Common Agricultural Policy Regionalised Impact - The Rural Development Dimension

Reporting

Project Information

CAPRI-RD

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Coordinated by
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Germany

Final Report Summary - CAPRI-RD (Common Agricultural Policy Regionalised Impact - The Rural Development Dimension)

Executive Summary:
The Common Agricultural Policy Regionalised Impact – the Rural Development Dimension (CAPRI-RD) project developed and applied an operational, Pan-European tool including all Candidate and Potential Candidate countries to analyse the regional impacts of all policy measures under CAP Pillar I and II across a wide range of economic, social and environmental indicators, aligned with the CMEF. CAPRI-RD's core contains consistently linked economic models at the NUTS 2 level: the CAPRI model for agriculture, and a newly developed layer of regional CGEs. Given the importance of the EU's agricultural trade, CAPRI includes a global agricultural market model. The project improved price transmission modelling inside the EU market, reviewed the implementation of de-coupled payments, and maintained the CAPRI farm type layer. Harmonised and regularly updated databases, including regional Social Accounting Matrices, act as

the models' sources. Quality management for data and results is ensured by clearly documented procedures that are partly based on statistical methods and sensitivity analysis. Spatial down-scaling algorithms break down land use results to 1x1 km grid cells to facilitate the spatially explicit calculation of environmental impacts. During the project's lifetime, CAPRI-RD was improved and expanded stepwise. That enabled an annual policy impact assessment of scenarios defined in close cooperation with Commission services, and allowed contributions to be made to the yearly DG-AGRI outlook work. Further, yearly training sessions developed the necessary capacity in the European Research Area to successfully apply CAPRI-RD during and after the project. A Graphical User Interface (GUI) allows scenarios to be defined, the model to be steered, and the results to be explained through tables, graphs and maps. Dissemination activities included the distribution of reports, model documentation, GUI, code and data via the internet.

Project Context and Objectives:

The core objective of the CAPRI-RD project was the development of a Pan-European operational tool for regional and spatial policy impact analysis of the CAP with regard to Rural Development Indicators. The tool was be developed by extending and improving the regionalised partial equilibrium model for agriculture, CAPRI (Common Agricultural Policy Regionalised Impact model). Extension and improvement related to four aspects:

Firstly, the expansion of CAPRI to all Candidate and Possible Candidate Countries; a review of certain aspects of the model as price transmission inside the expanding EU; implementation of the latest CAP Pillar I reform steps, including decoupled payments, reformed market interventions and systematic quality management for its databases, projection and scenario results.

Secondly, a layer of regional Computable General Equilibrium Models (CGEs) based on the RegFIN (Regional Finnish CGE model) for all NUTS 2 regions of the EU was developed and linked transparently to CAPRI in order to allow and improve analysis of Rural Development (RD) measures that target primary factors and non-agricultural activities, and capture backward and forward linkages of agricultural activities.

Thirdly, existing databases on Pillar II (RD) measures were integrated in a systematic manner, and interfaces to CAPRI and CGEs were developed to allow impact assessment.

Fourthly, based on Common Monitoring and Evaluation Framework (CMEF – Commission Regulation No 1974/2006 Annex VIII), indicator factsheets and calculators were developed and operationally integrated into the tool to allow for forward looking impact assessment of CAP Pillars I and II, agro-food trade regulations and other policies targeting agriculture and rural regions.

The various components are integrated in a common IT framework, including a Graphical User Interface (GUI) that allows the definition of scenarios, model runs and result exploitation. The tools thus allow analysis in one consistent framework building on micro-economic theory impacts of CAP Pillars I and II, of changes in markets or border protection for a wide range of economic, social and environmental indicators.

The project mainly targeted stakeholders at the European and national/regional level who design and evaluate the CAP according to the Pan-European character of the tool and the specifics of the call text. The tool allows stakeholders to access indicators and scenario results via an improved version of the CAPRI GUI. The exploitation possibilities of the GUI (tables, graphs, maps) can be used directly by stakeholders such as DG-AGRI, DG-ENV, DG-REGIO, the European Environmental Agency, and industrial or farming groups. Alternatively, analysts e.g. at the EU's Joint Research Centre or at other research institutions, apply the tool for policy impact analysis, retrieve key results via the GUI and prepare stakeholder reports based on those results.

