Project 502184

GENEDEC

A quantitative and qualitative assessment of the socio-economic and environmental impacts of decoupling of direct payments on agricultural production, markets and land use in the EU

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Contact (1): Pierre-Alain Jayet, INRA, Grignon, France, jayet@grignon.inra.fr
Contact (2): Werner Kleinhanss, Institute of Farm Economics, Federal Agricultural Research Centre, 38116 Braunschweig, Germany
E-mail: werner.kleinhanss@fal.de

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Abstract

Decoupling is the leading principle of the 2003 CAP Reform. It represents a fundamental shift towards more market orientation and better competitiveness of the European agricultural sector. In this Delivery the impacts of different decoupling options on land use, livestock production and income are quantitatively assessed and analysed. The analysis is done using several quantitative models. AROPAj is used to analyse the impact at EU-15 level while the models of FAL, Parma, UPM and TEAGASC perform in deep analyses for their respective home countries (Germany, Italy, Spain and Ireland). The analysed scenarios capture the National Implementation schemes as well as simplified implementation options and further going alternatives. Price scenarios are established in cooperation with IDEMA, another EU-research project.

The results show a general reduction of cereals, oilseeds, and protein crops irrespective of the way premiums levels are determined. Partial decoupling, in comparison to full decoupling, softens the impact but does not change the trend. In all models part of the land is no longer used for production because it becomes economically unattractive. In the livestock sector decoupling generally leads to a reduction of the stock of bulls and suckler cows. Sheep increase due to favourable price projections. However, the impact strongly depends on the details of the chosen decoupling scheme especially with respect to partial decoupling. Decoupling causes an increase of farm income because of both, more favourable prices and more market orientation. However, the decrease of direct payments by modulation reduces income.

Results of the farm models show that full decoupling induces more severe changes in production than partial decoupling. Partial decoupling, therefore, still distorts factor allocation und the market equilibrium and is therefore less efficient. Especially, the coexistence of different decoupling schemes in the Member States is problematic. The historical and the regional implementation have similar allocation effects and are, thus, equally preferable with respect to their impact on the common markets. However, it is shown that a regional implementation causes more severe transmission effects of direct payments to the landowners.

For future policy reform it is proposed to introduce a more harmonised set of policy instruments across the entire EU. This could be a combination of a regional model and a scheme similar to the Bond Scheme proposed by SWINBANK and TANGERMANN (2004). Payments granted in the framework of a regional model are adequate to secure the adherence of common production standards via Cross Compliance while bonds are suitable to achieve policy goals concerning stability and distribution of farm incomes. For the latter, however, both, the duration of the reception and the total amount of payments per farmer should be limited.

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1 Introduction

Despite being planned as the Mid Term Review (MTR) of Agenda 2000, the 2003 CAP Reform goes far beyond its predecessor. The fundamental aims of the reform were to increase farmers' competitiveness and market orientation, to stabilise farm income, to prevent the abandonment of land and to increase the legitimacy of agricultural support from the perspective of the taxpayer (EUROPEAN COMMISSION, 2003a; 2003b). Another important reason for its adoption was to prepare the Common Agricultural Policy (CAP) for the next round of WTO negotiations. EU direct payments at that time were coupled and designated to the Blue Box. It was commonly expected that in the future Blue Box payments would be included in the calculation of the Aggregate Measurement of Support (AMS), causing the AMS to exceed the allowed maximum. To avoid this, it was deemed necessary to decouple direct payments to make them eligible for the Green Box. Green Box payments are not included in the calculation of the AMS (WTO, 2006).

Decoupling, therefore, is the leading principle of the 2003 CAP Reform. This principle is also used for reforms of other market organisations implemented afterwards such as hops, tobacco, cotton, sugar and reforms currently under negotiation. The topic was raised in a position paper of the Commission in the year 2002. During policy negotiations, Member States worked out their own reform proposals, and some of these ideas were considered in the final regulation. So the regional implementation (Articles 58-59) and the partial implementation (Articles 64-69) were included in the form of implementation options. Surveys on the applied schemes show that Member States made use of these options resulting in a diversity of policy schemes (GAY et al. 2005, SWINBANK et al. 2004). Indeed, not even two of the old EU-Member States decided to implement the same set of policy instruments.

This paper is a joint effort of partners involved in Work Package 5. The objective of this Delivery is both to quantitatively assess the impacts of the decoupling options on factor allocation, production and farm income and to elaborate recommendations for the development of an optimal mix of policy instruments. Of main interest are the following aspects:

- Effect of full decoupling in contrast to partial decoupling
- Impact of the way the level of entitlements is determined
- Consequences of the obligation to keep the land in good agricultural and ecological condition
- Questions like land abandonment, environmental concerns and interregional competitiveness are other aspects to be discussed based on the quantitative results.

As most partners involved use their own models for their home country it has been decided to proceed as follows:

- UPM (ESP), Parma (ITA), Teagasc (IRE) and FAL (GER) focus on assessments at the national level, analysing the impact of the National Implementation and other relevant implementation options. The use of national models has the advantage that partners can include their expertise on the agricultural sectors of their home countries in their modelling work
- INRA uses AROPAj to analyse the impact of the National Implementation schemes and the effects of full decoupling at EU-15 level.

The structure of GENEDEC has been elaborated at the time of publication of the legislative proposal of the MTR. As the 2003 CAP Reform was decided upon afterwards, and some of the alternative options for decoupling became reality, the description of objectives given in the contract is somewhat outdated. Work Package 5 is defined as follows:

WP 5.1: Evaluation of alternative options within the COM proposal

WP 5.2: Partially decoupled schemes

WP 5.3: Pillar-2 measures

Discussions between team members resulted in the conclusion that WP 5.1 and WP 5.2 should be combined, while one part should deal with decoupling options of the final CAP 2003 regulation and the other part should be oriented towards other options which go beyond the reform. The latter could be modifications of given options and the analysis of further reaching schemes. The impact of Pillar-2 measures is addressed in Delivery 8.

The study is structured as follows: Chapter 2 is dedicated to recent adjustment of models' structures and specifications with regard to the underlying subject. National implementation schemes, alternative decoupling scenarios and the respective price scenarios are described in Chapter 3. In Chapter 4 the main results are presented and analysed. The analysis starts with the EU-wide perspective, followed by national case studies and is completed with an in-depth analysis of alternative decoupling instruments under conditions of the German agricultural sector. In Chapter 5 results are compared and recommendations for future reforms of agricultural policies are given.

2 Recent changes of the model specification

In this Chapter recent developments and adjustments and model specific scenario assumptions are described. The model description is not extensive because models are already described in Delivery 2 (REHMAN, 2006) or in Delivery 4 (JAYET et al., 2006).

2.1 EU-FARMIS

EU-FARMIS is a comparative-static process-analytical programming model based on data from the Farm Accountancy Data Network (FADN), with individual farm data being aggregated to farm groups. Production is differentiated for 27 crop activities and 15 livestock activities. The matrix restrictions cover the areas of feeding (energy and nutrient requirements, calibrated feed rations), intermediate use of young livestock, fertiliser use (organic and mineral), labour (seasonally differentiated), crop rotations, and political instruments (e.g., set-aside, quotas, and direct payments). A positive mathematical programming procedure (see, e.g., HOWITT, 1995; HECKELEI, 2002) is used to calibrate the model to the observed base year levels, with non-linear terms standardised to external elasticities.

