model allowed simulating the real farmers' decision process in response to any changes both in the constraints and in the boundary conditions. The tool provides a comprehensive information framework including: water balance components, crops irrigation requirements, farmers choices in terms of land use and irrigation techniques, economic results (costs and incomes), environmental impacts. Climate, land cover and soil datasets have been implemented as thematic maps into a GIS based model, and integrated with the main economic parameters at farm and crop level. Future scenarios of climate change have been simulated and their impacts on water balance taken into account. The obtained results aim at making better use of water resources and at addressing the policies for an efficient water management under severe drought conditions that are likely to occur in the region according to climate change projections.

Keywords: hydrological-economic model; agriculture water management; climate change; semi-arid region

Evaluating measures for improving farm competitiveness in the European Rural Development programme: a comparison of different matching approaches

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The heterogeneity of farms and the problem of self-selection are challenging the evaluation of treatments in agriculture. This is particularly the case for Rural Development (RD) measures with voluntary participation and heterogeneous outcomes. However, econometric methods can help to overcome these problems. One of these is a conditional difference-in-difference estimation. This approach combines Matching with the difference-in-difference (did) estimator. Whereas the did-estimator is largely straightforward, Matching can be done in various ways. In this paper, we apply Propensity Score Matching (PSM) and Direct Covariate Matching (DCM) and compare those regarding matching results, as well as treatment effects and robustness to hidden bias after did-estimation. The application is done to assess effects from farm investments in Austria, which are supported through the RD programme. The results show that both approaches are able to reduce bias due to observables. Both indicate farm growth and specialisation in farm activity through supported investment but show high sensitivity to hidden biases. In particular we would like to emphasize the higher transparency of the approach with DCM. But in order to get consistent treatment effects of RD measures, the inclusion of more data or further methods is required.

Keywords: Rural Development, evaluation, conditional difference-in-difference, Matching

Assessment of CAP reform post 2013 in the rural areas of Emilia-Romagna Region

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The aim of this contribution is to provide an evaluation of the impacts of the European Commission proposals on homogeneous rural areas of Emilia-Romagna Regions organized by province and altitude. In particular the model will consider the impact of Greening's criteria on land allocation in different farm systems and the relative economic effects. The model will allow to evaluate which rural systems and which farm typologies will be favored or penalized by the reform. Furthermore the model will provide results on dynamics in land allocation. The impact assessment will be developed by an "integrated" regional model based on the use of Positive Mathematical Programming (PMP) methodology. In particular will be used the regional model AGRISP (Arfini-Donati, 2013) updated with the introduction of the new policy requirements as proposed by the EU Commission. The database used in the model is merging of two data-banks: i) the IACS-AGREA database (the administrative databank of Emilia-Romagna Region) - concerning micro information about land use, and decoupled payments ii) the FADN of Emilia Romagna about economic variables. After defining a Baseline scenario which reproduces the 2012 policy and market condition, the following policy scenario will be considered: i) First scenario will focus on the effect of regionalized redistribution of the payments; ii) Second scenario will expand the first scenario including in the elaboration also the implementation of Greening constraint. The results obtained are intended to be a useful tool for policy makers and stakeholders involved in the current discussion of Cap reform. The results also intend to support discussion anticipating what could be the changes in farmers decisions if the commission proposal will be applied.

Examining trends and cycles of agricultural production of SAARC countries

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This paper examines the issue of trend, cycles and irregular in the per capita agricultural production (PCAP) of 3 countries, i.e. Bangladesh, India and Pakistan, of South Asian Association for Regional Cooperation (SAARC). SAARC constitutes about 23% of the world population and has 15% of the world's arable land. The selection of the aforementioned countries is based on their agricultural economic importance to the region which is about 80%. This paper uses the unobserved components model to decompose the PCAP of each country and to investigate the relationship of each component among these countries. The time period for the study is from 1961 to 2010 and FAO statistical data set is used. Smooth trend plus stochastic cycles methodology of Koopman et al. (2009) is used to estimate the model by maximum likelihood. Primarily the residual diagnostics validate the model with good fit. Diagnostics of normality, auxiliary, prediction and forecasts also notice that there is no deficiency in the model. Empirical results clearly addressed that India is positively correlated with Bangladesh in irregular but moderately correlated with Pakistan in growth. There is less evidence of stronger correlation in longer cycle than shorter cycle. In short cycle, India has strong but negative correlation with Bangladesh however, in long cycle it is strongly correlated with Pakistan.

Keywords: SAARC, smooth trend, cycles, unobserved components, PCAP

Price volatility transmission in selected European food supply chains

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The past decade was marked by increased volatility of food prices at the global and European levels. The spillover of world agricultural price volatility to the EU resulted from the successive reforms that liberalized the European agricultural sector and exposed it to international market signals. Even though farmers and consumers are both exposed to the rise in volatility, current literature is inconclusive on the degree of volatility transmission along the chain. While many argue that the volatility felt by farmers is much higher while consumers benefit from relatively stable prices, others argue that consumers are equally (or more) at the mercy of volatility than farmers. Moreover, these studies rarely attempt to explain the observed degree of volatility transmission along food supply chains. The aim of this study is to bridge the aforementioned literature gaps by examining the degree of volatility transmission along multiple selected European food supply chains and by explaining the observed degree of transmission. Proxies of market power, menu costs, government market interventions, the cost share of inputs and the roles of cooperative owned farms will be used to explain the degree of volatility transmission. The cases of the German and Spanish pork chain, the German cheese chain, and the Spanish and French tomatoes chains are examined. The multivariate GARCH model is used for the analysis. Identification of country and product differences in volatility transmission is insightful from a policy making perspective since it guides policy makers in the design of price stabilization measures that are country and product specific.

Keywords: Food price volatility transmission, market power, menu costs, government interventions, cost share, cooperative owned farms, multivariate GARCH, European Union

Dynamic Productivity Growth of the Spanish Food Industry

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The economics literature on efficiency has produced a wide range of productivity growth measures. The introduction of the directional distance function has led to the development of Luenberger productivity growth measures, either based directly on the static directional distance function or on its dual representation through static profit or cost function. However, currently available productivity measures including Luenberger measures generally ignore the costs of adjustment of quasi-fixed inputs like labor and capital to their long-run levels and the time interdependence of production decisions. Doing so is essential when analysing productivity growth and its decomposition when considering the adjustment of assets.

The Spanish food industry is of great relevance for the economy of the country, representing 16% of the net sales of industry, 17% of industrial employment and 8% of Spanish GDP in 2010. It is characterized by a predominance of small and medium-sized enterprises, which makes it very sensitive to external competition. This exposure to external competition is expected to further increase following the ongoing globalization and the liberalization of food markets. Concerning organizational forms, cooperatives have a great economic and social importance in this sector.

Against this background, the objective of this paper is to estimate dynamic Luenberger TFP growth based on the dynamic directional distance function for the Spanish food industry over the period from 2001 to 2010. Choosing this time span we are able to analyze the years before and during the financial crisis in Spain. The dynamic directional distance function represents an adjustment cost technology in order to account for the presence of quasi-fixed factors of production. The Luenberger productivity growth measure is decomposed into efficiency growth, scale and technical change. Differences in TFP components between sub sectors, firms from different size classes and organisational forms are tested using the adapted Li test.

Keywords: dynamic TFP growth, food industry, IOF, cooperative

Examining Convergence in Per Capita Agricultural Production Value across 20 Asian Countries

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Since 1990s, the convergence issue has become an important field of econometric research. In recent years, a remarkable evolution of convergence literature is found in the area of agricultural economics. This article demonstrates β - and σ -convergence of per capita agricultural production value (PCAPV) across 20 countries from three geographical parts in Asia, i.e. South, East, and Southeast, for the period of 1980-2010. These countries are embodied in the study because of the substantial contribution of agriculture to their economies. The data have been created using annual agricultural production value and agricultural population collected from the FAOSTAT online - database. The neoclassical least square regression, fixed effects (FE) and random effects (RE) panel data models are employed in examining β and σ convergence. The two-way FE model by adding time effects is found to be most appropriate for determining β convergence at any level of significance. However, the empirical results do not support σ -convergence at any conventional level of significance. The present study, therefore, is going to consider nonparametric and semiparametric approaches to identify the presence of convergence.

