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**COMBINING NON-MODELLING AND MODELLING
APPROACHES FOR THE EVALUATION OF RD POLICY:
STUDY OF THE IMPACT OF MODULATION AS A POLICY
INSTRUMENT**

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Abstract

Two separate, but interlinked methodological approaches – the modelling approach and non-modelling approach – have been used in a study commissioned by DG Agriculture and Rural Development to understand the impact of Modulation. In these two approaches a range of methodological and analytical tools are used.

Some of these tools offer projections, others, such as the case studies, provide insights that are context-specific, whilst others provide information on impacts that can be compared across the EU-27. Individually they do not provide a comprehensive picture of the full range of impacts arising from different modulation scenarios. However, the methodology has been developed in such a way so that the data generated from these different approaches is complimentary and may be triangulated. This means that the results from different methodological tools can be cross-checked and validated.

1. Modulation as a policy instrument

The term ‘modulation’, was first used in relation to the Common Agricultural Policy (CAP) during the 1992 McSharry Reforms, and related to a proposal to impose a ceiling, or cap, on the amount of subsidy that an individual farmer could receive from the CAP. During the Agenda 2000 CAP reform, the meaning of modulation changed. The term was used to describe a policy mechanism for shifting funding from the part of the CAP budget dedicated to providing income support payments to farmers (Pillar 1) to the newly introduced rural development regulation¹, known as Pillar 2. At the time there was little support for such a mechanism being introduced on a compulsory, EU wide basis, and the final agreement resulted in ‘voluntary modulation’ being introduced, giving Member States the option to redirect up to a maximum of 20 per cent of Pillar 1 funds² to their rural development programme (RDP) budgets.

The Mid Term Review of the CAP in 2003 initiated a shift away from support for agricultural production along with a greater emphasis on sustainability, the environment and rural development. Amongst a number of fundamental changes to the operation of Pillar 1 funds, an agreement was reached that made modulation a compulsory policy mechanism for all EU-15 Member States to implement, with later obligations for the new Member States.

The legal basis for this, current, form of modulation, was laid down in Article 10 of Council Regulation (EC) No 1782/2003 of 29 September 2003, which specified that all farms within the current EU-15 would be subject to compulsory modulation from 2005 at levels of 3% in 2005, 4% in 2006 and 5% for 2007-2012, and that these resources would be allocated between Member States according to a set of objective criteria to be spent on rural development measures. Compulsory modulation does not apply to the twelve new Member States that acceded to the EU in 2004 and 2007 until their Pillar 1 payments reach the same level as those for the EU-15. This will be 2013 for the EU-10, and in 2016 at earliest for Bulgaria and Romania. Compulsory modulation does not apply to the French overseas departments, Azores and Madeira, or the Canary or Aegean Islands.

2. Methodology of the study on the impact of modulation³

The methodological approach that has been taken to understand the impact of modulation is based on several different types of analysis, which can be divided into two broad categories: a modelling approach and a non-modelling approach. The modelling approach allowed for results to be generated on impacts across the EU-27, and for simulations of the likely changes of these impacts under different rates of modulation, while the non-modelling approach allowed for more qualitative, context specific insights into the impacts of modulation to be made. The use of models also permitted an exploration of any differences that might emerge from changes to rules

¹ Council Regulation 1257/1999 of 17 May 1999 on support for rural development from the European Agricultural Guidance and Guarantee Fund (EAGGF) and amending and repealing certain Regulations.

² The legal basis for voluntary modulation was set out under Article 4 of Council Regulation 1259/99

³ Contract N° 30-CE-0162480/00-47 of the Directorate General for Agriculture and Rural Development with LEI and IEEP: http://ec.europa.eu/agriculture/analysis/external/modulation/index_en.htm.

relating to franchise levels, co-financing requirements, or allocation of funds within Pillar 2 to specific measures, albeit based on a set of generalised assumptions.

It is not possible to accurately assess the impacts of particular measures independently of the context within which they operate and the specific way in which the measures are implemented (i.e. eligibility criteria, targeting etc). For this reason, it is not possible for the models to capture the full complexity of the actual situation, particularly in relation to the redistributive effects of compulsory modulation through Pillar 2. The non-modelling element of the study is, therefore, essential to understand and fully take account of the variety of responses to modulation across the EU-27 Member States and to try and derive as full a picture as possible of what is happening on the ground, particularly in order to be able to evaluate the social and environmental impacts of the redistribution of money between farm types, regions and countries. The overall approach therefore comprises both quantitative and qualitative tools.