The modelling is based on farm groups rather than single farms to ensure the confidentiality of individual farm data, but also to increase the manageability and the robustness of the model system in the face of data errors which may exist in individual cases. Homogenous farm groups are generated by the aggregation of single farm data. Standard stratification criteria for the establishment of farm groups are FADN regions, farm types (arable crops, milk, grazing livestock, permanent crops, pigs and poultry, horticulture) and farm size (criteria for size depend on farm type, e.g., size of arable crops farms refers to ha UAA). Generally, the stratification of farm groups is flexible and can be adjusted depending on the specific policy to be analysed. For this study, the stratification of the 2002 EU-FADN data (by regions, farm types and size) resulted in 153 farm groups for Germany.

Recent developments

With the 2003 CAP Reform, direct payments were decoupled, meaning that it is not necessary to produce in order to receive payments. This lowers the incentive to produce both crops and livestock. The reduction of livestock production leads to a decrease of the need for roughage fodder. However, Cross Compliance requires that land has to be kept in good agricultural condition and direct payments are thus still linked to land use. The model should, therefore, allow farmers both to comply with the regulation and to reduce fodder output. To take this into account, in addition to a low input intensity for grassland, a **mulching** activity was introduced in EU-FARMIS. It is implemented in the form of an additional grassland intensity which is characterized by a lack of output and very low input. To allow farmers to mulch arable land as well, the model was enabled to convert arable land into grassland (but not vice versa). By the extension of mulched area, farms now can better respond to the reduction of fodder demand. Another way of reducing fodder output is to let land become fallow. In the model fallow land is not used for production and the Cross Compliance criteria are not met. It is simply residual land not used in the farm. However, entitlements cannot be activated on fallow land.

In models based on positive mathematical programming, the introduction of new activities or intensities such as mulching is difficult if they are not observed in the base year, because the model is usually calibrated to reproduce the base year's activity levels. In order to solve this problem, it was assumed that a very small part of total grassland was mulched in the base. However, it is not plausible to assume that in the base year the economic attractiveness of mulching is equal to the attractiveness of "normal" grassland usage, because by mulching no output is generated and additional costs arise. Therefore, farms should start to mulch their grassland only if this gap in economic attractiveness is offset. To take this gap into account, the opportunity costs of mulching have to be determined. However, this is a difficult task because no product prices for fodder grass are available. To have a plausible estimate; the opportunity costs were assumed to be equal to the sum of the rental value of grassland and the costs of mulching in the base year. This value is subtracted from the objective value of the mulching activity. Consequently, farmers will only start to mulch their grassland after the relative attractiveness of mulching has surpassed the opportunity costs.

As mulching of arable land and grassland seems to be comparable, only one mulching activity is specified in the model.

Price adjustment for young cattle:

The increasing specialisation of farms has led to a situation where trade of young livestock is common between farms of different types within a region, and also across national borders. For a consistent analysis of different policy scenarios, it is important to keep the supply (produced and imported) and use (fattening/raising and export) of young livestock in balance. This is especially relevant for the modelling of the cattle sector, where rising milk yields, in combination with milk quotas, potentially lead to quite different structures compared to the base year. To ensure a balanced market, equilibrium prices for young cattle were derived by linking the respective trade balances across France, Germany, the Netherlands and the UK. In doing so, the model is even able to capture the effect of the simultaneous implementation of different decoupling schemes in these Member States.

Implementation of the sugar market reform:

In contrast to the other models applied in GENEDEC, in EU-FARMIS, the sugar market reform was analysed. The aim was to take the main effects of the reform into account without going into details of the complex sugar market regime. Therefore, a rather simplified approach was chosen. The analysis rests on three assumptions. First, it is assumed that in the framework of the restructuring programme the German sugar industry will not sell quota but will buy the maximum amount of additional quota allowed. Second, it is assumed that farmers will stop producing C-sugar. Third, it is assumed that the share of C-sugar in the base year is equal across the entire sector.

Sugar beet prices are adjusted in order to meet the minimum beet price in the year 2010. Set aside shares are calculated based on their historic share in the base year. In the case of the national implementation, the extent of set-aside is externally determined.

As a consequence of the implementation of the sugar market reform, the FAL price assumptions concerning sugar beets deviate from the general price assumptions provided by ESIM.

2.2 PROMAPA.G

PROMAPA.G is a non-linear programming model for analyzing the impact of different agricultural policies on Spanish agriculture. This model, designed to process data at the farm holding level, is calibrated with positive mathematical programming (PMP) techniques in a procedure that accommodates the inclusion of *a priori* information.

The key equations for the model are in the paper by JÚDEZ et al. (2005a) elaborated in the context of this project. The following discussion contains a description of the improvements introduced and used to obtain the results analysed hereunder. These improvements concern model formulation on the one hand, and software for reading inputs and obtaining both individual farm type and aggregate results on the other.

2.2.1 Changes in model formulation

These changes essentially involve model calibration, formulation of single farm payments and modulation, fitting grassland yield to herd size, and herd size to premiums. Iteration procedures are required to obtain the final solution for the latter two points.

Model calibration

PROMAPA.G is currently designed to use three calibration methods. A third method involving the use of exogenous supply elasticity values has been added to the standard and maximum entropy PMP procedures introduced in the previous version of the model. All these procedures may be implemented with or without *a priori* information on the opportunity costs of land.

Single farm payment (SFP) and modulation

Whereas in the previous version of PROMAPA.G the SFP depended solely on base year activities, in the present version it is likewise affected by the activities conducted in the simulated year. Both the SFP and the respective modulation are computed endogenously.

The formulation of these two important features in the new CAP reform, while not exactly the same, is based on the formulation described in FRAHAN et al. (2005).

Let **X** be a vector with 2n components having variables X_{hi} representing the hectares of crop i on land type h in a given farm type. The following variables are likewise defined:

XES = ha of land eligible for the single payment in the simulated scenario.

XE = area of eligible land, in ha, generating the single farm payment.

XP1 = sum in € in the first payment bracket, exempt from modulation measures (regarded to be less than or equal to €5000).

XP2 = sum in € in the second payment bracket, subject to a modulation discount, assumed to be 5%.

The right hand side variables and coefficients are defined as follows:

A_h = ha of land type h (h=1: non-irrigated; h=2: irrigated) on the farm

AER = ha of land on the holding eligible for the single payment in the reference period.

a_{hi} = coupled payment per ha in € for crop i on land type h.

d = payment entitlement per ha in €.