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With the second user group at the regional level the tool was tested also for different policy relevant questions as mid-term and ex-post rural development programmes evaluation. Special attention was given for the testing of the model for pre-accession policy relevant for IPA RD instruments as well as for the accession impact analysis regarding I. and II CAP Pillars for selected candidate and potential candidate countries.
Close interactions with stakeholder groups at Pan-European and at national/regional level) ensured that all relevant policy instruments are covered by the tool and that indicator calculators match stakeholder expectations. The users of the tools are identified as research teams that possess a strong background in quantitative modelling the agricultural sector, as well as lengthy experience in Pan-European and global policy impact assessment. These teams map scenarios defined by stakeholders into the language of the economic models, and then run the models in a consistent manner to generate the indicators used for policy impact assessment.
Dissemination activities targeted both established and potential clients and users of such a Pan-European tool. The current users are partners in the CAPRI-network and include JRC/IES, JRC/IPTS, DG-AGRI and selected national/regional ministries responsible for RD measures. Yearly training sessions, which will also be open for researchers and/or institutions not yet working with CAPRI, presented changes in the system

and provided hands-on training of the CAPRI-RD modelling system. As in the past for CAPRI, the training sessions also placed researchers from JRCs and desk officers from political DGs in a position to exploit the results from the database and scenario analysis.
The CAPRI-RD project tested and validated the proposed tool on a regular basis during its lifetime. This procedure has been applied successfully since 1999 for various research projects centred on CAPRI and has proven useful. The project therefore included annual updates of database time series, annual development of a baseline and annual applications of the enlarged CAPRI(-RD) modelling system. The aim of this is threefold:
Firstly, the procedure ensured that for the duration of the project, an operational and validated CAPRI(-RD) modelling system was always available for the CAPRI(-RD) network, including the EU Commission.
Secondly, new or improved portions of CAPRI-RD that became operational during the project's lifetime had been integrated into the CAPRI system and made available to the network of CAPRI(-RD) users. Thus, the results could already be exploited during the project's lifetime.
And thirdly, the procedures involved in the application process, from database updates over projection to scenario definition and model application (including their IT implementation and documentation) were tested in real-world applications, and can then refined in further stages of the project. This was especially important for the indicator calculators: clients were able to review, validate and, when appropriate, use the new indicators once they became operational.
The project emphasised the integration of databases, models, indicators and IT. The project successfully developed a system which could be updated and kept operational beyond the lifetime of the project; also, the project's components were designed for transparent integration. The economic models are thus structured so that they are sourced by harmonised databases of a Pan-European scale, wherever possible available at EUROSTAT. The indicators are to the result sets generated by the models. The existing CAPRI IT infrastructure was improved and expanded to host the various CAPRI-RD components.
As specified in the call text, the project has built upon CAPRI as a regionalised EU agricultural economic model. As required, CAPRI covered already the EU27 plus Western Balkan countries as at the NUTS 2 level, whereas expansion to Turkey as well as a systematic review of data for the Western Balkans was part of the project, in order to cover all Candidate and Potential Candidate Countries. Adapting to the need of Rural Development policy modelling was achieved based on two complementary methodologies. The

of Rural Development policy modelling was achieved based on two complementary methodologies. The first one developed economic models at the regional scale following the concept of CGEs, which cover all economic activities, including primary factor markets. That expansion mirrors the fact that many RD measures under Pillar II target sectors of the rural economy other than agriculture, and that farming has strong backward and forward linkages in rural regions. Variations in agricultural activities driven by policy and market changes thus impact other sectors of the rural economy, and those impacts need to be taken into account when analysing regional policy effects. The second methodological advance consisted of the integrated and interlinked development of a database for CAP Pillar II and its interfaces to the economic models, as well as appropriate indicator calculators based on the CMEF. Thirdly, simulations in CAPRI are based on the CAPRI farm type layer, which breaks down each NUTS 2 region in up to 10 farm models which are currently based on a typology that takes farm specialisation and size into account. The typology was reviewed in the context of the project according to its suitability for RD impact assessment.
As required in the call text, instruments from Pillar I, including Cross-Compliance and GAEC, and measures from Pillar II impacting farm management decisions were, as far as possible, be implemented in CAPRI where missing. Given the project's Pan-European perspective, the implementation was based on a classification of the various measures based on attributes stored in Pan-European databases. In order to