Non-modelling Approach

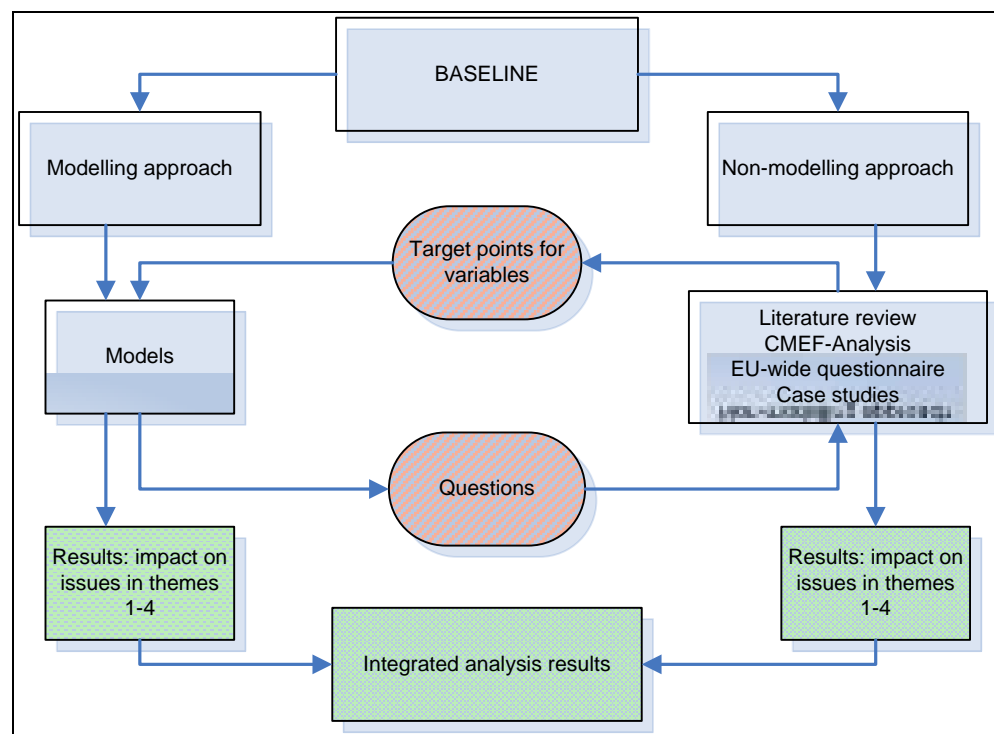
- Literature Review: this looks at existing literature on the implementation of modulation and its impacts as well as the social, economic and environmental impacts of rural development measures. This allows assumptions regarding the impact of specific measures to be formulated, and these assumptions are then qualified for the specific national/regional context through the case study interviews.
- Case Studies carried out in eight Member States (Finland, France, Germany, the Netherlands, Poland, Portugal, Slovenia, United Kingdom), gathering information from national literature, assessments of the 2007-2013 RDPs and semi-structured interviews with key officials and stakeholders;
- Questionnaires carried out by telephone interviews in the 19 Member States in which case studies were not conducted;
- CMEF Indicators – collation of information on output, result and impact indicators for the case study Member States

Modelling Approach:

- Budget model, tailor made for the project, provides much of the financial detail that is specific to the study,
- A suite of economic models (LEITAP, ESIM, CAPRI and FES) to assess the economic and sectoral impacts
- Dyna-CLUE, a land-use model, allows the results from the economic models to be disaggregated spatially

Some of these tools offer projections, others, such as the case studies, provide insights that are context-specific, whilst others provide information on impacts that can be compared across the EU-27. Individually they do not provide a comprehensive picture of the full range of impacts arising from different modulation scenarios. However, the methodology has been developed in such a way so that the data generated from these different approaches is complimentary and may be triangulated. This means that the results from different methodological tools can be cross-checked and validated. The integration of the two approaches is further described in Figure 1, in order to provide a comprehensive analysis of the 4 study themes: (1) distribution and budget, (2) farm structure, (3) socio-economic effects (competitiveness, farm income, employment, quality of life) and (4) environment.

Figure 1: Schematic presentation of the methodology



Questions from modellers are incorporated in the non-modelling and in return comes target points and information to create sound assumptions in the models. The results of the two tracks are then integrated in the analysis.

2.1 Non-Modelling Approach

It is not possible to accurately assess the impacts of particular measures independently of the context within which they operate and the specific way in which the measures are implemented (i.e. eligibility criteria, targeting etc). For this reason, it is not possible for the models to capture the full complexity of the actual situation, particularly in relation to the redistributive effects of compulsory modulation through Pillar 2. The non-modelling element of the study is, therefore, essential to understand and fully take account of the variety of responses to modulation across the EU-27 Member States and to try and derive as full a picture as possible of what is happening on the ground, particularly in order to be able to evaluate the social and environmental impacts of the redistribution of money between farm types, regions and countries. The approach comprises both quantitative and qualitative tools as set out below.

1. A Literature Review: this looks at existing literature on the implementation of modulation and its impacts as well as the social, economic and environmental impacts of rural development measures. This allows assumptions regarding the impact of specific measures to be formulated and these assumptions are then qualified for the specific national/regional context through the case study interviews. It should be noted, however, that the most recent official evaluations on Pillar 2 expenditure remain the mid-term evaluation reports of the 2000-2006 RDPs as the *ex post* evaluations are not due to be completed until December 2008. The availability of quantified data on the impacts of particular measures is variable, and generally limited, within these evaluations, and this means that evidence on the impacts of

specific measures is limited. Where new measures have been introduced in a Member State for the 2007-2013 programming period, or the targeting of a particular measure has changed, this makes the assessment more difficult and in these situations, where it has been possible to access these, information from the 2007-13 RDP *ex ante* evaluations and Strategic Environmental Assessments has been reviewed.

2. A standardised telephone interview with non case study Member States: Because of the variations in policy response to modulation across Member States, particularly in relation to the design of their 2007-2013 Rural Development Programmes, and the importance of the link between the way in which EAFRD is implemented and impacts on the ground, it is important to obtain as full a picture as possible of the different policy responses across the EU-27. EU telephone interviews were, therefore, carried out with key officials responsible for the development of the current RDPs in 19 Member States (other than the case study countries, for which the questionnaires are integrated in the case study protocol), to collect information on the way in which increased funds within the Pillar 2 budget have influenced the structure and design of Rural Development Programmes, particularly in terms of the way in which the additional funds have been distributed between the different Axes and measures. Specifically, some of this information will feed into the budget model to help achieve more accurate projections of how additional compulsory modulation funds might be distributed within Axis 2 under higher compulsory modulation rates. The information gathered also allows us to compare different Member States' approaches to the use of compulsory modulation in a more qualitative way, and provides useful contextual information against which we can assess whether or not the case study information is representative of broader patterns of use, or very specific to a particular Member State.