Taking M_{hi} (**X**) as the average gross margin of crop i on land type h, and distinguishing between eligible (i = 1,2, …, n_1) and non-eligible (i = n_1+1, n_1+2, …, n) crops, the model that incorporates the specific characteristics of the single farm payment and modulation can be summarized in the following expressions:

(1) $$\max: \sum_{h=1}^{2}\sum_{i=1}^{n} M_{hi}(\mathbf{X})X_{hi} + XP1 + 0{,}95 * XP2$$

subject to:

(2) $$\sum_{i=1}^{n} X_{hi} \leq \mathbf{A_h} \quad \mathbf{(h = 1, 2)}$$

(3) $$\sum_{h=1}^{2}\sum_{i=n_1+1}^{n} X_{hi} + XES \leq \mathbf{A_1 + A_2}$$

(4) $$XE \leq \mathbf{AER}$$

(5) $$XE - XES \leq \mathbf{0}$$

(6) $$-\sum_{h=1}^{2}\sum_{i=1}^{n_1} a_{hi} * X_{hi} - d * XE + XP1 + XP2 \leq \mathbf{0}$$

(7) $$XP1 \leq \mathbf{5000}$$

$$X_{hi}, XES, XE, XP1, > 0, XP2 \geq 0$$

The function to be maximized (Equation (1)) is the gross margin, including coupled and decoupled payments, where the terms M_{hi}(**X**) are quadratic functions.

Equation (2) limits the cultivated area on land type h to the area of this land type on the holding. Dual values of land are associated with this equation.

Equation (3), which defines the eligible area under the simulated scenario, is formulated in such a way that land that is not farmed is included in the eligible area.

Equations (4) and (5) define the eligible area that serves as a basis for computing the single payment in the simulated year. This area is the eligible area either in the reference period (AER) or the simulated year (XES), whichever is lower.

Equation (6) defines the total sum of (coupled and decoupled) payments, XP1+XP2, in the simulated year.

Finally, equation (7) limits the sum of payments not subject to modulation measures.

Fitting grassland yield to herd size

The inaccuracy with which grassland yields are estimated is one of the main problems encountered when fitting livestock to farm forage area. This problem has been solved by using an iterative procedure in which the initial grassland yield is re-estimated to adapt it to the number of head of livestock on a farm.

Fitting premiums to herd size

In Spain, the number of premiums for suckler cows is often smaller than the number of heads on the farm. This means that the total premium received by a farm in the simulated year may be the same as in the base year, even though the herd size declines.

The assumption adopted to address this problem is that, in the group of farms represented by a given farm type, the total sum of aid in the simulated year is the same as received in the base year. Under this assumption, the premium per head increases if the number of maximum upper limits heads declines and decreases if the number rises. With iterations, successive adjustments can be made until equilibrium is reached for the premium received per head with respect to variations in herd size.

2.2.2 Software for reading inputs and obtaining results

FORTRAN 95 software, developed in close conjunction with the model, is designed to interact with GAMS in such a way that: i) the model is provided with the necessary inputs for the various farm types; ii) the GAMS results are monitored in iterative solution procedures; and iii) the final results for each farm type are captured and aggregated.

2.2.3 Farm types used

The farm types chosen for this study were the average farms listed in the Spanish FADN for 2002, for the TF most closely related to the recent CAP reform in Autonomous Community (NUTS II), with the exception of the Canary Islands (due to the highly distinctive farm types listed in the FADN for that region). Table 2.2.1 shows the 86 farm types considered, along with the associated TF and region. The weighting factor used to compute the aggregate results for a given farm type was the number of farms represented by that type, according to the Spanish FADN.

2.2.4 Additional assumptions concerning the implementation of Scenarios in PROMAPA.G

Apart from general scenario assumptions described in Chapter 3, in PROMAPA.G several additional assumptions are made:

– Modulation measures are to be phased in, the simulations assumed them to be in the final phase, i.e., to consist in 5% reduction in the total, exempting only the first €5000.

– The compulsory set-aside area considered in the simulation year is the same as in the base year in full and partial decoupling scenarios.

– The decoupled payment was determined for each farm type based on the area of crops and the number of head of livestock in the base year. In other words, the base year replaced the reference period (average crop and grassland areas in 2000, 2001 and 2002) in the PROMAPA.G model.

– The measures used in the continuation of Agenda 2000 assumption were the measures in place in the base year.

– The decoupled measures in the full decoupling Scenarios in the simulated year were defined to be the sum of the coupled and decoupled measures in Table 3.2.1, with the exception of the following specific payments, which were regarded to be coupled: i) specific premium for protein crops; ii) specific quality premium for durum wheat; iii) specific payment for rice; iv) coupled area payment for cotton.

In the full decoupling scenarios with a standard payment entitlement per ha (regional model), the sum used for all the farm types, €240.08/ha, was the entitlement per ha found for the full decoupling scenario in the nation-wide aggregated results.

Table 2.2.1: Farm types considered

	1 Galicia	2 Asturias	3 Cantabria	4 Basque	5 Navarre	6 Rioja	7 Aragon	8 Catalonia	9 Balearic Isles	10 Castile and Leon	11 Madrid	12 Castile-La Mancha	13 Valencia	14 Murcia	15 Extrema-dura	16 Andalusia
1310 Specialist cereals (other than rice) oilseeds and protein crops				X	X		X	X		X	X	X			X	X
1320 Specialist rice													X			X
1410 Specialist root crops						X			X	X						X
1420 Cereals, and roots crops combined				X		X				X						
1430 Specialist field vegetables					X							X		X	X	
1442 Specialist cotton																X
1443 Various field crops combined					X	X	X	X		X		X			X	X
4100 Specialist dairying	X	X	X	X	X			X	X	X						X
4210 Specialist cattle-mainly rearing	X	X	X	X	X					X	X				X	
4300 Cattle-dairying, rearing and fattening combined	X															
4410 Specialist sheep				X	X	X	X			X	X	X		X	X	X
4450 Sheep, goat and cattle combined					X							X		X	X	X
6000 Mixed cropping					X	X	X	X		X	X	X	X		X	X
7000 Mixed livestock holdings							X								X	X
8000 Mixed crops-livestock					X		X	X		X		X	X	X	X	X

3 Scenarios

Scenarios analysed in Delivery 7 can be divided into two subgroups: the first is dedicated to the analysis of decoupling schemes within the scope of the 2003 CAP Reform. These are the National Implementation schemes, the historical implementation, the regional implementation and different approaches towards partial decoupling. The second group consists of scenarios that go beyond the reform. They are analysed to shed more light on the effect of the Cross Compliance obligation to keep the land in good agricultural and ecological condition and to analyse the impact of the stepwise increase in the degree of coupling for three chosen premium schemes. Reference scenarios are either Agenda 2000, the National Implementation or the historical implementation of the 2003 CAP Reform. The choice depends on the focus of the analysis.

The scenarios Agenda 2000 and National Implementation are analysed by all partners. Depending on their home country's choice for National Implementation, most partners additionally analysed two of the three following scenarios: partial decoupling as it was implemented in France and Spain, the regional implementation and the historical implementation. FAL, furthermore, analysed two more variants of partial decoupling, the impact of mentioned gradual steps of partial decoupling and a scenario inspired by the Bond Scheme.

For most models the target year for the references and scenarios is 2013, which means that the intermediate steps of dynamic hybrid models are not considered. Partners use the principle of comparative-static scenario analysis, which means that policy options are compared with a reference for an underlying target year. The scenarios are described in more detail in the following.