highlight the respective pros and cons of case-specific evaluations based on detailed knowledge of the measures and regional or national databases (which, however, often lack stringent quantitative analysis), for selected regions the project compared the results simulated with CAPRI-RD for selected measures with their evaluation by regional teams.
Since 2001, the EU directive 2001/42/EC on Strategic Environmental Impact Assessment and the subsequent communication COM(2002)/276, as well as the impact assessment guidelines (SEC(2005) 791) have ensured that the economic, social and environmental consequences of certain plans and programmes are identified and assessed during their preparation and before their adoption. Compared to the ex ante evaluation of policy alternatives regarding their economic and budgetary effects only, as was often done in the past, assessing the likely environmental and social effects of a policy option or policy programme requires analysing results in their spatial context and in appropriate, often physical units. This is especially true for the reshaped CAP, which is focused along the three pillars of sustainability. Cross-compliance and GAEC as part of Pillar I, as well as Axis 2 of Pillar II, target the manifold interaction between agriculture, land use and the environment. At the same time, the reform of the Common Market Organisation fosters the integration of European farming into global markets.
RD measures under CAP Pillar II are integrated in the overall concept of RD and target not only agriculture, but also other sectors and impacts via forward and backward linkages with economic activities in other sectors. The feedback and indirect effects of a certain policy measure are usually as important as the direct effects. Especially in rural areas, the small sector assumption applied in Partial Equilibrium Models cannot be maintained. CAPRI-RD therefore developed a coherent and transparent link between a specialised sector model for agriculture and CGEs at the regional scale. In addition to their ability to define appropriate environmental pressure indicators, the specialised model for agriculture describes CAP policies in sufficient detail so as to allow the evaluation of sectoral policies such as the Nitrate Directive or Cross Compliance under the CAP; this is difficult to achieve with other approaches, such as CGEs. On the other hand, the multi-sectoral character of the CGEs is needed to represent all economic activities relevant to regional and rural development which are targeted e.g. by Axis 3. It was thus the most promising way to adapt the model to the needs of Rural Development policy modelling.
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CAPRI-RD. That implied the necessary structural development of the models to allow for interfacing, their consistent integration into a common software platform, their implementation for all EU Member Countries, plus all Candidate and Potential Candidate countries at the regional scale, and the development of methodologies for iterative linkage. The NUTS 2 breakdown of the economic models allows major economic impacts of CAP and rural development policies to be simulated at an appropriate regional resolution.

Evaluating Community policies, especially regarding their environmental impacts, requires an appropriate spatial context as they depend on local factors such as soil, climate and landscape characteristics or habitat boundaries. Accordingly, a second important step in CAPRI-RD linked the regional level of administrative NUTS 2 units as found in the agricultural sector model with a spatial data layer at a 1x1 km pixel resolution at the Pan-European scale, based on the application and combination of a simple land use change model with statistical downscaling.

An important general contribution of CAPRI-RD was the development of a methodology for common baselines of all models in CAPRI-RD which describe plausible, consistent developments in the various sectors and in land use cover up to a final simulation year, including the effects of policies already decided upon according to current law. The CAPRI-RD tool allows the definition of ex ante policy scenarios –

changes relative to baselines – and thereby facilitates impact assessments based on the extended and improved CAPRI modelling system; it also calculates indicators based on the CMEF using an appropriate spatial resolution, and thus is partly based on a spatially dis-aggregated result layer at 1x1 km resolution. A GUI allows the user to steer those working steps and exploit the results via interactive tables, graphs and maps.

A major part of the CAPRI-RD project dealt with the classification of RD measurements in general, and the measure under Pillar II specifically regarding their economic impact and their impact assessment in economic models. This work was closely related to a systematic scan of available data on the implementation of Pillar II measures. Accordingly, a database was developed where the different measures and programmes are stored inter alia according to their economic model interfaces. For example, a farm investment programme is linked to the price of capital for agriculture in the CGE.

As mentioned above, the CAPRI-RD project dealt with integrating CAPRI with a layer of regional CGEs based on RegFIN. The specific aim was to develop methodological solutions, clear interfaces and a technical infrastructure that allow a link to be made between different existing components at the regional level. Hence, the sustainable development, maintenance and application of those components, as well as that of the overall CAPRI-RD tool, are now possible. The use of specialised agricultural sector models is motivated by the annexes to the impact assessment guidelines on page 23: “The strength of sectoral models is that they focus only on one economic sector and thus enable a relatively high degree of dis-aggregation and a detailed representation of the specific economic and institutional factors.” Their main disadvantage, the missing links with other sectors of the economy, is now addressed by Computable General Equilibrium at NUTS 2 level for whole of Europe. This greatly enhances the potential of quantitative impact assessment for policies targeting the non-agricultural part of the economy, and furthermore allows analysis of both backwards and forwards linkages between economic activities at the regional scale. Based on the consistent description of income generation and distribution, the CGEs deliver important economic and social indicators at the regional level. As stated in the annexes to the impact assessment guidelines on page 23: “The strength of CGE models is their internal consistency; i.e. they allow for consistent comparative analysis of policy scenarios by ensuring that in all scenarios the economic system remains in general equilibrium (however, extensions to model market imperfections are possible). They integrate micro-economic mechanisms and institutional features into a consistent macro