3. Case Studies: Eight case studies (Finland, France, Germany, the Netherlands, Poland, Portugal, Slovenia and the UK) were undertaken to a much more in-depth analysis of the operation of compulsory modulation (and voluntary modulation in the cases of the UK and Portugal) to date, and the impacts that both the reductions in Pillar 1 payments and the increased availability of funds through Pillar 2 have had in relation to the full range of study themes. The case studies, through a detailed assessment of national literature, the Rural Development Programmes, and semi-structured interviews, are the main source of information for understanding the impacts and added value of redistributing compulsory modulation through Pillar 2 measures as these impacts are in large part dependent upon the way in which the EAFRD is implemented within a particular Member State, and as such are more difficult to model.

As far as possible, the case studies attempt to collate empirical data that can be fed through into the models and the indicator analysis. However, one of the key values of the case studies is the contextual information that they provide to enable a commentary to be made on the outputs of the models and the indicator analysis that is based on the detailed situation for eight different Member States. Providing this contextualised commentary on the impact of compulsory modulation in relation to all the study themes, both within the context of the two modulation scenarios being considered and the outputs of the sensitivity analysis, will be the main way in which the case study information will be used.

Part of the Case studies was also to investigate the redistribution between farm types to determine who will gain and who will not gain. In Figure 2, the framework for this assessment is presented.

Figure 2: Analytical framework for assessing the redistributive effects of compulsory modulation between Pillar 1 and Pillar 2 at the level of the beneficiary

Unaffected <ul style="list-style-type: none"> • No P1 reduction • No P2 payment 	Outright winners <ul style="list-style-type: none"> • No P1 reduction • P2 Payment
Losers <ul style="list-style-type: none"> • P1 reduction • (a) Ineligible for P2 • (b) Less P2 than P1 • (3) Already maximum 	Net winners <ul style="list-style-type: none"> • P1 reduction • P2 payment <ul style="list-style-type: none"> ○ Neutral ○ Positive

4. Common Monitoring and Evaluation Framework (CMEF) indicator analysis. The CMEF indicators provide the main source of non-modelled quantitative information on the outcomes of the measures within Pillar 2. The collection of data on the input, output, result and impact indicators has been collected from the RDPs of the case study countries. While it had been hoped that it would be possible to compare data from all RDPS, this did not prove possible, within the timeframe of this study, as the way in which the indicators are reported within individual RDPs is very variable. The different types of CMEF indicators for which data is collected is set out in Table 1.

The information given is prospective, rather than actual. The data needs to be treated with some caution as the figures are estimates against which success of the programmes will be measured, and may have been influenced to some degree by political considerations.

In order to derive the impact of the use of modulation funds within the second pillar using the CMEF indicators, a series of calculations based on a number of assumptions are made. Firstly, the increase in the second pillar budget due to modulation funds is taken from the budget model for each Member State or region. Secondly, an assumption is made that each euro of input has the same output, and the total anticipated value of the CMEF output or result indicator attributed to modulation is therefore proportional to the contribution modulation makes to the RDP budget. Thirdly, in order to assess the magnitude of the anticipated output in the RDP, we express the total output and the supported units due to modulation as share of a benchmark value, for example, the number of supported farmers relative to the total number of farmers in the country, or number of supported hectares as a proportion of UAA.

Assessing the contribution of modulation to the values given for the impact indicators is less straightforward. As the impact indicators are overarching, the direct relation between the individual measures and impact is impossible to determine – it is the combined effects of the results over all measures that leads to changes in the impact indicators. This complicates the quantification of the contribution of the modulation funds to the impact indicators and it cannot be calculated in the same way as with the output and result indicators. Therefore, we give a qualitative assessment of the contribution of modulation funds to the impacts of the RDP, based on the findings in the previous steps.

Table 1: Overview of indicators for assessing the impact of the Rural Development Programmes

Indicator	Description	Level
Input	These refer to the budget or other resources allocated at each level of the assistance. <i>Example: expenditure per measure declared to the Commission.</i>	Measure
Output	These measure activities directly realized within programmes. <i>Example: number of training sessions organized, number of farms receiving investment support, total volume of investment.</i>	Measure
Result	These measure the direct and immediate effects of the intervention. They provide information on changes in, for example, the behaviour, capacity or performance of direct beneficiaries and are measured in physical or monetary terms. <i>Example: gross number of jobs created, successful training outcomes.</i>	Axis
Impact	These refer to the benefits of the programme beyond the immediate effects on its direct beneficiaries both at the level of the intervention but also more generally in the programme area. They are linked to the wider objectives of the programme. They are normally expressed in “net” terms, which means subtracting effects that cannot be attributed to the intervention (e.g. double counting, deadweight), and taking into account indirect effects (displacement and multipliers). <i>Example: increase in employment in rural areas, increased productivity of agricultural sector, increased production of renewable energy.</i>	Rural Development Programme

Source: European Commission (2006), *Handbook on Common Monitoring and Evaluation Framework; EU Rural Development 2007-2013*; Brussels, DG for Agriculture and Rural Development, Draft guidance document, Version 2.

2.2 Modelling Approach

The first tool in the Modelling Approach is the development of a budget model, which calculates the budgetary impacts of the modulation process by Member State, both in terms of the reductions in Pillar 1 direct payments, and the contribution of modulation to the EAFRD budget (Figure 3).