3.1 Agenda 2000

This scenario represents the situation in the target year that would have been realised if decoupling had not taken place. Compared to the base year 2002, all important elements of Agenda 2000 like price reductions for milk, beef and cereals, adjustment of direct payments and the milk quota extension are implemented. The scenario differs from the original Agenda 2000 package as the changes of the milk market regime and the abolishment of the rye intervention decided in the 2003 CAP Reform are included in the underlying price scenarios.

3.2 National Implementation

Member States opted for different approaches towards National Implementation (SFP_nat). The schemes are briefly described in the following. A table providing an overview about the National Implementation schemes for the entire EU-25 is given in the annex (Table A.3.2.1).

France

France opted for a partial decoupling scheme based on farm individual references. 25% of arable crop payments stay coupled. Additionally, a specific quality premium for durum wheat is introduced, and as in all other Member States, part of the payment for protein crops stays coupled. Concerning livestock, 40 % of adult slaughter premiums and 50 % of sheep and goat premiums remain coupled. The suckler cow premiums and calf slaughter premium stays fully coupled. Special beef and extensification premiums are fully decoupled.

Germany

Germany introduced a so-called dynamic hybrid model. In a transition period from 2005 until 2012, entitlement levels are composed by regional area-based premiums for arable- and grassland and farm individual top up payments. The payments are fully decoupled and entitlements are transferable without premium reductions.

The initial regional entitlement levels are officially calculated as follows (BMVEL 2005):

– Farm individual premium components are deduced from the sector plafond of (decoupled) direct payments (the special premium for male adult cattle, the suckler cow premium, the slaughter premium for calves, the milk premium, 50 % of the extensification premium, the decoupled part for dry fodder and tobacco, premiums for sheep and goats and 25 % of the starch potato premium paid in the reference period 2000-2002).

– The remaining total is distributed at the federal state level based on the federal states' shares of used agricultural area (UAA) and on the total amount of direct payments.

– Initial premium levels of grassland range from 15 to 40 percent of the level of premiums for arable land. They are calculated based on 'premium relationships'[1].

[1] For arable land, the area based entitlements initially include the premiums for arable crops and 75 % of the starch potato premium. For grassland, the initial entitlements include 50 % of extensification supplements for beef, the national envelope of beef premiums and the slaughter premiums.

Over time premium levels are adjusted with regard to the stepwise introduction of tobacco, hops and sugar premiums. From 2010 until 2012 the farm individual top-up payments are reduced stepwise and integrated into the regionally based entitlements. From 2013 onwards entitlement levels are unified (but regionally differentiated) for the entire UAA, excl. permanent crops. In the analysis, only the unified premium levels reached in the target year 2013 are considered. Additionally, no differentiation is made between entitlements for set-aside or for vegetables, food-potatoes and fruits.

Italy

In Italy, direct payments are fully decoupled and entitlement levels are determined based on farm individual references. However, Italy made extensive use of Art. 69. Art. 69 allows Member States to reduce the amount of direct payments given to farmers in the form of area payments and to use the saved funds for coupled aid instead. However, the aid is limited to processes that respect specific farm commitments aiming to offer environmental benefits or to improve the quality of products.

In this context, the payment of cereals is reduced by 8% to sustain the arable crops included in the Annex IX of the Reg. 1782/2003. The payment is conditional on the choice of specific seeds (no GMO). Furthermore, the use of Art. 69 was extended to animal production, in particular to slaughter cows and the extensive rearing of bovines. Lastly, a coupled supplementary payment for sheep and goats is planned. The calculation is based on the reduction of 5% of the maximum amount of payments attributed to this sector.

Ireland

Ireland started paying single farm payments to farmers in 2005. Payments are based on historical references. The payment scheme was based on averaged number of animals and/or average hectares of land on which payments were claimed in years 2000, 2001 and 2002. Direct payments are fully decoupled.

Spain

The Spanish Implementation scheme is very similar to the French one. Direct payments are partially decoupled and entitlements are based on farm individual references. 25% of arable crop payments stay coupled. Additionally, a specific quality premium for durum wheat is introduced. 40 % of adult slaughter premiums and 50 % of sheep and goat premiums remain coupled. The suckler cow premium and calf slaughter premium stay fully coupled. Special beef and extensification premiums are fully decoupled. Spain additionally makes use of Art. 69. 10% of the ceiling for dairy payments and 7% of the ceiling for the bovine sector are retained. For further details see Table 3.2.1.

Table 3.2.1: Agenda 2000 measures in place in 2002 and decoupling provisions considered in PROMAPA.G

	2002	New CAP reform	
		Coupled	Decoupled
COP crops			
Standard cereal payment (except maize)	63 €/t	15.75 €/t	47.25 €/t
Standard oilseed payment	63 €/t	15.75 €/t	47.25 €/t
Standard protein crops payment	72.5 €/t	15.75 €/t	47.25 €/t
Standard grain maize payment	63 €/t (55.33 €/t)	15.75 €/t (13.83 €/t)	47.25 €/t (41.50 €/t)
Specific premium for protein crops	-	55.57 €/ha	-
Durum wheat supplementary payment	344.50 €/ha (226.10 €/ha)	71.25 €/ha (46.76 €/ha)	213.75 €/ha (140.29 €/ha)
Specific quality premium for durum wheat	-	40 €/ha	-
Standard set-aside payment	63 €/t	-	63 €/t
Rice			
Area payment for rice	334.33 €/ha (224.40 €/ha)	-	647.70 €/ha (612.21 €/ha)
Specific payment for rice	-	476.25 €/ha (450.15 €/ha)	-
Grain legumes			
Grain legumes payment (chick peas and lentils)	181 €/ha	-	181 €/ha
Grain legumes payment (vetches)	181 €/ha (150.52 €/ha)	-	181 €/ha (150.52 €/ha)
Cotton			
Deficiency payment paid to cotton production	77.19 €/100 kg (61,7 €/100 kg)	-	-
Area payment	-	€1039/ha [1)]	1358 €/ha [1)]
Additional payment		€151 /ha [1)]	
Sugar beet			
Payment aid	-	-	12.63 €/t [1)]
Sheep			
Dairy ewe premium	16.8 €/head	8.4 €/head	8.4 €/head
Non dairy ewe premium	21 €/head	10.5 €/head	10.5 €/head
Supplementary premium in less-favoured areas	7 €/head	3.5 €/head	3.5 €/head
Additional premium	1 €/head	-	1 €/head
Rearing cattle			
Suckler cow premium	200 €/head	186 €/head	-
Suckler cow additional payment	24.15 €/head	22.46 €/head	-
Extensification payment	100 €/head	-	93 €/head
New additional payment (2006)			
First 40 cows	-	33.27 €/head [1)]	-
Between 41-70 cows	-	22.18 €/head [1)]	-
Between 71-100 cows	-	11.09 €/head [1)]	-
More than 100 cows	-	0 €/head	-
Stocking density conditions			
General scheme	1.9 LU/ha forage area	1.9 LU/ha forage area [1)]	
Extensification	1.4 LU/ha forage area	-	
New additional payment	-	1.5 LU/ha forage area	
Dairy cattle			
Additional payment for milk	-	3.22 €/t	-
Cow milk premium	-	-	29.07 €/t

1) Provisional

3.3 Alternative options

For the following scenarios we assume an EU-15-wide application of the policy schemes.

