

[Appraising policies and programmes - An application to European agricultural policy](#)

Key Messages

- The EC Policy Impact Assessment Guidelines (PIA) for preparing policy proposals, (European Commission, 2009) , suggest that risk assessment is based on only one baseline scenario (defined in section 5.3 of the document). However, with a longer term perspective that adaptation requires, problems can occur when a different scenario than projected materializes. We therefore suggest that the entire appraisal and specifically the risk assessment should be carried out based on at least three scenarios, perhaps using the IPCC Shared Socioeconomic Pathways (SSPs).
- In section 9 of the PIA guidance document, ways in which the different options can be appraised are described. These are [cost-benefit analysis](#), [cost-effectiveness analysis](#), and [multi-criteria analysis](#). None of these include a rigorous assessment of policies under uncertainty. We, therefore, suggest combining risk assessment with these three appraisal tools by, for example, integrating into this text descriptions of other appraisal tools, such as [Real Option Analysis \(ROA\)](#), [Portfolio Analysis \(PA\)](#) and [Robust Decision Making \(RDM\)](#) that are already being used in the project appraisal of adaptation options. The stochastic IAM we use in the agricultural policy context incorporates the principles incorporated in these tools and could also be promoted in this regard.
- Given the very detailed and comprehensive list in tables 1-3 of the PIA guidance, on economic, social and environmental impacts, all relevant sectors of society appear to be covered. But as conventional tools may fall short of being able to incorporate the effect of a policy on different sectors, it may again be worthwhile to refer to the possibility of using, e.g. stochastic IAMs to integrate a multi-sector assessment where competing objectives need to be made explicit. We therefore suggest that developing and using such models may be helpful for the appraisal of other complex policies in the face of climate change.
- Although private actors, farmers in the agricultural sector clearly have responsibility for adaptation to climate change, many farmers have imperfect information on climate change impacts and the adaptation options that are available and suitable. This implies that it is important to consider whether the financial means incorporated in current CAP arrangements can be used to provide stronger incentives to farmers to adapt to climate change and therefore to make the agricultural sectors in Europe more climate resilient and less greenhouse gas intensive.

Introduction

Adaptation is more and more recognized to be an important part of any policy, as unavoidable climate change will affect every part of our society. Mainstreaming adaptation in sectoral policies or investment programmes is especially relevant as they involve the flow of substantial funds and will affect the livelihood of many people. To integrate the ability of policies to enhance adaptive capacity, as well as contributing to prior development objectives, is, therefore, essential.

Furthermore, cross-sectoral, rather than narrow sectoral analysis, needs to be a part of an impact assessment that can take into account the cross-sectoral multiple dependencies and objectives. Economic analysis can help examine these linkages.

The following presents an application of the policy-led framework to the appraisal of EU agricultural policies, in particular the Common Agricultural Policy (CAP). The application of the policy-led framework focused on context analysis and the integration of climate data into an economic analysis based on robust decision-making.

Defining the adaptation problem

The case study aimed at assessing which adaptation options lead to synergies between the direct CAP payments for sustainable resource management, climate change mitigation through bio-energy use as well as private and public investment in ecosystem management for adaptation. In particular, it examined how uncertainties may affect decisions for the timing and magnitude of public investment in ecosystem management for adaptation as related to direct CAP payments.

Policy appraisals often concentrate on single measures and single objectives, insufficiently addressing the fact that each single policy can fulfil several objectives, and different policies can enhance or impede each other's objectives. Therefore the case study employed an appraisal methodology which considers several policies at the same time and derives an optimal mix of different policies to reach an anticipated objective.

Assessing the adaptation context

A review of the EU CAP reform was performed to assess the current policy context. Based on a literature study and stakeholder consultation, it scoped out the problems and needs that decision-makers faced with when developing adaptation policies in the context of the CAP reform in order to make the European agricultural sectors more climate resilient.

Adaptation context analysis of the CAP: some key results

- Although the current CAP already has several mechanisms to enhance adaptation and to pay more attention to sustainability and climate resilience, further strengthening of these mechanisms, focusing specifically on proper uncertainties and risks representation and management, should be considered and informed by more substantial monitoring systems.
- The set of options for mainstreaming climate adaptation in the CAP ranges from simple provision of information on climate change and adaptation options in the context of the CAP policies, at one extreme, to a fundamental revision of the CAP mechanisms, at the other extreme. This leads to much larger shares of the CAP payments that are directly related to environmental targets and investments in adaptation.
- Although the rural development and CAP policies aim at fostering a climate resilient agricultural sector in Europe, currently there still is a high risk that despite the large amount of CAP subsidies, or even as a result of these, the agricultural sector is developing in a direction that makes it more vulnerable to weather extremes that may occur under climate change.
- A variety of alternative mechanisms are identified in the CAP that can be used to stimulate and facilitate adaptation including insurance, capacity building, networks, and partnerships. However, currently, it is not clear how the proposed measures will be implemented in practice and whether the speed and intensity of the actions are sufficient to provide the required resilience in the agricultural sector.
- In the context of water quality management, the CAP support may currently lead to developments in manure management, nitrogen leakage, and eutrophication that aggravate existing problems. For this reason, it is important to harmonize the CAP system further with policy areas such as biodiversity conservation, landscape, and water and air quality.
- Although private actors, farmers in the agricultural sector clearly have responsibility for adaptation to climate change, many farmers have imperfect information on climate change impacts and the adaptation options that are available and suitable. This implies that it is important to consider whether the financial means incorporated in current CAP arrangements can be used to provide stronger incentives to farmers to adapt to climate change and therefore to make the agricultural sectors in Europe more climate resilient and less greenhouse gas intensive.