possible). They integrate micro-economic mechanisms and institutional features into a consistent macro-economic framework and consider feedback mechanisms between all markets. All behavioural equations (demand and supply) are derived from microeconomic principles."
Methodologies are now developed that link, in a sound scientific manner, CAPRI and the newly-developed layer of CGE models. This part of the project has built upon experience gathered in SEAMLESS, SENSOR, and CAPRI-Dynaspat and focused on consistent iterative calibration techniques of partial and multi-sectoral models (agriculture sector models, CGE). Further, it technically integrates the various existing components. This kind of linkage goes beyond the work in SEAMLESS and SENSOR – where only agricultural activities are modelled at the regional scale, and interaction with other economic sectors is restricted to higher regional scales. As far as structural changes to existing components are necessary, CAPRI-RD will develop solutions ensuring that those components can still be used independently from each other. The same holds for the regional layer of CGE models, which can also later be used independently from the other regional models.
Access to the CAPRI databases, GAMS code, the GUI and documentation, as well as publicly available model results are organised via an SVN server hosted by UBONN. SVN is a Software Versioning System allowing the development of the system and its database in a distributed network. Users can download a

local copy to work with, and then make automatic incremental updates to keep their local copy up-to-date. During the project's lifetime, an on-line documentation system for the code base of CAPRI was developed and linked to the methodological documentation, which will also be converted into a suitable online format. CAPRI-RD project has thus successfully developed an integrated Pan-European operational tool, based on sound scientific methodologies, tested and validated for ex ante scenario-driven policy impact analysis of CAP Pillars I and II regarding the different pillars of sustainability, from national to a 1x1 km grid level.

Project Results:
As specified in the call text, the project has built upon CAPRI as a regionalised EU agricultural economic model. As required, CAPRI covered already the EU27 plus Western Balkan countries as at the NUTS 2 level, whereas expansion to Turkey as well as a systematic review of data for the Western Balkans was part of the project, in order to cover all Candidate and Potential Candidate Countries. Adapting to the need of Rural Development policy modelling was achieved based on two complementary methodologies. The first one developed economic models at the regional scale following the concept of CGEs, which cover all economic activities, including primary factor markets. That expansion mirrors the fact that many RD measures under Pillar II target sectors of the rural economy other than agriculture, and that farming has strong backward and forward linkages in rural regions. Variations in agricultural activities driven by policy and market changes thus impact other sectors of the rural economy, and those impacts need to be taken into account when analysing regional policy effects. The second methodological advance consisted of the integrated and interlinked development of a database for CAP Pillar II and its interfaces to the economic models, as well as appropriate indicator calculators based on the CMEF. Thirdly, simulations in CAPRI are based on the CAPRI farm type layer, which breaks down each NUTS 2 region in up to 10 farm models which are currently based on a typology that takes farm specialisation and size into account. The typology was reviewed in the context of the project according to its suitability for RD impact assessment.
As required in the call text, instruments from Pillar I, including Cross-Compliance and GAEC, and measures from Pillar II impacting farm management decisions were, as far as possible, be implemented in CAPRI where missing. Given the project's Pan-European perspective, the implementation was based on a classification of the various measures based on attributes stored in Pan-European databases. In order to highlight the respective pros and cons of case-specific evaluations based on detailed knowledge of the

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Building a coherent link between these different economic models was therefore an important objective of CAPRI-RD. That implied the necessary structural development of the models to allow for interfacing, their consistent integration into a common software platform, their implementation for all EU Member Countries, plus all Candidate and Potential Candidate countries at the regional scale, and the development of methodologies for iterative linkage. The NUTS 2 breakdown of the economic models allows major economic impacts of CAP and rural development policies to be simulated at an appropriate regional resolution.

Evaluating Community policies, especially regarding their environmental impacts, requires an appropriate spatial context as they depend on local factors such as soil, climate and landscape characteristics or habitat boundaries. Accordingly, a second important step in CAPRI-RD linked the regional level of administrative NUTS 2 units as found in the agricultural sector model with a spatial data layer at a 1x1 km pixel resolution at the Pan-European scale, based on the application and combination of a simple land use change model with statistical downscaling.

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Methodologies are now developed that link, in a sound scientific manner, CAPRI and the newly-developed layer of CGE models. This part of the project has built upon experience gathered in SEAMLESS, SENSOR, and CAPRI-Dynaspat and focused on consistent iterative calibration techniques of partial and multi-sectoral models (agriculture sector models, CGE). Further, it technically integrates the various existing components. This kind of linkage goes beyond the work in SEAMLESS and SENSOR – where only agricultural activities are modelled at the regional scale, and interaction with other economic sectors is restricted to higher regional scales. As far as structural changes to existing components are necessary, CAPRI-RD will develop solutions ensuring that those components can still be used independently from each other. The same holds for the regional layer of CGE models, which can also later be used independently from the other regional models.

Potential Impact:
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modelling the agricultural sector, as well as lengthy experience in Pan-European and global policy impact assessment. These teams map scenarios defined by stakeholders into the language of the economic models, and then run the models in a consistent manner to generate the indicators used for policy impact assessment.
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List of Websites:
http://www.ilr.uni-bonn.de/agpo/rsrch/capri-rd/caprird_e.htm

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