SFP_hist

This scenario previously was called “historical implementation”. Full decoupling is introduced in all EU Member States. Entitlement levels vary among farms as they are determined based on the historic references of individual farms. Rules for Cross Compliance apply.

SFP_reg

All EU-Member States opt for the regional model. Unified entitlement levels for each Member State are introduced for the entire UAA. Direct payments are fully decoupled.

Partial decoupling schemes

The partial decoupling scenarios are referring to the options defined in Articles 64-68 of the regulation:

– The first scheme (**SFP_par1**) represents the French/Spanish approach. Coupled are 25 % of arable crop payments, 40 % of adult slaughter premiums, 50 % of sheep and goat premiums and 100% of suckler cow premiums and calf slaughter premiums. The special premiums for male cattle are fully decoupled. The base year’s activity levels are used for the calculation of farm individual entitlements.

– The second scheme (**SFP_par2**), assumes coupling rates of 75 % for the special premium for male cattle and 50 % for the premium for sheep. The activity levels of the base year are used for the calculation of farm individual entitlements as well.

– In the third scheme (**SFP_par3**) slaughter premiums for calves and adult cattle are fully coupled. Additionally, 50 % for the premium for sheep remains coupled. Entitlements are based on farm individual historical references.

Variations of degrees of decoupling

To further assess the impact of partial decoupling, scenario runs with varying degrees of coupling are conducted. The impact of changing the degree of decoupling for different premium types is analysed. Steps of 25%, 50%, 75% and 100% are considered. This is done for

– arable crop premiums

– the special beef premiums

– the suckler cow premium

The scenarios are equal to the **SFP_hist** in all other aspects.

Bond Scheme

The scenario Bond Scheme (**Bond**) is inspired by SWINBANK and TANGERMANN (2004) and SWINBANK et al. (2004). Decoupled payments paid to farmers are based on a historical reference (2002). There are no activation constraints for entitlements, i.e., the Cross Compliance requirement to keep the land in agricultural condition does not hold. The scenario is equal to the scenario SFP_hist in all other aspects. To make the impact on income comparable it is assumed that farmers do not sell their bonds/entitlements but receive payments on an annual basis.

3.4 Price projections for the scenarios

Beside the policy framework, price projections are crucial for farm model based policy analysis, because prices are taken as exogenous. Price projections were realised in cooperation with IDEMA, another project of the 6th Framework Programme. For projections, ESIM, a partial equilibrium model also being used for Commission services, was applied by BALKHAUSEN and BANSE (2006). Projections for three scenarios were provided:

- coupled direct payments[2],
- the National Implementation and
- full decoupling.

ESIM works with real prices - deflated with 1.5 % annually. It was left to the partners to decide if they prefer to work with real or nominal price data. It is important to note that for both approaches the price relations among scenarios are the same. Only the price level differs. Therefore, the influence on the results should be minimal.

ESIM prices of the scenario “coupled direct payments” are used for the GENEDEC scenario Agenda 2000. Estimates for the ESIM scenario “National Implementation” are used for the GENEDEC scenario ‘National Implementation’ and additionally for the partial decoupling schemes (SFP_par1, SFP_par2 and SFP_par3). For all other scenarios price estimates of the ESIM scenario “full decoupling” are used. In the case of the Bond Scheme it was decided to use the same projections as for the scenario SFP_hist, although the introduction of a Bond Scheme would probably have a different impact. In Table 3.4.1 price changes of each scenario in comparison to Agenda 2000 are given.

[2] The scenario is based on the CAP 2003 reform without decoupling.

Table 3.4.1: Price scenarios

	Relative change in comparison to Agenda 2000 (2013)	
	SFP_nat / SFP_par1-3 %	SFP_hist / SFP_reg / Bond %
Wheat	4.0	4.4
Rye	0.0	0.0
Barley	6.5	7.0
Oats	7.2	8.0
Grainmaize	7.1	7.7
Rape	2.7	2.9
Other oilseeds	2.4	2.6
Potatoes	10.7	11.2
Sugarbeets	3.6	3.7
Milk	-4.7	-4.2
Beef	11.8	16.9
Pork	2.0	2.3
Sheep meat	25.9	32.3
Eggs	2.2	2.4
Poultry meat	2.0	2.2

Source: ESIM / IDEMA.

The underlying price projections seem to be reliable for most products. Increasing beef prices are in line with expectations, but the level of increase, especially under full decoupling, is quite high. The price increases for sheep are questionable because they seem to be much too high.

The aggregation level of partner's models partially deviates from the aggregation used in ESIM. Therefore, additional price assumptions have to be made for crops not covered by ESIM. In the case of the PROMAPA.G model, this was the case for grain legumes, horticulture products, sheep's milk and veal and lamb. Therefore, the price forecast for beef was adopted for veal and the forecast for mutton was used for lamb. Furthermore, the base year prices were used for all other products not shown in Table 3.4.1.

As the PARMA unit, TEAGASC is not officially involved in Delivery 7 but volunteered to contribute. However, due to resource constraints TEAGASC were not able to implement the price scenarios provided in their model. Instead, price scenarios of the FAPRI-Ireland model are used. This, of course, limits the comparability of results and they have to be interpreted independently from the others.

4 Quantitative analysis of decoupling

4.1 Impact of alternative decoupling options in Germany

Bernd Kuepker and Werner Kleinhanss
Federal Agricultural Research Centre; Institute of Farm Economics, Braunschweig

The impact analysis of the National Implementation in Germany was conducted with EU-FARMIS. Seven scenarios are analysed: Agenda 2000, SFP_nat, SFP_hist, SFP_reg, and the three partial decoupling scenarios. The analysis regarding the impact of the National Implementation comes first. Afterwards the findings on the impact of the alternative implementation options are given.

4.1.1 Impacts of the National Implementation

The results of the National Implementation are compared to the Agenda 2000 scenario. Impacts at the sector level on land use, production and income are displayed in Table 4.1.1. Regionally differentiated figures are given in Table 4.1.2.

Impacts on land use and production

Change in land use is mainly influenced by full decoupling, price changes and adaptation of intensities. The entire UAA, except permanent crops, is eligible for the activation of entitlements. Main tendencies are the following:

- Reduction of Cereal areas by 5.1 % on average. Wheat area will be reduced less (3.8%), while rye areas – due to constant prices – will be reduced by 14.3%. Generally, in Eastern Germany the decrease of cereals, oil seeds and protein crops is more pronounced than in other parts of Germany.
- Protein crops, which are of minor importance in Germany, will be reduced by 15%. The acreage of protein crops is reduced by a higher magnitude than oilseeds and cereals. It is assumed that prices for protein crops like peas and beans are linked to the price of soybeans, which is unaffected by decoupling. Therefore, protein crops lose economic attractiveness in comparison with other crops.
- Reduction of food oilseed is in the same range as for protein crops. Some former food oilseed areas are replaced by non-food oilseeds grown on non set-aside areas, such that the coupled energy crop premium of 45€/ha can be reclaimed. This premium is not paid for production on set-aside; therefore non-food production on set aside will be reduced from 340,000 to 212,000 hectares.