Keywords: β -convergence, σ -convergence, PCAPV, fixed effects, random effects, nonparametric

Estimating economic effects of agroenergy development on land allocation and water requirements

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The very high public incentives on renewable energy production led to a growing interest to invest in agroenergies and a subsequent transformation of the traditional role of farmers that become in certain specific contexts, like swine breeding, specialized energy suppliers. In Italy, according to the statistics on renewable energy sources, during the last three years, the production of biogas (in terms of installed power) increased more than 400% (GSE, 2012). These important results obtained at national level as a response of the 2020 objectives and the internal plan strategy for the renewable resources can affect the agrifood chain organization and the use of scarce natural resources like water.

The objective of this contribution is to present an integrated model based on Positive Mathematical Programming (Paris-Howitt, 1998) and crop water simulation package AquaCrop (FAO, 2012) able to provide an economic and environmental assessment of the potential development of biomass crops for energy production in Italy. The implementation of the model to an extended group of farms selected from the Italian FADN database intends to evaluate: 1) the farm convenience thresholds to introduce this type of crop inside the agricultural production plans, 2) the impact of the no-food crop dynamics on the distribution of crops on the total UAA, and 3) the effect on water requirements for irrigation.

VAR models for dynamic analysis of prices in the agri-food system

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An adequate understanding of the dynamics that characterize the agri-food market is fundamental for the development of really efficient economic policies, especially after the two recent hikes in the prices of food commodities. The econometric literature provides today advanced analysis tools such as VAR models: these models are based on a system of equations in which each variable is regressed on a set of deterministic variables, on a number of l delays related to each covariate in the model.

To test the effectiveness of this analytical tool at dealing with the issues related to agri-food economy we applied a VAR analysis on prices of major food and energy commodities (oil and biodiesel) referred to the period January 2005-December 2012.

Our results identified statistically significant intertemporal relationships between the price of corn, soybeans, rapeseed and oil, and suggested the direction of these relationships; we could conclude that the price of corn and soybeans are generated in the energy market only.

Moreover, we used as variables the share of commodities used for the production of biofuels, and we could observe that important alterations on the food market *are due to the convenience in producing ethanol and biodiesel*, since the portion of the crops used for energy is in direct competition with that devoted to the feeding.

This kind of models, therefore, deal adequately with data and issues of the agri-food system and provide an analytical basis to develop economic policies that take into account the complexity of the global food system.

Keywords: commodities, VAR, agri-food market, bioenergies, prices

A Latent Growth Modeling: Dynamic Change of Agricultural Product on a Prefectural Level and New Agricultural-Oriented Policy in China

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The starting point of China's exponential growth is the market reforms of 1978, since then China has been maintaining in the last years an average annual growth rate of over 8%. This success was sustained by specific policies aiming at creating a two-speed system supporting the coastal and urban areas, thus to attract foreign investments and boost industrialization and trade. However, this impressive economic growth has been accompanied by increasing spatial disparities, of which the rural-urban dichotomy represents a large share. The speed-up urbanization and industrial construction in China largely changed the traditional basic sector of agriculture. The increases in urban population, large migration of rural labours and policy orientation has all been putting influences on agricultural production. Hence, the Chinese government started to give more priorities to agriculture after its admission into WTO, aimed to promote the agricultural productivity and rural development and mitigate the urban-rural disparities. The Chinese government has started to enact the western development drive and series of agricultural reforms to transfer the surplus economic capacity and balance the inequality since 2000. In 2004, the new agricultural subsidy system has been finally established in the world largest agricultural country. Before this reform, the agricultural subsidy was based on agricultural taxes and price scissors. It was not until 2004 when the agricultural tax was abolished and direct subsidy policy was established for farmers in order to protect the interests of food farmers all over the country. This transaction, from urban-oriented to rural-oriented, industrial-oriented to agricultural-oriented, is commonly acclaimed as a significant driver in agriculture. However, it is still unresolved that how exactly the agricultural product changes, especially among the single regions in China.

There has been a certain amount of debates on whether the agricultural product decreases due to the urbanization, or whether it has started to bounce back after the new series of agricultural policies. Given that to understand the changing trends of different regions over time in China has long been of interest to researchers and practitioners, we proposed this study on the trajectory of agricultural product after China joined WTO. The objective of this study was to depict the long-term trend of agricultural product on the prefectural level in China with Latent Growth Modelling (LGM), which can describe individual behaviours in terms of initial levels and their developmental trajectories from those levels, and determine the variability across individuals in both initial levels and trajectories as well as provide a means for testing the contribution of other variables or constructs to explaining those initial levels and growth trajectories. In doing so, LGM methods simultaneously focus on correlations over time, changes in variance, and shifts in mean values, thus using more information available in the measured variables than do traditional methods.

Figure 1 describes the working path diagram of LGM, the Y_1 is the quota of agricultural product in time 1 (year 2001), Y_2 is the same variable measured at time 2 (year 2002), until Y_{10} at the year of 2010. It is very reliable to have the variable measured at ten years to estimate a changing trend. At the bottom, the ε_i represent measurement errors because it is reasonable to assume that our measurement of agricultural production is not perfectly reliable. Mean α_i is the group's average

intercept at the initial level, and $\text{Mean } \alpha_s$ is the group's average rate of change. They also have variances, denoted by D_i for the variability of each single prefectural city at initial level and D_s for individual variability in trajectories within the group. The mean tells us the average mean and slope for the group. At the individual level, each city may have a different intercept and slope.

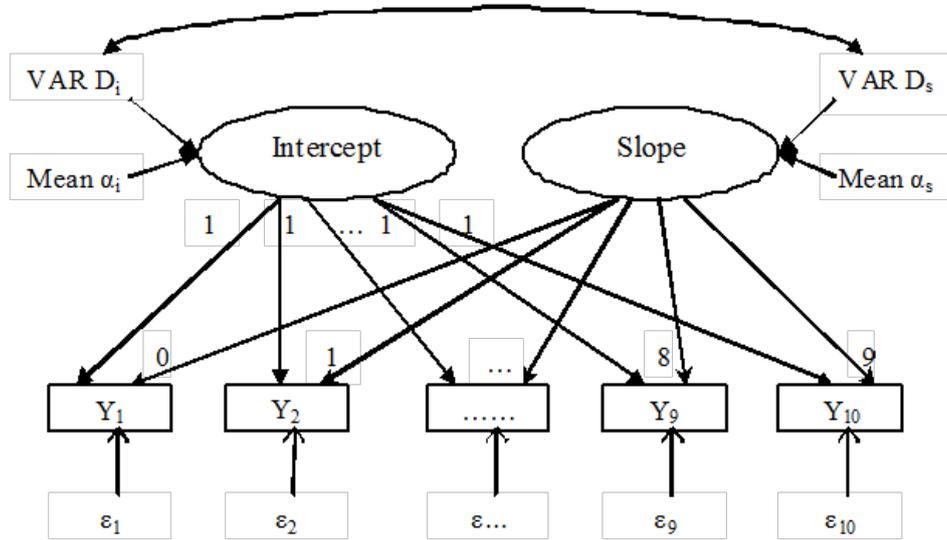


Figure 1. Conceptual Path Diagram

An index of time series (ten years) data on the proportion of agricultural product in gross regional product of nearly 300 samples from 2001 to 2010 was collected and applied to test the latent growth model of agricultural products, which designed for describing the prefectural conditions in terms of initial levels and their developmental trajectories from those levels, and in the mean time, focusing on correlations during the long term. After the processing of outliers and missing data, there would be 258 prefectural cities left. Therefore, our data pool is large enough to satisfy LGM and evaluate the changing trajectory of agricultural production in China. The year of 2004, when the direct subsidy was enacted and the agricultural tax was abolished in the whole nation, would be considered as a breaking point to separate the whole period into two parts with the application of piecewise model, hence to analyze the trajectories and provide some new angles to analyze which type and what capacity of changes brought by the new series of agricultural-oriented policies and reforms.

Keywords: Agricultural product, LGM, Regional disparity, Developing trend, Food subsidy

Developing of modeling tool for policy and economic rent in agriculture

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In the paper the completely original micro-economic model of the producer's choice is presented. To capture the impact of agricultural policy on the agricultural producer's income two main sources of income growth were included in the model, namely efficiency of production (economic rent) and funds obtained from solutions under the CAP agricultural policy (policy rent). In the paper the micro-level (plan, animal and mix production types) and macro-level agricultural data were used. The agricultural producer optimizes his choices, i.e. reaches equilibrium when it comes to these two sources of income for the objective function (income maximizing). Therefore, the purpose of the article was to show a certain range of substitution between these sources of revenue of the producer. We have observed that the rate of substitution of these two sources of income growth is not equal to one, which means that replacing one with the other is not without any effect on the level of income.

Keywords: policy rent, economic rent, agriculture, producer's income.