Figure 3: Budget model at the national level

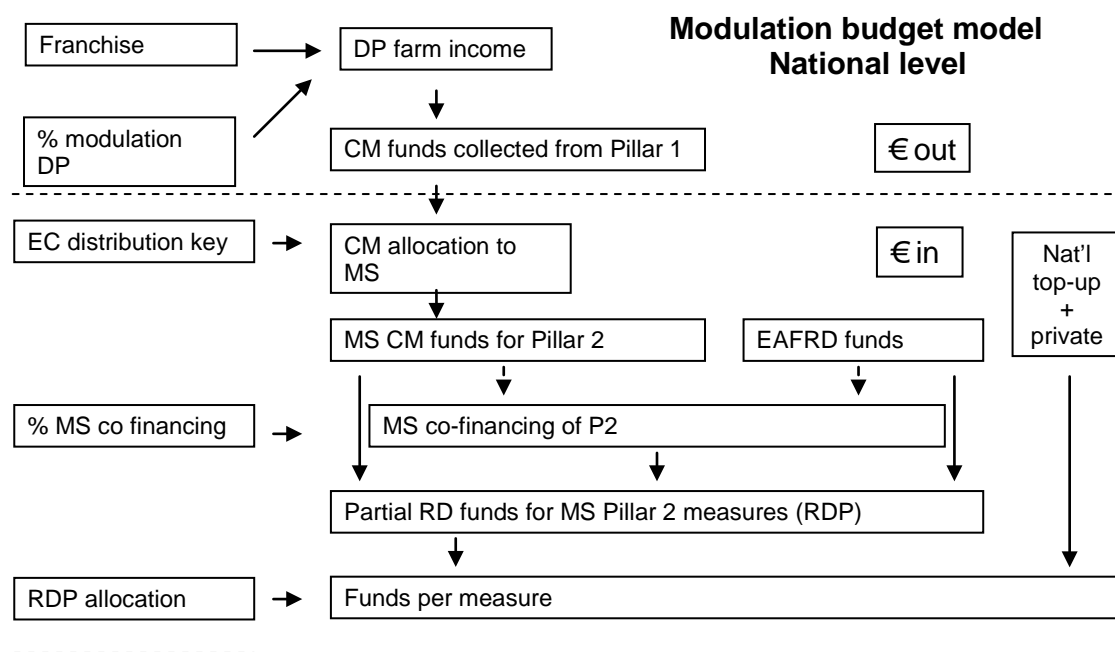
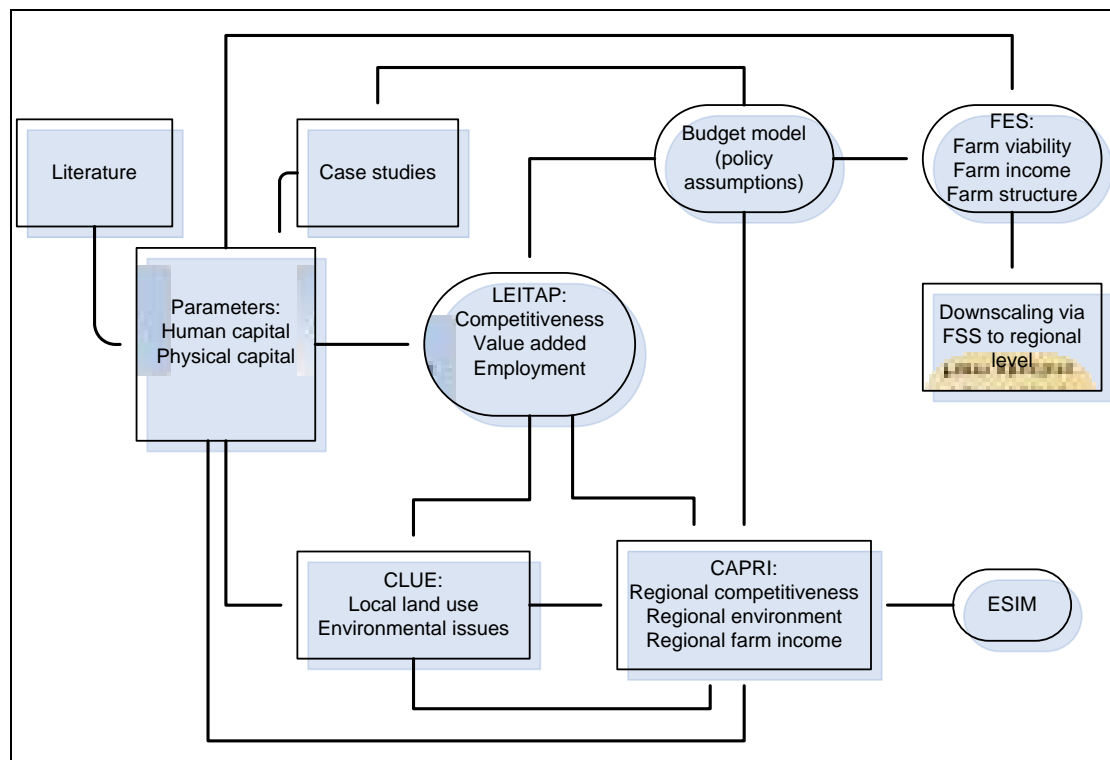


Figure 3 distinguishes between the operations (on the right-hand side) that determine the flow of money from the EAGF budget and monetary sources, and flows (from the top downwards) involved in the elaboration of the financial resources for the rural development measures in the second Pillar. It also highlights the fact that the calculations involved in generating the monetary flows from Pillar 1 to Pillar 2 are variable, as they depend on the level of the franchise, the percentage of modulation applied to direct payments, the EC distribution key, the percentage of MS co-financing, and the individual Member State allocation of resources between measures within their RDPs (on the left-hand side of Figure 3).