Table 4.1.1: Impact of the National Implementation on income, land use and production in Germany

		Agenda abs	SFP_nat abs	rel. change %
Land use				
Cereals	1000 ha	6,500	6,169	-5.1
Wheat	1000 ha	3,070	2,954	-3.8
Barley	1000 ha	1,865	1,785	-4.3
Rye	1000 ha	633	542	-14.3
Oats	1000 ha	167	152	-8.8
Oilseeds (Food)	1000 ha	1,034	936	-9.5
Protein crops	1000 ha	247	210	-15
Potatoes	1000 ha	194	211	8.9
Sugarbeets	1000 ha	387	354	-8.4
Arable forrage crops	1000 ha	1,503	1,536	2.2
Fodder maize	1000 ha	1,084	1,025	-5.5
Other fodder	1000 ha	419	511	22
Non-Food	1000 ha	341	378	10.9
Set-aside	1000 ha	1,190	957	-19.6
Grassland	1000 ha	4,022	4,476	11.3
Intensive grassland	1000 ha	2,557	2,414	-5.6
Extensive grassland	1000 ha	1,454	1,826	25.6
Mulched area	1000 ha	3	228	.
Fallow	1000 ha	49	20	-59.1
UAA	1000 ha	15,246	15,274	0.2
Arable land	1000 ha	11,223	10,798	-3.8
Grassland	1000 ha	4,019	4,249	5.7
Livestock production				
Dairy cows	1000 heads	3,946	3,945	0
Suckler cows	1000 heads	351	326	-7.3
Bulls [1)]	1000 heads	1,674	1,488	-11.1
Fattening pigs [1)]	1000 heads	54,108	54,729	1.1
Poultry	1000 heads	48,673	49,717	2.1
Sheep	1000 heads	1,325	1,390	4.9
Production				
Cereals	1000 t	44,632	42,751	-4.2
Rape	1000 t	2,736	2,528	-7.6
Non-Food	1000 t	1,242	1,371	10.3
Sugarbeets	1000 t	26,147	23,951	-8.4
Milk	1000 t	30,012	30,006	0
Beef	1000 t	1,078	1,002	-7.1
Pork	1000 t	5,415	5,479	1.2
Poultry meat	1000 t	801	817	2
Economic indicators				
Production value	Mill €	29,583	29,250	-1.1
Other revenue	Mill €	2,913	2,913	
Total subsidies	Mill €	6,466	6,582	1.8
Direct payments	Mill €	4,874	4,979	2.2
Variable input	Mill €	-18,759	-18,563	-1
Other costs	Mill €	-3,445	-3,445	
Depreciation	Mill €	-5,470	-5,430	-0.7
Interest	Mill €	-849	-838	-1.2
Wages	Mill €	-2,940	-2,869	-2.4
Income indicators				
Farm Net Value Added (FNVA)	Mill €	11,272	11,292	0.2

1) Annual production.
Source: FARMIS; INLB-EU-GD AGRI/G.3.

Table 4.1.2: Impact of the National Implementation on land use and production at regional level

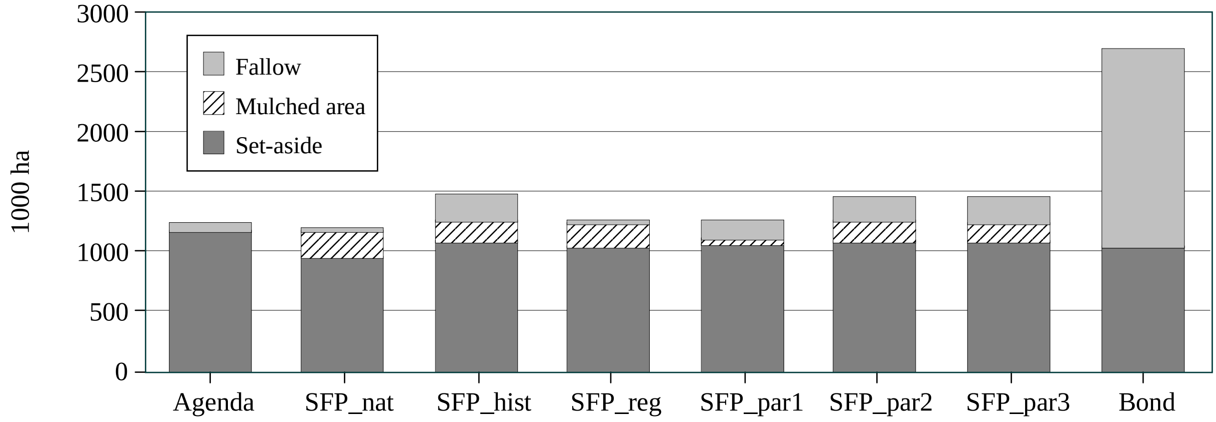
	Relative change in comparison to Agenda 2000 (%)				
	North	South	Center	East	Total
Land use					
Cereals	0.7	-3.5	-4.0	-10.9	-5.1
Wheat	0.9	-2.2	-3.0	-8.3	-3.8
Barley	1.3	-3.3	-3.4	-11.1	-4.3
Rye	-5.7	-7.0	-10.8	-18.9	-14.3
Oilseeds (Food)	-1.4	-5.2	-6.2	-14.1	-9.5
Protein crops	-3.9	-7.8	-11.1	-17.9	-15.0
Potatoes	9.2	8.5	7.1	8.9	8.9
Sugarbeets	-8.4	-8.4	-8.4	-8.4	-8.4
Arable forrage crops	1.7	2.0	6.0	2.4	2.2
Fodder maize	-5.1	-5.5	-3.4	-6.4	-5.5
Other fodder	28.8	17.5	20.2	20.7	22.0
Livestock					
Dairy cows	0.0	-0.1	0.0	0.0	0.0
Suckler cows	-7.7	-3.7	-9.1	-8.0	-7.3
Bulls 1)	-11.6	-8.3	-13.6	-14.2	-11.1
Fattening pigs1)	1.1	1.1	1.3	1.2	1.1
Poultry	2.1	2.3	2.7	2.1	2.1
Sheep	10.9	3.5	6.5	3.4	4.9

1) Annual production.
Source: FARMIS; INLB-EU-GD AGRI/G.3.

– The sugar beets area will decrease by about 8 %; these changes are driven by the assumption that the production of C-sugar is abandoned. Total production is restricted to the level of former A and B quota, plus the additional quota bought in the context of the sugar market reform. The quota is still fulfilled. Results concerning sugar beets should be interpreted with some care because they depend on assumptions about the strategic behaviour of the sugar industry, the C-sugar production in the base year and the sugar content of beets. Referring to ongoing investments in ethanol production, which are not taken into account in the model, in reality sugar beet production might take a different path.

– Based on favourable price development, potato production will increase by 8.9 %. This seems to be in contradiction with the fact that food-potatoes can only be used for the activation of OGS entitlements and their number is constant. However, as in the model, eligible areas are determined on the basis of 2002, and the potatoes acreage is reduced by about 10% in the baseline (2013 against 2002), a sufficient number of OGS entitlements are available.

Figure 4.1.1: Magnitude of set aside, mulched area and fallow in all analysed scenarios



Source: FARMIS; INLB-EU-GD AGRI/G.3.