R&D partnership in the rural agri-food sector. The role of spatial variables

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Innovation in agri-food firms is usually reflected in exchange between businesses and innovation systems. Knowledge generation and implementation are the result of exchanges, which often depend on spatial factors. A database of over 1,000 agri-food businesses in the Autonomous Community of Valencia is used to test the influence of internal characteristics of the firm and of external characteristics linked to territory on the willingness to carry out partnerships with knowledge supporting institutions. R&D partnerships are measured taking into account patents, papers published and partnership agreements with universities and public technical institutions. Internal characteristics have to do with firm size, age of the firm and legal form, with special attention paid to coops. External variables linked with territory are measured at local labour systems (LLS) level in the region. They are characterised by distance to research institutions, level of education of the population, presence of industrial districts, main sector of specialization, and variables depending of neighbouring local labour systems LLS. In particular, we test the constraints given by the rural nature of the local labour system on the willingness of a firm to undertake R&D partnerships. A probit model is tested, correcting possible intra-group correlations when spatial variables are combined with individual data. Results show that rural areas and small size of firms are not a handicap for R&D partnerships.

Keywords: agri-food firms, R&D partnership, territory

Technology, Treatment and Behavioural Change - Agri-Environmental Policy and Producer Behaviour

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This empirical study investigates the effects of different agri-environmental schemes on individual producer behaviour. We consider the effects on production intensity, performance and structure for a sample of farms for the period 2000 to 2009 and use the policy examples of the Environmental Stewardship Scheme (ESS) and the Nitrate Vulnerable Zones (NVZ) both operated in the UK. The econometric methodology is based on a directional distance function framework as well as the application of propensity score analysis by the use of matching estimators. Preliminary results for the farming intensity analysis indicate that (1) agri-environmental schemes vary in their outcome over different farm types, (2) for some farm types (i.e. cereal producers, dairy farms) both instruments deliver similar results, and (3) for others (e.g. crop producers or pig and poultry farms) only one instrument appears to be effective. With respect to farming performance first results for cereal producers show that (4) both instruments deliver quite similar results with respect to input productivity changes whereas (5) only very small effects on farms' efficiency levels could be found: Both instruments lead to lower land and capital productivity, both instruments lead to higher labor productivity, however, a lower land productivity for NVZ but a lower capital productivity for ESS farms. The methodological novelty of this research lies in the use of a sound production theory based multi-output multi-input approach to disentangle measures for production performance and structure which are then used as indicators for the robust treatment effects' analyses.

Keywords: Agri-Environmental Policy, Directional Distance Function, Matching Approach

To disaggregate, or not to disaggregate, that is the question: The effect of a sectoral breakdown in GTAP framework

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Introduction

Dairy farming is one of the most important sectors in agriculture and thus, contributes to income generation in many parts of the world. Though, production and consumption rates of dairy products vary from one country to another. In 2012 the highest fluid milk production and consumption volumes are within the European Union (EU) followed by the United States of America (USA) and India. In terms of butter, cheese, skimmed milk powder (SMP) and whole milk powder (WMP) production, the EU and USA lead the way. While the EU, USA and Oceania are main exporters of cheese, SMP and WMP, Asian countries are their biggest trading partners (USDA, 2013). Besides, dairy sector is one of the most protected industries in the world. World dairy trade is highly distorted utilizing many policy instruments, e.g., tariff rate quotas, production quotas or other domestic support. Tariffs in many countries are set very high and are mostly over 100%, whereas export subsidies are not so common except for the EU.

Given the complexity of the dairy sectors, it is essential for a thoroughly analysis to understand the dairy industry. The current Global Trade Analysis Project (GTAP) database version 8 distinguishes 57 sectors across 129 countries, in which dairy industry is handled in two sectors, namely as raw milk and dairy products. However, for a detailed industry specific or in-depth policy analysis, a higher disaggregated database would be desirable. The importance of this disaggregated sectoral breakdown is already emphasized by several authors (e.g., Elbehri et al., 2001; Grant et al. 2007; Mraz and Matthews, 2007; Charteris and Winchester, 2010) especially where different products are targeted by varied policies or face different demand and supply structures as well as trade flows.

There is an extensive literature reviewing dairy policies on a country basis (e.g., Sumner and Balagtas, 2002; Harris, 2004; Suzuki and Kaiser, 2005) and by employing partial equilibrium (PE) or general equilibrium (GE) models (e.g., Meilke and Lariviere, 1999; Jensen and Nielsen, 2004; Bouamra-Mechemache et al., 2008). In contrast, to our knowledge there are rare papers demonstrating the importance of sector disaggregation level in dairy sector (Grant et al., 2007; Mraz and Matthews, 2007; Charteris and Winchester, 2010). Grant et al. (2007) combine a highly disaggregated PE and a GE model to analyze tariff rate quotas in the US dairy sector. Charteris and Winchester (2010) compare a GE model with a disaggregated dairy sector and joint production with an aggregated GE model without joint production. Mraz and Matthews (2007) do not offer policy analysis or compare the results of a disaggregated database with an aggregated one, but provide a guideline for database breakdown by employing GTAP and SplitCom together.

Our paper seeks to reveal the effects of disaggregation of the dairy sector in the GTAP model when running policy simulations. We employ the GTAP framework (Version 8) and the Splitcom utility to increase our sector disaggregation. Thereby, our aim is to quantify the effect of a disaggregation of the dairy products on key variables in the policy analysis (e.g., trade flows, output and prices). By carrying out a WTO liberalization scenario, we expect to show the differences in results owing to sectoral breakdown.

Data and Methods

As mentioned, the GTAP database distinguishes two dairy sectors which are raw milk and dairy products. Utilizing the SplitCom enables us to disaggregate the single dairy products sector into six sub-sectors, i.e., butter, cheese, SMP, WMP, fresh milk products and other dairy products. One bottleneck in this analysis is the supplementary data needed for the each sub-sector and each region such as production, utilization, bilateral trade flows, protection rates and cost structure. This additional data will be gathered from several databases (European Commission, Food and Agriculture Organization, International Trade Centre - Market Access Map, Organization for Economic Cooperation and Development, United Nations Commodity Trade Statistics Database, United States Department of Agriculture and World Trade Organization.). But in cases of lacked data, SplitCom has the ability to compensate (compare Horridge, 2005).

Given the importance and scale of this sector in these regions our analysis focuses on the dairy markets in the EU, North America and Oceania. Hence, our regional mapping consists of the EU, North America, Oceania, Latin America, Africa, Asia and rest of the world. To conduct the differences in results, we first run a WTO liberalization scenario which is based on the most recent proposal of 2008 with the standard GTAP model (two dairy sectors). Tariff cuts are calculated on the HS6 tariff line level and aggregated using the TASTE utility. Thereafter, we run the same scenario with the modified GTAP model (six new dairy sub-sectors), disaggregate the tariff cuts based on TASTE and compare our results.

Results

We report the results particularly focusing on the welfare, trade, price and output effects as well as in comparison. Previous studies have shown that trade liberalization can have different impacts due to the aggregation level of the database employed by the models. Aggregation most likely results in lower welfare gains (Grant et al, 2007; Narayanan et al., 2010a, 2010b), underestimation of trade flows and lower changes in output (Grant et al, 2007; Charteris and Winchester, 2010). Thus, we expect our results to be significantly different depending on the sectoral breakdown used in the GTAP model. Our first results verify the outcome indicated in the literature.

Keywords: Disaggregation, GTAP, SplitCom, dairy sector

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Does the CAP slave the fittest?

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The last three decades the CAP has introduced plenty of policy-created assets such as: dairy quota, sugar quota, suckler cow quota, tradable direct payments based on historical reference. Environmental and member state specific policies have also contributed to this evolution. There are numerous scientific papers that highlight inefficiencies in these systems. Policy assessments have shown that reforms would improve competitiveness of the agricultural sector and increase overall welfare in the farming sector. Yet, it is clear that policy reforms move very slowly and often the most efficient policy option is not chosen.

This paper shows through a political economics analysis why some reforms are heavily opposed by the farm lobby despite the fact that they would be beneficial for the viability of the farming sector in the long run. The key observation in our analysis is that farmers that go to retirement benefit from supporting the value of policy-created assets while the growing and investing farmers suffer from the fact that they need to pay for these policy-created assets. The tragedy in the reform of the CAP is that growing farms are outnumbered by retiring farms. The paper illustrates this point with different cases at EU and member state level.