Once the budgetary effects of modulation have been established by the budget model, a range of economic models and a land use model are used to assess the economic and environmental impacts of modulation under the different scenarios. FES (a Financial Economic Simulation farm economic structure model), provides information on farm viability and farm structures, LEITAP provides information on competitiveness, value added and employment; ESIM gives projections of agricultural commodity markets; CAPRI is able to assess indicators on regional competition, regional environment and regional farm income; and Dyna-CLUE disaggregates this information spatially to help assess changes in land use and their potential environmental impact. The general structure of the Modelling Approach is given in Figure 4.

Figure 4: Quantitative impact analysis



Models are shown with their output contributions in this study. Rounded field indicate national levels and squared fields regional levels. The budget model provides basic information to all models and to the case-studies. Case studies together with literature provide the basis for the assumptions regarding the parameters human and physical capital that are used in the models.

Figure 4 demonstrates that the modelling approach is integrally associated not only with the budget model, but also with the case studies, and the modelling approach also draws on the literature review in order to investigate the exogenous parameters and

multiplier coefficients that are used in the modelling approach. Where such information is not available, assumptions with regard to parameters and multipliers have to be made by the modellers, on the basis of the best available expert knowledge. In order to model the economic and environmental impacts of modulation, it is necessary to find a means of linking agricultural commodity parameters with regional / territorial aspects. The global economy-wide dimension is covered by the economic model, LEITAP. ESIM provides more agricultural detail for the EU-25 countries, CAPRI distributes this impact to the regional (NUTS2) level, and FES to the farm level. Dyna-CLUE provides a detailed analysis of land cover change, thereby giving a spatial representation of the economic modelling outcomes.

In order to work coherently with agricultural commodity data, a common scheme for organising farm types (Table 2) and farm sizes is necessary. For this, the standard FADN classifications are used for the farm types ('TF8'), and seven categories are used farm size (in terms of ESU⁴); these categories are 0-4 ESU, 4-8 ESU, 8-16 ESU, 16-40 ESU, 40-100 ESU, 100-250 ESU and over 250 ESU.

Table 2: Agricultural specialisation on the basis of the codes for the types of farming (TF) in the Community typology (Reg. 85/377/EEC), using 8 standard classes.

Description of TF8	Grouping of TF on the basis of principal types of farming
Field Crops	13 specialist cereals, oilseeds and protein crops 14 general field cropping 60 mixed cropping
Horticulture	20 specialist horticulture
Wine	31 specialist vineyards
Permanent crops	32 specialist fruit and citrus fruit 33 specialist olives 34 various permanent crops combined
Milk	41 specialist dairying
Grazing livestock	42 specialist cattle – rearing and fattening 43 specialist cattle – dairying, rearing and fattening combined 44 sheep, goats and other grazing livestock
Pigs/poultry	50 specialist granivores
Mixed	71 Mixed livestock, mainly grazing livestock 72 Mixed livestock, mainly granivores 81 Field crops – grazing livestock combined 82 Various crops and livestock combined

An additional classification scheme is also used in this study, in order to group the rural development measures found in the EAFRD into groups of measures that behave similarly in terms of the economic mechanisms underlying the intervention logics for these measures. These groupings are set out in Table 4.

2.2.1 Analysis of modulation within the modelling framework

Modelling modulation has been made through a set of linked models. Linking models is an intricate task. The modelling was carried out in two steps: first Pillar 1 was reduced and second the money was introduced in the Pillar 2. The first step is usually quite straightforward (see Table 3), with the main challenge being the modelling of

⁴ ESU: The economic size of farms is expressed in terms of European Size Units (ESU). The value of one ESU is defined as a fixed number of EUR/ECU of Farm Gross Margin. Over time the number of EUR/ECU per ESU has changed to reflect inflation. The current situation is available at the web site indicated in the footnote, which also gives the current definition of “commercial farms” in terms of ESU (http://ec.europa.eu/agriculture/rca/methodology1_en.cfm).

decoupled payments. The second step is more complicated since modelling the second pillar has never been done before. Introductory comments regarding the treatment of Rural Development measures are provided below. One important aspect of agriculture is its contribution to public goods. The models used in this study are not suited for analysing this aspect and the current literature in the field also do not allow for any consistent implementation in modelling policy interventions.

Table 3: Treatment of Direct Payments (Pillar 1) in models

Treated in Model	Implementation of direct payments
LEITAP	Farm payments are implemented as primary factor payments in the various agricultural sectors. Coupled payments are directly coupled to sectors. Decoupled payments are implemented as an equal payment rate to land in all eligible sectors and therefore do not provide an incentive to switch between eligible sectors and between production factors used within the eligible sectors.
FES	Farm payments are directly calculated and implemented at farm level.
CAPRI	Analyses the effects of changes in farm payments at the regional farm and sector level. CAPRI distinguishes between a large number of types of premiums. Decoupled premiums as, for example, milk and sugar premiums are distributed over the eligible crops of the regional farm. Coupled premiums are linked to agricultural activities at the regional level.

Following the elaboration of the economic mechanisms underlying the intervention logics for the rural development measures, as is presented in the study, the economic models and the land use model employed in this study are able to perform a series of analyses in order to provide insight on the thematic issues in this study. These analyses can not reasonably be performed separately for each of the 46 rural development measures, and are thus grouped according to fundamental similarities in the economic mechanisms and how these are handled by each of the models. As an elaboration of this principle, Table 4 presents the groupings of rural development measures, the models that are used for their analysis, and what the relationship is between the models.