- There is a tendency to increase roughage fodder acreage on arable land as well as on grassland. Formerly subsidized silage maize is partly replaced by other fodder crops. The increase in total fodder crop area is induced by the following facts:
  - Lower yielding fodder crops are gaining competitiveness compared to former subsidized silage maize, because they are not affected by decoupling.
  - Eligible areas are needed for the activation of entitlements leading to a general extensification of grassland.
  - Animal feed rations are slightly adjusted.

In principle EU-FARMIS provides two ways for farms to phase–out crop production. First land can simply become fallow - without being “managed” in any way - and second, it can be maintained in good agricultural condition by mulching. In Figure 4.1.1 the impacts on set aside, mulched area and fallow are displayed for all analysed scenarios. In the scenario National Implementation, the total of set aside decreases because voluntary set aside becomes negligible while compulsory set aside area is almost constant. The amount of fallow area remains constant as well. However, the mulched area is significantly increased (224,000 ha). The latter will be mainly realized on sandy soil regions in Eastern Germany. The granting of direct payments for mulched areas prevents a significant amount of land to become fallow.

Impacts on in the livestock sector

As headage and milk premiums are transformed into land based entitlements, the livestock sector will be more affected by decoupling than the arable crop sector. The decoupling effect is, however, partially softened, and sometimes reversed by increasing prices for beef and sheep meat. Effects are as follows:

– Milk production is not affected as milk quota remains binding. The CAP reform in Germany has a significant impact on the shadow prices for milk quota. The sector average and values for the German “Laender” (federal states) are given in Table 4.1.3. As in EU-FARMIS, quota trade is implemented in the form of a rental market, only rental prices and not sales prices are given. The rental value of milk quota decreases in comparison to the Agenda 2000 scenario. On average the shadow values are reduced by 39% or by 26 Euro/ton. The decrease is caused by two effects. First, the prices for milk decrease further and second, the milk premium is decoupled. However, the milk quota remains binding. Reasons for this are the increase in productivity and the increase in beef prices. This becomes apparent looking at the high shadow values in the reference scenario. To make the milk quota redundant, a further significant drop of milk prices would be necessary.

– Suckler cow production and bull fattening will be considerably influenced by decoupling. Both activities lose economic attractiveness. In Germany, the number of suckler cows and the production of bulls are consequently reduced by 7 % and 11%, respectively. The impact differs on the regional level (Table 4.1.2). While reductions of suckler cows are strongest in the centre of Germany suckler cow stock increases in Northern Germany.

– Bull fattening will be reduced by 14 % in the Centre and East; in both regions this activity is less important. Therefore, the regional concentration towards the North and South will be enforced.

– Pig and poultry production increases slightly due to the rise in pig and poultry prices. However, neither pig nor poultry production is directly affected by decoupling. Thus, the impact is quite limited.

– As sheep premiums are decoupled, sheep production should be negatively affected by decoupling. However, due to the quite favourable development of sheep meat prices in the underlying projection, the decoupling effect is overcompensated and the number of sheep will increase by 5 %.

Table 4.1.3: Impact of the scenario National Implementation on the shadow prices of milk quota

	Shadow prices of milk quota (rental)		
	Agenda €/t	SFP_nat €/t	rel. change %
Federal states			
Bayern	54.3	26.1	-52.0
Brandenburg	69.3	43.5	-37.3
Baden-Wuerttemberg	50.0	24.1	-51.8
Hessen	60.1	32.4	-46.0
Mecklenburg-Vorpommern	63.7	37.3	-41.5
Nordrhein-Westfalen	78.3	51.8	-33.9
Niedersachsen	78.7	54.7	-30.6
Rheinland-Pfalz	69.1	40.1	-41.9
Schleswig-Holstein	82.1	57.7	-29.7
Sachsen	63.8	36.5	-42.9
Sachsen-Anhalt	70.4	42.1	-40.2
Thueringen	62.2	36.0	-42.2
Germany	66.2	39.9	-39.8

Source: FARMIS-EU, 2006 INLB-EU-DG-AGRI/G.3.

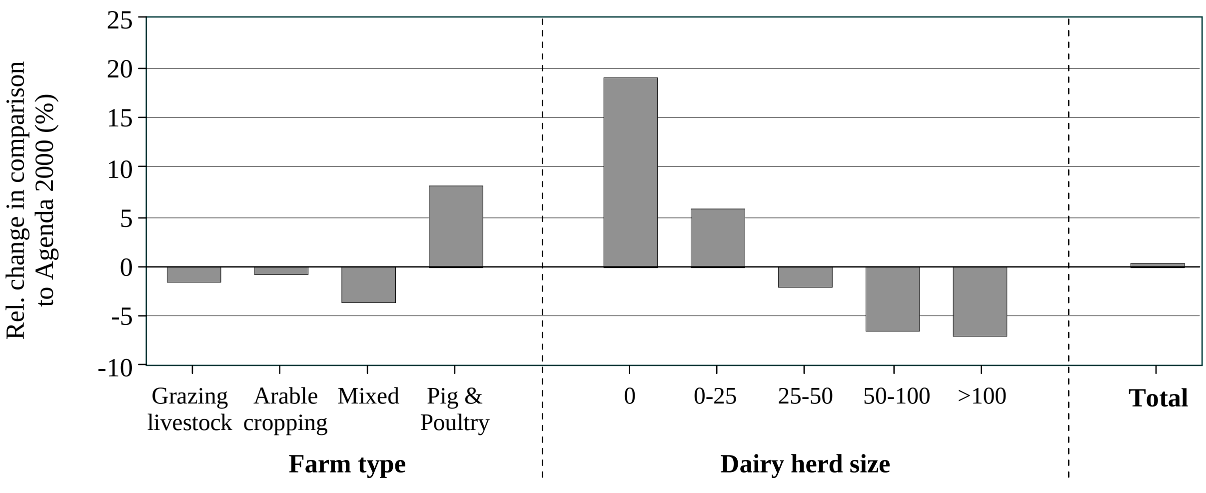
Impacts on income

For the general impact assessment of the National Implementation on agricultural incomes we use the indicator Farm Net Value Added (FNVA). FNVA measures the return to labour, land and capital irrespective of their ownership (e.g., rented or owner-occupied land, family or hired labour, own or borrowed capital), so that the profitability of similarly structured farms can be compared. Sectoral values for FNVA are given in Table 4.1.1.

At the sectoral level, the scenario National Implementation has almost no effect on FNVA compared to the reference. However, several aspects of the reform have an impact which is not visible at the sectoral level. Negative effects are induced by the introduction of mandatory modulation, the drop in milk prices and the sugar market reform. Positive, on the other hand, is the increase in cereal and meat prices and the enhanced market orientation. Concerning modulation, it is problematic that the use of modulation funds is not yet specified in EU-FARMIS. At the moment the payments are simply adjusted by the modulation rate, which means that FNVA is reduced by about 200 million € or about 2% on average. Part of the money will certainly flow back to the agricultural sector in the form of Pillar II measures.