Keywords: CAP, greening, tradable permit

Effects of policies developments on farmers' production decisions

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Trends in consumer preferences and production innovations are shifting agriculture and farmers' production decisions. An increasing number of differentiated food products appeal to specific consumer values such as environmental-friendliness or locally grown. Public policies and regulations influence producers' decisions regarding resource allocation. They may also distort firms' competition (OECD, 2001). Therefore, they may have an effect on competitiveness. The literature on the effect of government intervention on agricultural competitiveness is copious (Nivievskiy and von Cramon-Taubadel, 2008; Bezlepina et al., 2005). The EU provides farmers with incentives to adopt Countryside Stewardship Schemes (CSS) using subsidies in the framework of the agri-environmental regulation of the EU (2078/92), now included in the more general regulation on rural development. In this paper, a case study of 250 farmers in the Apulia region was carried out to investigate the determinants of the willingness to adopt a scheme involving taking care of arable field margins in particular. Starting by several studies in this field, we make use bivariate and multivariate logit analysis to corroborate not only the importance of personal, structural and financial factors, so also showing the importance of social capital. Farmers having an higher education, being association member and more open to both professional and non-professional contacts are more likely to adopt a CSS.

Keywords: Public policies; social capital; government incentives

Exploring consumers' attitude towards Greek products and the "Made in Greece" label on packaging

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This paper explores consumers' attitude towards Greek products and the "Made in Greece" label usage on packaging. Taking into consideration the general economic and social ordeals which Greek people face nowadays, consumers' opinions for Greek products' several dimensions, such as price and quality, were examined. For this purpose, a questionnaire was created and answered by over a 1000 Greek consumers. Furthermore, there has been an attempt to understand the implied reasons which lead consumers to choose a Greek product and are referred to socioeconomic impacts like reinforcement of the national economy and reduction in the unemployment rate. This kind of reasons associated with a local product purchase may prove the existence of a country of origin effect. Finally, the "Made in Greece" label seems to affect the consumers' attitude towards Greek products and the companies which produce them. Therefore, this paper highlights the importance of the country of origin labeling, as a means of promotion.

Keywords: Greek product, country of origin effect

Identifying of the Factors Affecting Fresh Fruit Production and Marketing in Canakkale/Turkey

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Fresh fruit production and marketing is of significance in Canakkale as a consequence of suitable climate and natural conditions. The aim of this study is to identify the factors which affect fresh fruit production and marketing. In this respect, a survey has been carried out in Canakkale, and questionnaires prepared in accordance with the objectives of the study have been filled out through face to face interview with 98 producers who have been chosen by means of stratified random sampling.

Product scope of this study includes apple and peach which constitute 71% of the total fresh fruit production in Canakkale. This study has employed basic statistical methods along with Logistic Regression Analysis. Factors affecting fresh fruit production have been identified through Binary Logistic Regression Analysis, whereas factors affecting fresh fruit marketing have been found out by means of Multiple Logistic Regression Analysis. Besides, rational solution suggestions have been also offered for issues raised in the result of the survey by considering the characteristics of the production areas.

KeyWords: Fresh fruit production, fresh fruit marketing, agricultural policies, production and marketing policies, Canakkale, Turkey.

Economic analysis, a decision-support tool when choosing how best to protect water abstraction points

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In order to obtain and preserve drinking water that meets required standards, local authorities can choose between two types of measures:

- Preventive measures involving the establishment of sanitary protection zones around water abstraction points or catchment areas.

Establishing sanitary protection zones around water abstraction points or catchment areas involves prescribing conditions for current or future activities. If the raw water is already of sufficient quality, these prescriptions are control instruments that must be applied to preserve the resource, and need only avoid or reduce the impact of point sources of pollution and/or diffuse pollution that could have a harmful effect on water quality. Those instruments are often implemented as cross-compliance measures when they were applied to agricultural activities, but in most cases they consist of agro-environmental measures that farmers adopt willingly in order to reduce agricultural pollution. For non-agricultural, industrial or urban activities it may be necessary to prescribe that existing facilities be brought in line with standards.

- Curative measures involving water treatment to ensure that it meets regulatory requirements.

Comparing the economic costs of these preventive and curative solutions can be seen as a decision-support criterion for local authorities who need to find an economically acceptable solution that is also to the general advantage (potability standards).

At the moment, studies attempting to make an economic assessment of the measures applied to achieve good quality water are mainly based on cost-benefit analyses that only take into account as a criterion the efficiency of the measures taken. The aim of **this study is to produce a protocol for a socio-economic analysis with which to assess any plan for the protection of drinking water catchment areas**. This protocol is based on the cost-benefit method but incorporates the criterion of the *efficiency* of the measures.

The Discussion section will consider the assessment at farm level of the impact of introducing contracts concerning several agro-environmental measures on the overall economic efficiency of farms and also on the partial efficiency of each activity: "Phy" efficiency for plant protection, "N" efficiency for fertilisation, etc. Our working hypothesis is that the adoption of such agro-environmental measures improves the economic efficiency of farms. The efficiency of measures is calculated using the Data Envelopment Analysis method. This efficiency criterion is considered to be a useful tool for decision-makers needing to choose measures that will be of least cost to the community as a whole.

Keywords: protocol for a socio-economic analysis, efficiency, agro-environmental measures , water abstraction points.

Measuring market power in agricultural industries with a large number of differentiated products

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In his 2012 AAEA Presidential Address, Sexton proposed that analysis of market power in modern agricultural markets must go beyond the traditional focus on concentration and that it should also account for the increased emphasis on product quality and differentiation. Sexton acknowledged that "...such expanded focus can greatly complicate efforts at formal modeling..." (p 210). But he also proposed that conclusions from such analyses, and hence the policy implications, would likely differ significantly from those based upon traditional market power analyses that ignore such phenomena. Historically, technical difficulties have prevented progress in such analyses.

Measuring market power in industries with a large number of differentiated products is technically difficult. Econometric methods based on structural demand and supply modeling were mainly developed for industries with a single homogeneous good. Because a large number of cross price elasticities need to be estimated, structural approaches cannot be easily extended to industries with many differentiated products in the absence of limiting (and questionable) restrictions. Such structural models may also require additional restrictive assumptions embedded in the parametric specification of the supply and demand functions making any test of market power jointly dependent on the assumed functional forms and the presence of market power in a given industry.

The most commonly used approach for estimating market power in differentiated product industries involves the use of discrete choice models (Berry et al., 1995). Yet, discrete choice models are suitable for the estimation of demand systems and typically abstract from supply considerations, which must be properly accounted for in the measurement of market power.

They also require assumptions that do not always correspond to the realities of markets. In particular, discrete choice models imply that buyers must be presented with all possible product options from which they choose only one.

Alternative methods for estimating market power in differentiated product industries do exist but they are also subject to empirical challenges of their own. The residual demand approach proposed by Baker and Bresnahan (1988) estimates the product demand of a firm once the conjectures and reactions of all other competing firms have been accounted for. This residual demand, however, can be identified only if relevant cost information exists for each individual product in the market and such information is rarely available, especially when the number of products is large.

Given the inherent empirical challenges, we draw on the existing literature to develop here a second-best approach to measuring market power in industries with a large number of differentiated products. Instead of providing a point estimate of market power, our proposed method calculates an upper-bound of the markup charged by firms and hence an upper bound to exercised market power. We then illustrate how our method can be used in practice by applying it to an industry with a very large number of differentiated products -- the US hybrid seed corn industry. In this context, we provide an estimate of the upper-bound of the markup charged for hybrid corn seeds from 1997 to 2008 and we find that the market power exercised in the US corn seed market during this period was moderate.

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The WFD implementation in Emilia Romagna: a cost-benefit analysis

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In compliance with the European WFD, this study provides a conceptual framework for the economic assessment of the actions required to prevent the deterioration of fresh water in the long run. A cost effectiveness analysis (CEA) is implemented in order to assess the impact of alternative economic policy measures aimed at achieving the WFD objectives for each sources of deterioration. Then, a Cost Benefit Analysis (CBA) is implemented in order to evaluate the economic feasibility of the proposed actions. Such evaluation consider the financial barriers/benefit of different interest groups (citizens, agriculture, industry). The study analyse the interdependencies within each water body in order to identify which are the most sensitive areas connected to water deterioration. Results show the existence of macro-areas threatened by low level of water quality and/or quantity distinguishing the spatial effect on water deterioration due to natural conditions and to human activities within the region. The technical and economic constraint of the feasible measures justifies any extension/relaxation of the WFD expectations.