Climate and risk information

A priority area in this case study was to further develop the representation of the climate-yield functions relevant to the modelling exercise. To this end, the literature on the impacts of climate

change on agricultural yields was reviewed, in particular those that have been modelled using crop models and used as an input into economic models.

There was a variety of modeling set-ups adopted in the studies reviewed, the differences including: basic setups (time horizon, spatial resolution, regional setup, sectoral resolution for general equilibrium models); different reported variables, different definitions of these variables (e.g. prices), different baselines; choice of socio-economic scenarios; derivation of biophysical crop yield changes; inclusion of global trade relations and inter-regionally consistent climate change effects on crop yields, and; adaptation assumptions.

The papers in the assessment found that while aggregate effects are relatively small, this masks large regional differences, in particular, more positive effects in Northern Europe and negative effects in Southern Europe are found. Furthermore, effects in the agricultural sector are large compared to other sectors for Northern and Southern Europe. However, the inclusion of international trade effects - as well as explicitly excluding or including adaptation - is decisive for results and can potentially reverse signs regarding output changes.

Option identification, sequencing and prioritisation

Clearly, a sophisticated integrated multi-regional cross-sectoral modelling framework is more likely to be able to undertake such an analysis. This case study explored the potential for the Global Biosphere Management Model (GLOBIOM) - a stochastic Integrated Assessment Model (IAM) - to do this.

GLOBIOM includes climatic and systemic risks of different kinds and security (safety) criteria that enable buffering of various shortfalls, e.g. production and consumption, to meet Food-Energy-Water-Environment Security requirements at regional and global levels, which is important for planning agricultural sustainable development policies. The criteria also included targets and norms on the emission of greenhouse gases, water, and fertilizer utilization norms.

The stochastic GLOBIOM was applied to compare synergies and trade-offs between Pillar II structural policy measures (costly, often irreversible, that can imply high sunk costs and lock-in situations, e.g. investments in irrigation systems, food/feed storage capacities) and non-structural Pillar I measures (measures that can be reversed or adjusted for on short notice, such as payments per hectare) in the CAP. The approach minimizes total costs of the decisions providing policy makers with flexibility for revising the measures in light of newly acquired knowledge about uncertainties.

Strong synergies and trade-offs between Pillar I and Pillar II, non-structural and structural measures, were found. In some regions, the introduction of rather moderate grain storages can not only increase adaptive capacity towards climatic shocks, but also decrease water demand, save investments into irrigation expansion, stabilize profits and thereby decrease the demand for income support. Agricultural policies have to account for the risk exposure of the location and the potentials of the location to adapt. Implementation of agricultural reforms in one region can affect other regions. Thus, introduction of CAP measures, in particular, changing structure of CAP subsidies from coupled to direct payments, can lead to subsidizing free riders, decrease incentives for investments in long-term structural adaptation, cause a decrease of "self-sufficiency", an increase of import dependence, changes in trade balance and market structure, an increase in market risks, a decrease in food security, and socio-economic instabilities.

The stochastic GLOBIOM provides insights regarding robust distribution of subsidies based on location-specific risk-exposure, profitability and security indicators. Under a scenario of robust subsidies combined with storage facilities, the demand for irrigated area can be decreased by about 6% compared to the case without storages.

Assessing adaptive capacity

Adaptive management is the process of regularly adapting policy responses in view of new knowledge and experience. Policy measures can, in some cases, stimulate adaptive responses to climate change risks and strengthen overall resilience. Key elements to strengthen adaptive management include: (1) polycentricity of governance structures, (2) functional networks and cooperation, (3) access to information and elicitation, and (4) opportunities for learning.

[More information on the application of the framework here.](#)

Financing, programming and implementation

Results indicate the need to pay particular attention to the differences and synergies between the measures of the two CAP pillars. While independent deterministic evaluation of measures can result in ineffective distribution of CAP funds, the coherent analysis of dependencies and trade-offs leads to more effective adaptation. It has been shown that different payments schemes lead to different outcomes in terms of increasing demand and cropping area for some regions and crops, whereas they lead to a decrease for other regions and crops. Moreover, effects differ when analyzing direct payments alone or together with other policy measures such as storage capacities. The clearest example here is the demand for irrigated land. The demand for irrigated land reduces when direct payments and storage facilities are provided. Hence, different policy measures may act as substitutes in different regions.

Moreover, explicit treatment of uncertainties and risks for robust adaptation strategies saves considerable maladaptation and sunk costs compared with investments into adaptation projects appraised using scenario-by-scenario deterministic analysis of alternative climatic scenarios, in this case yield shocks. For example, decisions evaluated with respect to a single shock scenario, e.g. average yield scenario, can substantially underestimate land demand as well as production technologies, able to hedge production risks in extreme scenarios. By taking into account the variability of yields, the stochastic GLOBIOM identifies the portfolio of land uses and technologies required to hedge the risks and leave the society better-off regardless of what shock scenario occurs.

Bibliography

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Econadapt insights

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[Adaptive Management of Rural Land Use Systems: the Common Agricultural Policy](#)

[Stochastic modelling for robust decision-making: The Common Agricultural Policy](#)

[Integrated uncertainties and risk management for robust decision making](#)

[Uncertainties and causes of uncertainties in climate change adaptation](#)

[Uncertainties and risk analysis in climate change adaption](#)

[Sourcing and using climate information for economic assessments of adaptation](#)