Table 4: Treatment of Rural Development measures* in quantitative models

	Treated in Model	How implemented (information needed from other models/case studies)
01 – Human Capital Investment [111-115, 131-133]	LEITAP	Payments influencing the total factor productivity in agriculture. Rate of return on investment is 40% (Evenson, 2001) Deadweight loss is assumed to be zero (sensitivity analyses is done with 25% deadweight loss)
	CAPRI	Via link with LEITAP
	FES	Payments on investment at farm level
02 – Physical Capital Investment [121-126]	LEITAP	Payments which influence the total factor productivity due to capital investments in all agricultural sectors. Rate of return on investment is 30% (Wolff (1996) and Gittleman, ten Raab and Wolff (2006)) Deadweight loss is assumed to be zero (sensitivity analyses is done with 25% deadweight loss)
	CAPRI	Via link with LEITAP
	FES	Payments on investment at farm level
03 – LFA Land Use Support [211, 212]	LEITAP	Income payment linked to land in agricultural sector. FADN data are used to distribute payments across sectors.
	CAPRI	Regional direct support. Distribution over sectors and regions based on FADN data and CLUE results.
	FES	Farms receive LFA or mountain area support when they are in these areas (income support)
	Dyna-CLUE	LFA support adds to the relative preference for the location for arable land or grassland (only for current agricultural land within LFA regions)
04 – Natura 2000 [213]	LEITAP	Income support linked to land in agricultural sector. FADN data are used to distribute payments across sectors.
	CAPRI	Regional direct support. Distribution over sectors and regions based on FADN data and CLUE results. Conditional on extensive technology being used.
	Dyna-CLUE	Agricultural land in Natura 2000 areas receives a higher relative preference (as compared to no support) for agriculture (only for current HNV agricultural land within LFA regions)
05 – Agri-Environment measures [214-216]	LEITAP	On the one hand, income support linked to land in agricultural sector and on the other hand a yield and labour productivity loss. FADN data are used to distribute payments across sectors.
	CAPRI	Regional direct support. Distribution over sectors and regions based on FADN data. 50% of the support directed towards TF8 farm types 1, 2, 3, 4 and 8 is conditional on extensive technology being used, for remaining amounts extensive as well as intensive technology is eligible.
	FES	Payment linked to land
06 – Forestry [221-227] 07 – Diversification [311-313] 08 – General rural development [321-323, 331, 341] 09 – LEADER [411-413, 421, 431] 10 – Technical assistance [511, 611]	LEITAP	Investment support for non-agricultural activities that increase productivity. Rate of return on investment is 30%. Deadweight loss is assumed to be zero (sensitivity analyses is done with 25% deadweight loss)
	CAPRI	Via link with LEITAP
	Dyna-CLUE	For forestry: conversion of arable land to forestry or grassland in erosion sensitive areas is stimulated by lowering the relative preference of current arable land in erosion sensitive areas.

* The RD measure numbers are indicated between square brackets [#].

3. The impacts of modulation

The study of the impact of modulation has been undertaken through a double perspective of two different scenarios: a baseline scenario of compulsory modulation at 5%, and a Health Check scenario based on a 13% modulation rate, as elaborated in the Commission proposals in May 2008. As the effects of modulation *per se* are quite limited, in comparison with the macro-trends affecting agriculture since the 1950s, it is often the higher modulation rate that provides an indication of what the influence of modulation might in fact be.

The results of the combined analysis are consistent for the two primary observations coming from the study. Firstly, the reduction of first pillar payments made through the modulation process – at the level that occurs at present – has a negligible influence on agricultural commodity production and on the viability of farm businesses generally. However, the impact on farm income is naturally negative. Secondly, there are beneficial effects in evidence as a result of the availability of additional modulated funds within the second pillar – both for farmers and to other actors within the rural economy. This is in a large part due to the fact that these measures have clear objectives, are targeted at areas of identified need and the total amount of money available is higher due to co-financing requirements. As a result, the second pillar measures are able to provide the leverage that they are intended to, whether it is in increasing productivity and competitiveness through Axis 1, maintaining and improving the environment through Axis 2, enhancing the vitality of the rural economy through Axis 3, or encouraging local leadership and partnership through Axis 4 (the LEADER programme). However, the transaction costs of targeted payments and the monitoring costs are not quantitatively taken into account in this study.

Modulation can lead to a significant transfer of support between farms of differing type and size. Logical deduction from the existing pattern of payments suggests that, in general, modulation tends to lead to a redistribution of funds from:

- Larger to smaller farms, although the participation of rather small farms in many Pillar 2 measures is low in many Member States
- Larger arable farms to:
 - Livestock farms, including a significant proportion of more extensive farms, which are the main recipients of Axis 2 money, but also dairy farms, potentially accessing funding under all axes.
 - Other farm types which are able to access physical and human capital investments under Axis 1.
 - Forestry and farm/forestry enterprises (through the forestry measures).
 - Beyond the agricultural sector to the broader rural economy.

It is important to remember when considering the impacts of compulsory modulation, however, that its effects extend considerably beyond a simple readjustment to the funds available within the two pillars, as the additional funds that are made available for Pillar 2 are then augmented by national co-financing and, for certain measures, by private sector contributions. The funds provided by the Member States themselves, therefore, make a substantial contribution to the impact of second pillar resources. In contrast, the financial gain or loss from changing the level of the ‘franchise’ – the part of Pillar 1 payments that are not taken into consideration for the modulation amounts

– is minor. As such, compulsory modulation acts as a conduit for leveraging an increase in funding available for rural areas, both to the agricultural sector and beyond.

In relation to the impact of compulsory modulation on the specific study themes, as presented below, it has been the combination of the non-modelling and modelling approaches that has allowed a balanced understanding of the effects of this policy tool.