Alternative specifications of reference income levels in the Income Stabilisation Tool

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Supporting farmers in managing their income risks has become one of the focal points on the agenda of agricultural policy makers and currently the introduction of an Income Stabilisation Tool (IST) is discussed in Europe. First evaluations of the IST address actuarial evaluations, governmental costs, impacts on optimal farm programs and the identification of potential beneficiary groups among farmers.

We contribute to this literature by providing empirical information on the sensitivity of an IST to different specifications of reference income levels. To estimate a potential indemnification by the IST, a farm-level reference income must be specified in advance and can be either based on a 3 year average or a 5-year Olympic average. However, averages do not account for underlying trends and may lead to biased results. For instance, if incomes tend to decrease over time, an average will overestimate the expected (and thus reference) income level and the insurance will more likely indemnify this farmer. Based on Monte Carlo simulation analyses, we propose the use of farm-level trend models to specify reference income levels using extrapolation, e.g. by establishing a linear regression between income and time.

We use farm-level as well as aggregated data over the time period 2000-2009 to empirically illustrate the potential impacts of different reference income specifications on governmental costs, farm incomes, the distribution of incomes across the farm population and insurance participation.

Keywords: income stabilization tool, reference income, simulation

Stochastic Market Modelling with Gaussian Quadratures: Do Different Linear Transformation Methods and Rotations of Stroud's Octahedron Matter?

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Stochastic modelling with large market models rapidly turns into large integration problems of high dimensionality with high computational requirements. For symmetric regions of integration, quadrature formulas based on Stroud's n -Octahedron (1957) are formulas of degree 3 with minimal number of points which can make the stochastic modelling with large economic models manageable. However, past research has woken the suspicion that different formulas may lead to results which differ in exactness. For this analysis the European Simulation Model (ESIM) is used with stochastic yield terms for wheat, barley and rapeseed in order to test different quadrature formulas and compare results to Monte Carlo based stochastics. The exercise shows that model results differ depending on the quadrature formula used. It is exhibited that those formulas using the transformation via Cholesky or the formula from Arndt (1996) are coordinate dependent while those using the transformation via diagonalization and the formula from Artavia et al. (2009) are not. Under the observed correlation, the most accurate results are obtained using Arndt's formula and no distinction can be made between linear transformations or arrangements used in combination with it. The quadratures using Arndt's formula are more accurate because they generate points with high probability of occurrence.

Keywords: Gaussian Quadratures, stochastic market modelling, numerical integration, Monte Carlo Simulation

Decomposing the Bilateral Agricultural Trade Costs into Their Components

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In this study, Turkey's agricultural bilateral trade cost is calculated by using Novy index methodology. The data on trade costs refers to agricultural trade between Turkey and its 118 trading partners for the 1995-2010 period and it is extracted from the new ***Economic and Social Commission for Asia and the Pacific (ESCAP)*** Trade Cost Database. The bilateral measure of trade costs is truly comprehensive, including not only international transport costs and tariffs but also other trade cost components discussed in Anderson and van Wincoop (2004), such as direct and indirect costs associated with differences in languages, currencies as well as cumbersome import or export procedures. We also include geographical and historical factors, as well as traditional trade policies such as tariffs and RTA membership, logistics and trade facilitation performance, connectivity, and behind-the-border regulatory barriers. At the second step, trade cost index is estimated by basing on a full list of tariff and non-tariff factors and finally a variance decomposition analysis is carried out to find the weights of various factors that affect bilateral agricultural trade cost of Turkey.

The Stakeholder Analysis: a Contribution in Improving Impact of Rural Policy Some Findings from Two Field Surveys

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Since more than a decade agricultural economists pay more attention to CAP's effects evaluation as a consequence of a larger social request for understanding what impacts are generated by adoption of Rural Development Policy. The EU 2020 strategy fosters a political shift from the market liberalization processes towards policies promoting stability and equity, in addition to environment protection and social inclusion. Thus, CAP will have to be better evaluated by both quantitative and qualitative tools in order to understand the role of local communities in RDP implementation. In studying the role of wine tourism, in particular the successful case of Young Wines Exhibition of Sardinia and the failure of the 'Verdicchio di Matelica' Wine Road (Ancona) the use of Stakeholder Analysis has shown positive contribution in evaluating role of social actors in success/failure of RDP implementation. This work aims at discussing the necessity to use a more holistic evaluation method, mainly focusing on possibilities and difficulties of involving local social actors and Policy Makers.

An Interdisciplinary Modelling Approach Assessing the Cost Effectiveness of Agri-environmental Measures on Reducing Nutrient Concentration to WFD Thresholds under Climate Change: the Case of the Louros Catchment

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The application of the Water Framework Directive (WFD) in the European Union (EU) targets certain threshold levels for various nutrients concentration. Nitrogen (N) in its various nitrates and nitrites forms as well as Phosphorous (P) are the most important nutrients. Agriculture and animal husbandry are, in many cases, the most important non-point (diffused) sources for these nutrients. Other human induced activities contributing to increased concentration of dissolved nutrients include the wide spread operation of septic tanks in rural areas and the seasonal operation of small scale food manufacturing plans.

In the EU, agri-environmental measures constitute a significant component of Pillar 2 - Rural Development Policies (RDPs) in both financial and regulatory terms. Environmental measures also are linked to Pillar 1 payments through cross-compliance and the greening proposals. This paper draws from work carried out in the REFRESH FP7 project and aims to show how various geophysical, climate change, economic and possibly land use models can be integrated to assess the cost-effectiveness of agri-environmental measures in relation to nutrient concentration targets set by the WFD especially in the presence of important Habitats depending on water quality. An INtegrated CAtchment model (INCA) of plant/soil system dynamics and instream biogeochemical and hydrological dynamics is at the core of our modelling effort. Environmental policies in agriculture attempt to control, directly or indirectly, nutrient input to the environment. However, N concentrations and loads in rivers reflect the integration of the catchment N sources which, besides agriculture and animal husbandry, include other anthropogenic contributions such as septic tanks and manufacturing wastes and physical contributions from the vegetation and mineralisation (and subsequent nitrification) of organic nitrogen in soils.

We present the procedures (methodological steps, challenges and problems) for assessing the cost effectiveness of agri-environmental measures at the baseline situation and climate-and land-use-change scenarios. Furthermore, we present results of an application of this methodology to the Louros watershed in Greece and discuss the likely uses and future extensions of the modelling approach. Finally, we attempt to reveal the importance of this methodology for designing and incorporating alternative environmental practices in Pillar 1 and 2 measures.

Keywords: Cost Effectiveness, Agri-environmental measures, Integrated Modelling, Water Framework Directive, Climate Change, Mitigation

Evaluating the performance of rural governance in Calabria

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The objective of this study is to provide an assessment of the performance of the development process of Leader approach in the Rural Development Programme 2007-2013 in Calabria. In particular, on one hand, we want to measure and evaluate the application of the “Good Governance” criteria, studying in deep, by the identification and selection of an appropriate set of process indicators (Franceschetti et al, 2012), procedures and actions practiced by Local Action Groups (LAG) in Calabria to reach the purposes of the program. On the other side, those indicators will be employed to construct the tree evaluation through which the performance of each LAG will be tested compared to an optimal model of “*Good Governance*”. To this end, it is proposed a multicriteria model is integrated, which combines two techniques: Analytic Hierarchy Process (AHP) and VlseKriterijumska Optimizacija The Kompromisno Resenje (Vikor). The expected results deal with the definition of a possible model for assessing the quality of governance rural-oriented process of implementation. Therefore, the information obtained from the model will be useful both for the possible identification of solutions to enhance the development of the territory and to get evaluation opinions to transfer in future programming 2014-2020.

Keywords: Rural Governance; Indicators of performance; AHP; VIKOR;

Conservation agriculture as a driving force to accumulate carbon in soils: an analysis of RDP in Lombardy

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Carbon emissions are a global problem and the CO₂'s credits for emissions and C-sequestration reduction are a part of the whole solving strategy. An important contribution is given by conservation agriculture (CA).

The paper aims to discuss the effects of CA on C-accumulation in soils, and to measure the effectiveness of policies comparing the amount of resources invested to store carbon in a given period of time.

With CN-cycle model ARMOSA, we calculated the C-storage in soils thanks to the adoption of CA for 20 years in Lombardy. The analysis, based on 600 farms (24,550 hectares), is implemented by data referred to the measure of RDP (Rural Development Program) that supports CA in Lombardy. The results show that the accumulation of C in soil can contribute significantly to achieve Kyoto targets. Suggestions for policy-makers are briefly outlined in relation to other similar policies applied at international level, as the Australian soil carbon accreditation scheme.