Farm Structure: Modulation on the scale examined here is not seen to have a significant net impact on changes in the number or size of farms within the EU-15 – although it may accelerate existing trends towards fewer, larger farms and certain categories of investment, particularly as a result of the availability of additional funds for the physical and human capital investments in Pillar 2. However, compulsory modulation may also serve to slow down structural change as a result of increased support for Pillar 2 measures, such as LFA and agri-environment, which can help maintain the economic viability of farm businesses, particularly in marginal areas, that would otherwise disappear.

Production: According to the models, the net overall agricultural production effect due to modulation under the Health Check scenario appears to be positive, albeit small, for primary agriculture in the EU-15 (0.48%) and the EU-27 (0.4%). Taken alone, the reduction of Pillar 1 direct payments has a minimal negative production effect (-0.06%), which is to be expected, given that payments are decoupled.

There are some differences between products. The net production effect is slightly positive for all broad groups of products (e.g. oilseeds, vegetables and permanent crops, meat), with the meat sectors being the most strongly influenced by modulation in terms of production. The exception to this is cereals, where the models indicate a slight net decrease in production of durum wheat, which at present still receives coupled payments in some areas, and, benefits from significant Article 69 support (before 2009; now Article 68), particularly in Italy.

The main cause of this positive effect is the availability of additional money for Pillar 2 measures, particularly physical capital investment measures. While investments in human and physical capital measures through Axis 1 may increase production, however, investments in Axis 2 measures will equally require the maintenance or introduction of more extensive management practices, which may conversely constrain production.

Competitiveness: Increased rates of compulsory modulation appear to have a small net positive impact upon competitiveness within the agriculture sector, albeit measured in the narrow sense of gross value added within agriculture.

Outputs from the economic models suggest that the increased rates of modulation under the Health Check scenario have a small net positive impact on GVA, compared with the baseline scenario. The impact on welfare is slightly positive. This is the case, without taking into account the anticipated impacts of the additional funds on the delivery of environmental non-market goods, which it is not possible to quantify as part of this analysis. On the other hand, transaction costs are not taken into account.

The positive impact is mainly caused by the impacts of Pillar 2 measures, particularly the dynamic impact of measures that increase the productivity of production factors such as human and physical capital mainly in Axis 1, for example those that enable investments in new technologies and physical infrastructure to be made, as well as those that focus on improving human capital, thereby helping to rationalise production processes, or to improve the quality of products. In relation to the service and processed food sectors, Axis 3 measures also have a role to play in contributing to increased competitiveness outside the agricultural sector, particularly those focused on incentivising diversification, improvements to rural infrastructure and stimulating tourism.

Farm Income: The impact of modulation on farm family income is unclear, with different economic models giving slightly differing results. These results, however, have to be treated with extreme caution as they are very dependent on the assumptions made about which Pillar 2 measures are considered to have an income effect. General conclusions mask more significant local and regional differences, particularly between farm types, whereby some type of farms/businesses are likely to benefit and some will lose out in terms of income.

Accepting that most measures within Pillar 2 will only have a small income effect, it seems that, looking at the overall impact of modulation, the main farm types to 'lose' from modulation would be arable/permanent crops, and beef producers. These types of farm tend to be recipient of higher levels of direct payments through Pillar 1; and although they may receive money back through Axis 1 and Axis 2 measures, it is conditional on meeting additional obligations in many cases and probably will not be sufficient to make up for the losses in their direct payments.

Those that are more likely to gain from modulation include dairy farms and fruit and vegetable producers, due to the lower level of direct payment receipts, and the possibility of them accessing funds through Axis 1 (and possibly Axis 2), as well as suckler cows and sheep and goats, due to the likelihood of their being able to access Pillar 2 funds, particularly agri-environment and LFA support, but also support through Axis 1.

In addition, there may be some counter-intuitive effects, whereby farms with attributes highly compatible with Pillar 2 objectives lose out under modulation because they experience Pillar 1 reductions but cannot access any further Pillar 2 measures, for example because they are participating in all the schemes for which they are already eligible. Such farms are most likely to be those enrolled in multi-annual schemes such as LFA and agri-environment schemes and will include some farms providing significant public goods.

Employment: While some changes in employment both within agriculture and the services, energy and industry sectors are likely to be experienced as a result of compulsory modulation, these changes are very minor. Overall, under the Health Check scenario, employment in the food processing and services sectors increases very slightly (0.02%) and decreases within the primary agriculture sector, albeit only by 0.12%. In relation to the agricultural sector, the main reason for this decrease stems from the reductions in Pillar 1 direct payments. This is then reinforced by the Pillar 2

investments in physical capital (mainly Axis 1), some of which may encourage further structural change. Modernization implies that some labour might be released in the short run but that the remaining farmers are more competitive in the long run. The ones who leave agriculture find a job in other sectors due to Axis 3 measures and a small GDP growth. Modulation therefore encourages and accommodates the process of structural change.

The models, CMEF indicators and case studies, all suggest that, under the Health Check Scenario, higher employment levels are likely to be experienced than would be the case with no modulation, as a result of the input of additional funds in Axis 2 and Axis 3 of the second pillar. However these do not outweigh the decreases seen as a result of reductions in Pillar 1 and the additional availability of funds for physical capital measures. The LFA and agri-environment measures help maintain and generate additional employment both directly within the agricultural sector as well as indirectly within other economic sectors. LFA payments, for example, contribute to farm income and the maintenance of employment in rural areas, and agri-environment schemes can have beneficial employment effects, for example by promoting organic farming, which is generally more labour intensive, and through generating the need for the use of contractors with specialist and traditional skills. In addition, the environmental benefits that accrue from these schemes can lead to indirect employment benefits resulting from increased tourism and recreation. Axis 3 measures relating to creating diversification opportunities, new business start-ups, improving service provision in rural areas and enhancing an area's tourism potential, as well as activities funded through the Leader approach, all have the potential to increase employment in rural areas, largely outside the agricultural sector. While the impact of these measures on employment creation will be small, given the limited resources allocated to these measures, the impact may be locally significant, contributing to a more diverse and secure job market in rural areas.