Keywords: RDP, carbon credits, conservation agriculture

Measuring biodiversity of cropping structure with the use of FADN data

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Greening of the Common Agricultural Policy as proposed by the European Commission for the 2014-2020 CAP reform raised an interest in measuring crop biodiversity. Different biodiversity indicators have been developed by environmental sciences. Based on the example of Polish FADN from year 2009 consisting of 12258 single farm records, authors verify in the paper the suitability of most popular biodiversity indices for measuring level of diversification of cropping structure in order to assess fulfillment of greening criteria.

As an example one of the most popular indicators, the Shannon index was calculated for farms complying ("green") and not complying ("not green") with the EC greening requirements. Overlapping of density functions illustrates the shortcomings of the index for this specific application. (figure 1)

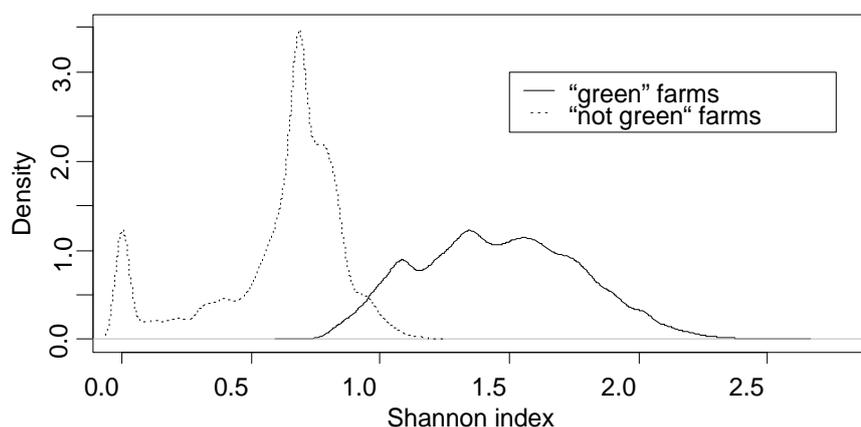


Figure 1. Kernel density estimate for distributions of Shannon index for the sample of Polish FADN farms

Using the biodiversity indices for measuring crop diversification on large areas is related to spatial aggregation. For example values of the Shannon index calculated for Poland, based on official statistics, is 2.43 while value of the index calculated as a weighted average of FADN farms sample is 1.36. Similar bias could be observed on NUTS2 level. This suggests that biodiversity indices calculated for large aggregates are strongly biased and should not be used neither for comparisons between regions nor for verification of EC greening criteria.

Keywords: CAP greening, biodiversity, Shannon index

Co-specific investment resulting in a New Generation Cooperative organizational form - The case of a potato starch cooperative in Denmark

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This paper presents how the co-specific investment has resulted in the new generation of cooperative. We use the Danish potato starch cooperative as a case study in order to describe the main features of the new generation cooperatives. In this specific case, both farmers and factories need to invest in co-specific assets. Firstly, potato growers make huge investments in equipment such as potato planters, harvesters, irrigation systems and drilling, storage houses, etc. Such investments are mostly very specialized machinery and labor for potato production only and are not particularly valuable in other production. Secondly, the starch factories are product specific, since they can only use potatoes as a raw material. In this situation both sides of the transaction are locked. However, while for the starch factory the next best alternative is no production at all, for potato growers can produce table potatoes and sell them in the spot market. The switch to table potato is easier with no cost for farmers, but it damages the starch factories. In order for the starch factories to reduce the risk of potato growers not delivering the product, they implement a membership fee and most importantly, they introduce an exitbarrier by enforcing the delivery obligation contracts. That means that if the farmer does not deliver the contracted quantity to the factory, he has to compensatethe factory the value of that quantity.

We also develop a theoretical model in order to capture the reason for these new generation cooperativesarebeing organized as they are for almost a century. The model includes different time-horizons between the two parties (e.g. farmer and processor), and an enforceable penalty for breaching the contract. We argue that the answer consists of the role of asset specificity as an important attribute that has influenced their organization.The presence of asset specificity in a business relationship raises the hold-up problem, in which each party to a contract is concerned about being forced to accept disadvantages later after it has invested, or that its investment would not have the same value if used for other alternatives. The hold-up problem is solved by implementing the exit cost.

New Generation Cooperatives model: adding value through cooperation. An opportunity for independent producers to achieve sustainable competitiveness and innovation in times of recession

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This study examined the distinct characteristics of a New Generation Cooperative (NGC) as an evolutionary solid business form that is under development through the last two decades in several market regions and its effect on local communities. Differences between the Traditional form and Investor Owned Firms were recognized as a way to understand the reasons of existence for such an organizational structure, as well as its defects. After appreciating the attributes of local producers in the district of Chania, their attitude towards cooperatives and NGC form and current market conditions, the possibility of implementing NGC model to add to their wealth (in the context of rural development) was examined including necessary modifications that may be needed in order to achieve this in a local or national level.

In detailed effect, the theoretical framework that expresses the basic notions of cooperativism and the evolution towards new models that rose was examined. The specific goals of this study were to point out those key factors that diversify the new generation model in terms of operation towards alternative models, to appreciate possible benefits for rural development, society, as well as possible negative externalities. Choosing a region such as Chania prefecture, research on the conditions in which local producers operate was conducted, as well as on their perception of their economic status. A main goal of the research was to assess the possibility of future involvement in an investment attempt such as a New Generation cooperative (environment, positioning, priorities and future expectations). By collecting relevant data and analyzing it there was an attempt to explain it in the context of a theoretical and empirical basis (significance, factors that affected policies followed, individual and communal decision making ability). All this helped creating a useful pattern for further research and a comparison between producers with similar socioeconomic characteristics. As soon as results will be finalized it would make it possible to more easily recognize future members and adjustments or modifications of policies that may be necessary to achieve cooperative sector development. Key factors of communities under study for which separate data was collected:

- Cohesion, level of consensus among future members
- Weaknesses of local community
- Past performance and experience
- Value added industry knowledge
- Willingness to invest (risk aversion)
- Ability to invest

Discussion

New generation cooperative model is often presented as a type of investment for producers who are interested in increasing their margins of the supply chain (income) and diversifying their investment portfolio (risk averse investors) to enter and/ or

become established in a specific market. However, this framework of selective operations and their activity add to the flexibility of the producer over the market fluctuations that agribusiness is suffering from. Given the distinct characteristics of NGCs, if implemented properly it could add towards a sustainable form of development and growth benefits in a community.

Keywords: new generation cooperative, organizational structure, efficiency, value adding activity, rural development, investment

Rural Development and Agriculture Modernization in Accordance with the European Standards - Increase of Products Competitiveness

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Economic activity is one of the most important activities for the survival of man and human society in general. This means the activity of the organized man in a certain way under separate units for the production, availability, consumption and accumulation of goods, in the form of products or services.

The aim for a high, sustainable and continuous growth for the improvement of the social and individual welfare, as well as facing the challenges of the globalization process of the economy and the emerging of new problems for mankind, highlight the need for the rural development in general that of agricultural and environmental one in particular.

Agriculture provides about 19% of GDP in Albania. Thus, the strengthening of policies for rural development and the platform for economic diversification of the rural communities, support the enhancement and consolidation of this prior sector for the Albanian economy.

The measures undertaken for the rural development and agriculture modernization, offer great opportunities to the increase of competitive ability for some country's agricultural and farming products. Therefore, the decrease of import for these products provides income for the import of modern technological devices.

The policies of rural development implicate everything about the encountering of the globalized world challenges. The dimensions and effects of the latest world crisis proved once again that agricultural products are less affected by the economic financial crises, because the decrease of food consumption by people, is ranked to be the last.

From this viewpoint, each country is in need of a disclosure of the possessing potentials. Development policies of this sector exceed regional or national sizes. They are European and Global ones.

Regional and national experiences will be presented as arguments supporting the idea that agriculture is a fundamental instrument for a sustainable development, economic increase, environment protection, systematic gender integration in the activities of rural development.

As for the above, I think that the treatment of this theme will provide arguments that the European standards respected on the necessary rural development, increase and consolidate the competitiveness of agricultural products throughout global market.