Quality of Life: Overall the quality of life in rural areas is expected to benefit from increased levels of modulation, although it has not been possible to quantify this impact. Taking GDP as a somewhat crude proxy to reflect the material wellbeing across the EU, any increase in GDP can provide some indication of the potential improvement in the quality of life insofar as this relates to the growth in the economy overall. The models indicate that increased rates of modulation under the Health Check scenario have a positive, albeit very small, impact on GDP growth (0.04% at rates of 13% modulation). This positive result is entirely due to the increased availability of funds, and their associated national co-financing, within Pillar 2. The effect is largely caused by those Axis 3 measures which are focused predominantly on investments outside of the agricultural sector, for example on the setting up of new businesses, improving rural services and promoting tourism.

Looking beyond GDP, at low levels of modulation, reductions in Pillar 1 would not appear to have any real impact on the quality of life in rural areas, as no significant effects in terms of farm restructuring or land abandonment are experienced. However, drawing mainly on evidence from the case studies, increases in expenditure in Pillar 2 do have a positive effect on quality of life by increasing the funding available for measures that promote innovation, create employment opportunities, improve access to services for the rural population or provide funding for activities that can improve the economic attractiveness of, and thereby encourage investment in, rural areas.

Beyond Axis 3 and the Leader approach, the LFA and the agri-environment measures stand out as having the potential to enhance the quality of life in rural areas in relation to their role in maintaining and enhancing the attractiveness of rural areas, and hence in attracting increased tourism. In addition, the case studies highlighted the value of these measures for keeping people in farming.

Environment: Overall, the impacts of modulation on the environment are positive for all environmental parameters including biodiversity, water quality, soil quality, landscape and climate change. These positive impacts are the result of the availability of additional funds within Pillar 2 and relate to a whole range of measures across all four Axes. The extent of these impacts, however, is hard to quantify beyond general terms.

The reductions in Pillar 1 direct payments do not appear to have had significant impacts on the environment. This is unsurprising, given that the impacts on agricultural producers (in terms of influencing factors of productivity, farm structure and income) of reducing Pillar 1 payments have been shown to be limited. The models show that there may be a small increase in land leaving agriculture as a result of reductions in Pillar 1 payments; however, these appear to have been more than compensated for by increases in the availability of funds within Pillar 2, particularly for the LFA and agri-environment measures. These impacts could, of course become more significant as the modulation rate increases and/or the franchise level changes.

The availability of additional funds within Pillar 2, however, is likely to have a significant impact upon the environment across the EU-15, but particularly in Finland and the UK (England) where the additional funds have been specifically focused on the agri-environment measure. In all Member States, modulation can be seen to have a positive impact on the trends identified for the CMEF impact indicators relating to the area of HNV farmland, the farmland bird index, nutrient surplus and production of renewable energy. In relation to the CMEF result indicators, modulation, under the baseline scenario, is estimated to enable over 5 million hectares of land to be managed in ways that benefit biodiversity, 3 million hectares to be managed to help improve water quality and soil quality and 1 million hectares to be managed in ways that will help with climate change mitigation and/or adaptation.

The results also suggest that the availability of additional funds for, in particular, the agri-environment and LFA measures is likely to retain slightly more land under agricultural management that would be the case without modulation. The models show that this land is more likely to be grassland than cropped land. The CMEF impact indicators also show that a significant area of land is anticipated to be prevented from being abandoned over the 2007-13 programming period. While the proportions of land indicated by the models are very small (under 1% of all agricultural land), in reality, the effect could be much greater. It would certainly not be a uniform impact across the EU-15 and will depend crucially on local factors such as succession, land ownership, remoteness from markets etc.

4. Gaps / Research and analytical issues that need follow-up

The study has sought to explore the impacts of modulation through the use of economic models and national case studies. This has revealed the considerable

methodological and data challenges inherent in a complex policy evaluation exercise of this kind. This is particularly the case in seeking to specify and quantify the impacts of rural development policies in Pillar 2. Since these measures are a growing element of the CAP it is recommended that further investment both in analytical tools and data collection (at different geographical levels) is prioritised at both the Member State and EU level.

The availability of good quality, precise and comparable empirical evidence on the impacts of Pillar 2 measures at local, regional and Member State level is critical to inform future policy evaluations. While the CMEF indicators are a helpful step towards facilitating a more informative analysis of the impacts and estimates provided by Member States within their RDPs on the anticipated outputs, results and impacts of the various measures within Pillar 2, these need to be complemented by detailed monitoring programmes at the Member State level.

The newly established rural development and evaluation networks could offer a timely opportunity in this regard. These networks could be used to provide an assessment of current monitoring and evaluation programmes within individual Member States. They could work with the national networks to share good practice, and improve monitoring programmes to ensure that the benefits of Pillar 2 measures can be assessed more precisely and the information disseminated widely across all Member States.

If modelling is to be used to predict the impacts of different policy scenarios in relation to Pillar 2 measures with greater confidence, then again empirical evidence of the efficiency and effectiveness of these measures is crucial. For example, information about the rates of return to human and physical capital investments is needed, the level of deadweight or crowding out effects, transaction costs, and the impact of environmental measures on yields. Europe-wide economic models need to be developed further to enable them to reflect more locally differentiated impacts, including by farm type, based on the different ways in which measures are implemented in different locations. The work currently being undertaken in EURuralis 3.0 and the FP7 project 'CAPRI-RD' is a good start in this regard. Another large area of research is the conceptualization, modelling and monetization of public goods.

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