Keywords: European Standards; Rural Development; Agriculture; Environment, Competition, Market

Willingness of vine-growers in Less Favoured Areas to participate in Rural Development Schemes: an application of the Theory of Planned Behaviour

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Viticulture is a traditional agricultural activity that plays a significant role in the economy of rural households in certain Less Favoured Areas. In recent years, however, problems of industry structure and lack of competitiveness have led to its abandonment. Lately, as Greek households are faced with serious economic challenges, viticulture could be a promising income and employment generator. At the same time, it could help maintain the traditions and landscapes of rural areas. European Union Rural Development Schemes offer the opportunity to rural households to finance the development of vine-growing activities. However, in areas where vine-growing has growth potential, a decline of the agricultural activities and the unwillingness of farmers to adopt Rural Development schemes have been observed.

This study is trying to identify factors that influence the intention of farmers to continue the vine-growing activity and participate in Rural Development schemes, within the theoretical framework of the Theory of Planned Behaviour. A questionnaire was developed that included questions on vine-growing and on farmers' perceptions towards participation in the schemes, social norms and external influences, addressing vine-growers in Less Favoured Areas of Greece. Data analysis was performed in two stages: First, a principal component analysis was used to identify vine-growing systems, as well as patterns in farmers' views and attitudes. Second, ordered probit models were applied, to identify factors influencing farmers' intentions to continue vine-growing and to participate in subsidy schemes.

Keywords: Viticulture, Rural Development, Less Favoured Areas, Planned Behaviour, Principal Component Analysis, Ordered Probit.

Capturing the macroeconomic impact of technology-based greenhouse gas mitigation in agriculture: a computable general equilibrium approach

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The importance of greenhouse gas (GHG) emissions related to agriculture is gaining momentum in the climate change policy debate, as evident by the European Effort Sharing Decision (ESD). Food production is important to economic sustainability in many regions and therefore greenhouse gas mitigation in agriculture will have notable macroeconomic implications. A theoretically consistent and tractable framework capturing the link between GHG abatement in primary food production and the wider economy is essential to GHG mitigation strategy development in such regions. Computable general equilibrium (CGE) models provide a straightforward approach to compare the economic and environmental impacts of price / quantity-type policy instruments to meet emission abatement obligations. However, capturing changes to emission-intensity associated with production technology is not nearly as developed in the CGE literature, which is most often focused on (and therefore better suited to) modelling technology change in the energy sector rather than agriculture. This paper helps to fill this gap by systematically testing alternative specifications of production structure, parameter values, and emission accounting to improve capturing the macroeconomic impact of agriculture contributing to a target such as the ESD by means of technology change. The suitability of the proposed framework is tested using the case of dairy production in Northern Ireland, a small regional economy with a comparatively large proportion of economic activity related to the food supply chain than other regions in the United Kingdom.

Keywords: computable general equilibrium, greenhouse gas mitigation, agricultural policy, environmental policy, Effort Sharing Decision, economic modelling

Populating Agents in Agent-based models with Bayesian Network

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Understanding the complex behaviors of individual land managers, such as farmers' response to the changes of subsidy scheme, is a prerequisite for policy makers to make informative decisions. Agent-based modeling raises growing attention due to its capability of representing heterogeneous land managers, their interactions and decision-makings explicitly. However, despite the increasing availability of farm-level data, for example, the Farm Accountancy Data Network (FADN) data across Europe, not to mention numerous households survey data out of various research projects, few agent-based models has been empirically parameterized—populating agents from farm-level data and calibrating agents behaviors with empirical observations—due to lack of simple yet effective methods. In this research, we use Bayesian network, a graphical model based on sound statistic theory, to create agents from farm-level data while keeping the statistical properties of the agents consistent with the original observations. The data-mining process supported by Bayesian network can learn from the data sets and store the correlations and co-variation among variables in the network. Thus, the trained Bayesian network can generate any number of “realistic” agents instantly.

Keywords: Agent-based modelling, FADN, Bayesian network, farm-level data

Modelling the impact of the AP14-17 on the exit/entry of Swiss farmers an organic sector: Coupling between Bayesian Network and Swiss agent-based model

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The maintenance of organic farming production schemes is a theme receiving a growing interest now that there are signs of a slowing in organic farming uptake in Switzerland (-4.1%). With the adoption of the Swiss Agricultural Policy 2014-17 farmers will have to face new challenges. In this study, we have investigated the factors that most influence the exit/entry of the organic sector, using a 3500 survey farms data. The general aim of the paper is to analyse in depth how agricultural policy, key managerial and structural factors influence the ability of an organic farm to maintain the organic farming management. The methodological approach has been based on Bayesian Network (BN), which has allowed to integrate quantitative and qualitative data relating to managerial, structural and demographic information, and to provide as a main result a definite probability that any given farmer will maintain, exit or entry organic farm management. This model BN is coupled with the Swiss agent-based model (3300 farms) by using the economic inputs. The aim of the coupling is to establish a dynamic interface of economic and non-economic factors that motivate the conversion or the exit of the organic sector as well as for policy decision-making. The results suggest that the future agricultural policy reforms will make organic farming more attractive for farmers, given the price premiums and the direct payment levels relative to conventional products.

Keywords: organic farming, entry/exit, Bayesian Network, agent-based

Towards sustainable development in Romania

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During the last decades, the dynamics of fast changes bring many concerns regarding the social and environmental risks for the whole society. Demand for natural resources has grown rapidly, exceeding the Earth's long-term capabilities. Biodiversity worldwide and major ecosystems are under pressure from growing larger. Energy consumption continuously increases and poverty continues to affect relevant categories of the population.

To address these challenges, the Sustainable Development Strategy of the European Union (EU SDS), as was established in 2006, expresses a long-term vision of sustainable development, in which economic growth, social cohesion and environmental protection go hand to hand and reinforce each other.

In order to respond in an effective way to the environmental sustainability challenges, an important role can be played by the companies, through proper strategies and operations, i.e. green processes and product development. The main objective of this paper is to answer which are the sectors or areas that encourage the development of green products and how companies support the environmental strategic approaches stated by the EU SDS.

Keywords: sustainable development, green products, environment, strategy, company.

Primary sector and tourism: linking people, places and products

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During the Bit conference (International Tourism Exchange) in Milan on February 2013 a few travels themes came up which highlight consumers' preferences in which it is possible to find, first of all, food & wine and culture which are well connected with the primary sector.

European policies pay attention and value to the primary sector as multi-tasks that could influence the third sector. In fact typical products can be touristic attractions in Greece and in this case in Crete.

The aim of our work is to analyze and show features which are involved in the economy of agricultural and tourism development at the same time.

Keywords: food quality; typical products; know how; agritourism, folk and popular events; European agricultural and tourism policies.

The optimization of agricultural exploitation size in Romania using the Probit model

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Effectiveness of EU sustainability criteria on palm oil-based biodiesel: Literature review and quantitative analysis.

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Since the introduction of countervailing and anti-dumping duties on U.S. exports of biodiesel to the EU in 2009, Malaysia and Indonesia have become major exporters to the EU, both for palm oil-based biodiesel and palm oil. The sustainability criteria introduced by the EU Renewable Energy Directive, including GHG emissions minimum savings and restrictions on types of land used, will likely affect international markets for these products. We argue that these sustainability criteria will be ineffective mainly because of the restrictive methodological approach, the narrow scope of targeted commodities and the lack of consideration of the fact that main vegetable oils are interchangeable for most purposes. The objective of this paper is twofold. First, we thoroughly review the literature on the effectiveness of the sustainability criteria and analyze how these criteria may affect oil palm growing, global markets for biodiesel and vegetable oils and trade relations between Malaysia, Indonesia and the EU. Second, we use the partial-equilibrium agro-economic model CAPRI to quantitatively assess the impacts of the biofuels sustainability criteria. Model results show the slight change in net production of palm oil in Malaysia and Indonesia, how the main vegetable oils are easily interchangeable and how the cheaper vegetable oil fills the gap left by others, questioning the effectiveness of the EU sustainability criteria for biodiesel.

Keywords: biofuels, sustainability criteria, agro-economic modelling, palm oil, Renewable Energy Directive.

Possibilities of creating energy plantations producing woody biomass for use as fuel in Greece

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Energy plantations producing crops rich in sugars, starch or oils have been developed in Europe and worldwide resulting in the production of biofuels like bioethanol and biodiesel. However energy plantations producing woody biomass which can be used via burning for heat generation have not been developed in the same extend. The last few years the price of heating diesel oil in Greece has been increased remarkably and it is quite expensive to day leading many Greeks in energy poverty. As a result many people are trying to substitute heating oil with alternative fuels like wood and wood products. This fact creates the opportunity to develop energy plantations and to produce woody biomass which can be used as fuel for heating buildings. The government can offer various incentives to promote this kind of energy plantations which have many advantages in the era of increased scarcity of fossil fuels. In the current work:

- The process of creating an energy plantation irrigated with treated sewage effluents is presented based on a pilot project implemented in MAICH and supported by E.U.
- The produced woody biomass is estimated and the possibilities of using the trees wood as an alternative fuel are analyzed.
- The possibility of creating such commercial energy plantations is Greece for producing woody fuels alternative to fossil fuels is presented and the advantages for the farmers and the society are also analyzed.

Access of Tunisian Fruits and Vegetables to the European Union market: Potential Impacts of the revision of the Entry Price System¹

Romdhani, A. and B. Thabet²

Despite the publicized movement toward trade liberalization since the creation of the World Trade Organization in 1995, agricultural trade flows continue in actuality to be subject to numerous restrictions of a tariff and non-tariff nature. This is true in general; it is even more striking in the case of fruits of vegetables. These restrictions authorized by national policy makers constitute a bottleneck to the promotion and diversification of the exports of Tunisian fruits and vegetables.

Among the measures restricting the trade of these products, there is the entry price system, which is a complex tool used by the European Union to protect its market of fruits and vegetables and whose components are variable depending on seasons and products.

This work simulates the potential consequences of a possible opening up of the European market borders for fruits and vegetables coming from Tunisia and the rest of the world, following progressive and alternative reduction schemes going to the complete elimination of the entry price mechanism by the EU in this market, particularly its ad-valorem duty dimension.

The proposed tool of analysis is of a partial equilibrium type in the sense that it takes into consideration economics aspects related to the exports of these products, regardless of their various interrelationships with other agricultural and non agricultural commodities.

While following the methodologies proposed by François and Hall and J.M. Alvarez-Coque, this research is original in the sense that it simulates the impacts on period by period basis and takes the seasonality of products into account. It also departs from traditional analyses quantifying impacts on a bilateral basis only.

Hence, the model is made up of a series of behavioral equations describing excess demand and supply of fruits and vegetables of all trading partner blocks and attempts to achieve an "international" market equilibrium between export flows coming from all trading blocks and the excess demand for these commodities of the European Union. Typical products are taken to represent these commodities: tomato, oranges, and peaches. Three trading blocks are assumed: The European Union, Tunisia and the rest of the world³.

The obtained results suggest that the pronounced impacts are concentrated in specific periods, varying from one product to another and from one region to another. In addition to the possible volume gains to be achieved, Tunisia and other countries around the world may also gains in value of the exports. A significant increase in the level of export prices of peaches and tomatoes for Tunisia would follow the liberation process of the European market. The greatest impact on export prices would be for Tunisian peaches with positive relative variations of 14% and 9%, respectively for scenarios of a total removal of protection and a reduction of third in ad-valorem duties. Volumes and prices of local products in the EU would exhibit moderate reductions. Free trade for Tunisia as well as other countries would lead to an insignificant effect on Tunisian exports of oranges, with a decrease of 5% in the prices of oranges during the month of December against a sizeable development of exports (imports by the European Union) coming from the rest of the world.

Key words: Fruits and vegetables, partial equilibrium modeling, excess supply and demand, optimization

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- 1 This one outcome of the WP3 package of the SUSTAINMD/Tunisian project to which all member teams (A. Laajimi, M. Ben SAïd, C. Thabet and J-M Alvarez Coque from the Polytechnic Institute of Valencia (Spain) and S. Mili of the Agrarian Research Center of Madrid (Spain) have contributed.
 - 2 Former Master's student in the Department of Agriculture and food Economics of the National Institute of Agriculture, Tunisia and Professor of Agricultural Economics of the same department, respectively.
 - 3 The resulting optimization model was solved using the software GAMS

Diagnosis and Challenges of the Sustainable Agricultural Development in Egypt

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**The role of the State and private actors in managing
the SPS risk in the fresh produce marketing chains**

Jean-Marie Codron

Sustainable Agriculture and Forestry in Southern Mediterranean Countries: Policy Impacts and Challenges

Kyösti Arovuori, Paula Horne, Matleena Kniivilä, Samir Mili, Perttu Pyykkönen, Javier Martinez-Vega

The main purpose of this contribution is to present an explorative assessment of the impacts of different agricultural and rural policies affecting the sustainability of agriculture and forestry in the project Mediterranean countries. The impacts of different policy programs are evaluated under the available frameworks for sustainability. Three dimensions are recognised when considering sustainability: economic, social and environmental. The sustainability concept brings these dimensions together while there are different factors affecting distinct dimensions.

The first part of the paper provides a brief discussion of different frameworks to tackle sustainable agriculture and forestry, and subsequently defines the factors and indicators relevant in this area. The second and core part presents the qualitative policy impact analysis conducted for the target project countries. A similar analysis is conducted for project MPCs, Turkey Finland and Spain in order to benchmark the suggested qualitative policy analysis framework as well as the impacts of sustainability policies within the EU. Several important specifications are made when conducting the policy impact analysis. First, factors describing the essential elements of each dimensions of sustainability are defined. Second, indicators approximating the development of each factor are profiled. Third, policies impacting the different indicators are reviewed and fixed. Moreover, the relevance and applicability of factors and indicators for analysing sustainable agriculture and forestry in the target countries are highlighted. Last, and very importantly, data are collected according to a predesigned framework. In this regard, attention is drawn on how the lack of data - especially the lack of time-series and regional data, significantly restricts the efficient use of different indicators in some of the target countries.

Agriculture and the evolution of agricultural policies in the Mediterranean Partner countries: Putting the retrospective overview in context with future prospects

Konstadinos Mattas, Konstantinos Galanopoulos, George Baourakis

Agriculture constitutes a crucial element of the national economies of Mediterranean Partner Countries (MPCs) and is particularly the major source of employment in most cases. Given the importance of agriculture not only in terms of economic contribution, but also as a pillar for social cohesion and a key means to addressing two of the major problems that most MPCs have been facing for decades (i.e. high unemployment rates and poverty), national agro-food policy agendas have traditionally relied on intervention, subsidisation and protectionism.

In general, the majority of the MPCs are faced with considerable deficits in external food trade, low self-sufficiency rates even for staple food and a large reliance on food imports. The national agro-food policy agendas that relied extensively on state protectionism (e.g. high levels of duties and tariffs), subsidies and aid to the farmers as well as consumer subsidies for staple goods, had little impact on improving the productivity and competitiveness of the agricultural sector, but instead, distorted producer decisions, generated market inefficiencies and promoted a misuse of scarce natural resources.

This paradigm however, has been changing as MPCs gradually begun liberalising their economies in the recent years, but the adaptation process neither concluded nor will not be an easy one; liberalisation will increase the exposure of domestic sectors to global competition, and given their generally low competitiveness, adaptation to changing market needs remains a question.

Moreover, the unstable political situation in the region, further complicates the analysis; the social turmoil in the last couple of years, fuelled by the 2007/08 food prices crisis which has given rise to social unrest to a number of MPC (mainly Tunisia, Egypt and Syria) and stressed the need for democratic governance and transparency, will have a - yet uncertain - impact on agricultural sectors and the continuation (or not) of these policy reforms.

Within this context, this paper aims at providing a short retrospective overview of the evolution of national agro-food policies in the MPCs, in order to highlight the changes that occurred in the agro-food policy agendas in the recent years. In this respect, some insights to the future evolution of national agricultural policies will also be made.

How Compatible are The Rural Development Policies with Achieving a Sustainable Agriculture in Turkey?

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In the first part of the paper the diagnosed problems of rural economy in Turkey including trade balance degradation, inequalities and rural poverty, degrading natural resources, worrisome demographic trends and migrations and public health concerns will be elaborated basing on the possible sourcing factors underneath. In the second part, a review of sustainable rural development framework will be provided. Main policy framework stands on harmonisation of Turkey's agricultural policies and institutional framework with those of the EU. The integration of environmental concerns and good practices in land management and rural development is expected to be an important part of Turkey's compliance. The recently allocated EU's Instrument for Pre-Accession Assistance on Rural Development sources and national programs to support rural investments are two main tools facilitating Turkey's policy implementation. A sufficient number of foreign-financed implemented regional rural development projects are references of the country to maintain sustainable agricultural production and environmental protection. Rural development policies are designed to ensure social cohesion and competitiveness by increasing the income level of rural communities; to develop human resources in rural areas through expanding training and participatory organisational approach; and to protect environmental and cultural heritage in rural areas. The lack of assessment of rural policies in Turkey may create a handicap in setting the future policy priorities. This study aims to assess the linkage between examples of implemented rural programs and sustainability of agriculture via policy analysis.

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