Figure 4.1.2 shows the income effects of the National Implementation on farms differing by type and dairy cow size class[3]. Concerning the farm types, pig and poultry farms benefit the most, while arable crop farms and mixed farms suffer substantial losses. Looking at farms of different sizes (measured in the number of dairy cows), it is shown that specialized dairy farms are negatively affected while farms without cows, like bull fattening farms or farms with suckler cows will benefit. It cannot be deduced from the results whether farms specializing in suckler cows or farms specializing in bull fattening, or both, are benefiting, because both farm types are merged into one farm type. However, it is most likely that income increases for farms that have more grassland and operate on a lower intensity level. Farms with suckler cows fit into this pattern. This can be explained by price changes and the redistribution of premiums. Due to the regional implementation, farms with a high share of grassland and low animal stock density receive more direct payments under the new scheme. In contrast, specialized dairy farms suffer income reductions because their losses of milk premiums offset the gains of additional area premiums. Together with the reduction of milk prices, this causes a significant drop in income. Similarly, farms with a high share of sugar beet suffer significant income losses both due to the drop in sugar beets prices and due to the redistribution of direct payments.

Figure 4.1.2: Impact on FNVA: Effects of the National Implementation in comparison to Agenda 2000



Source: FARMIS; INLB-EU-GD AGRI/G.3.

[3] Only grazing livestock and mixed farms are included for the analysis of the effect on the dairy sector.

4.1.2 Alternative Implementation options

In addition to the National Implementation, five alternative scenarios are analysed: the SFP_hist, the SFP_reg and three types of partial decoupling called SFP_par1, SFP_par2 and SFP_par3. It is assumed that the schemes are implemented in the entire EU-15. The results at the sectoral level are given in Table 4.1.4. In Figures 4.1.3 - 4.1.6, the effects on land use and production in the regions are displayed. Figures 4.1.7 and 4.1.8 show the impact on farm income measured in FNVA for different farms types and dairy cow herd sizes, respectively.

Impacts of the SFP_hist

In the underlying scenario, we assume an EU-wide application of the scheme. Direct payments are fully decoupled, and their level is determined based on farm individual historical references. Concerning land use, the effects are similar to the effects of the National Implementation, but the reductions of cereals, oilseeds and protein crops tend to be more pronounced. However, the differences are quite low. They are mainly caused by the fact that the number of entitlements is lower than eligible area. Hence, for some land, no entitlements are available and it is much more likely that this land becomes fallow because it does not make sense for farmers to mulch land in order to keep it in good agricultural condition if no monetary incentive is given. Consequently, the amount of fallow land increases (see Figure 4.1.1). Additionally, it is striking that the sum of mulched land and fallow is higher in the scenario SFP_hist than in the scenario SFP_nat. This indicates that the requirement to keep land in good agricultural condition gives an incentive for production, because the relative attractiveness of mulching is low. Farmers are more likely to continue with production if they have to spend money for land management compared to a situation where they simply can let the land become fallow. Additionally, the amount of set aside increases.[4] Concerning land use, no clear regional pattern can be observed.

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[4] This is mainly due to a statistical effect. The share of set-aside in the scenario National Implementation is based on external information while in the other scenarios it is derived from the base year data.

Table 4.1.4: Impact of alternative implementation schemes on income, land use and production in Germany

		SFP_nat abs	SFP_hist	SFP_reg	SFP_par1	SFP_par2	SFP_par3
			Relative change to SFP_nat (%)				
Land use							
Cereals	1000 ha	6,169	-2.8	-0.9	2.0	-3.1	-3.2
Wheat	1000 ha	2,954	-2.4	-0.7	1.7	-2.6	-2.7
Barley	1000 ha	1,785	-2.9	-0.9	2.1	-3.2	-3.3
Rye	1000 ha	542	-4.9	-2.1	2.7	-4.8	-4.9
Oats	1000 ha	152	-2.8	-0.9	3.1	-3.4	-3.6
Oilseeds (Food)	1000 ha	936	-4.2	-1.3	2.8	-4.4	-4.5
Protein crops	1000 ha	210	-4.7	-1.5	3.2	-4.5	-4.6
Potatoes	1000 ha	211	-0.3	0.0	-1.1	-0.5	-0.5
Sugarbeets	1000 ha	354	0.0	0.0	0.0	0.0	0.0
Arable forrage crops	1000 ha	1,536	0.5	0.3	0.3	1.6	1.4
Fodder maize	1000 ha	1,025	0.6	0.5	0.7	2.1	1.7
Other fodder	1000 ha	511	0.4	-0.1	-0.4	0.5	1.0
Non-Food	1000 ha	378	-1.3	-0.3	-5.2	-1.5	-1.6
Set-aside	1000 ha	957	14.9	10.1	12.2	15.0	14.9
Grassland	1000 ha	4,476	-1.9	-0.5	-5.2	-1.9	-1.7
Intensive grassland	1000 ha	2,414	1.0	0.9	3.9	1.2	2.0
Extensive grassland	1000 ha	1,826	-2.8	-0.7	-8.5	-2.8	-2.9
Mulched area	1000 ha	228	-26.2	-12.7	-75.3	-27.6	-30.8
Fallow	1000 ha	20	(211.9)	(20.0)	(132.6)	(213.2)	(212.5)
UAA	1000 ha	15,274	-1.3	0.0	-0.7	-1.3	-1.3
Arable land	1000 ha	10,798	-1.0	0.2	1.1	-1.0	-1.1
Grassland	1000 ha	4,249	-0.6	0.2	-1.4	-0.5	-0.1
Livestock production							
Dairy cows	1000 heads	3,945	0.0	0.0	-0.1	0.0	0.0
Suckler cows	1000 heads	326	6.9	8.8	17.2	4.3	8.1
Bulls [1)]	1000 heads	1,488	3.0	2.7	3.2	9.4	6.9
Fattening pigs [1)]	1000 heads	54,729	0.2	0.2	0.0	0.0	0.0
Poultry	1000 heads	49,717	0.3	0.3	0.0	0.0	0.0
Sheep	1000 heads	1,390	4.1	4.3	7.5	12.9	12.2
Production							
Cereals	1000 t	42,751	-2.7	-0.9	1.8	-3.0	-3.0
Rape	1000 t	2,528	-3.8	-1.1	2.6	-4.0	-4.1
Non-Food	1000 t	1,371	-1.2	-0.3	-4.8	-1.4	-1.5
Sugarbeets	1000 t	23,951	0.0	0.0	0.0	0.0	0.0
Milk	1000 t	30,006	0.0	0.0	0.0	0.0	0.0
Beef	1000 t	1,002	2.5	2.4	3.1	5.1	6.5
Pork	1000 t	5,479	0.2	0.2	0.0	0.0	0.0
Poultry meat	1000 t	817	0.3	0.3	0.0	0.0	0.0
Economic indicators							
Production value	Mill €	29,250	0.5	0.9	0.6	-0.2	0.0
Total subsidies	Mill €	6,582	-0.2	0.0	-0.7	-0.6	-0.9
Direct payments	Mill €	4,979	0.0	0.0	-0.8	-0.6	-1.0
Variable input	Mill €	-18,563	-0.2	0.3	0.8	0.0	0.3
Other costs	Mill €	-3,445	0.0	0.0	0.0	0.0	0.0
Depreciation	Mill €	-5,430	-0.4	0.0	0.4	-0.3	-0.2
Interest	Mill €	-838	-0.4	0.0	0.6	-0.2	-0.1
Wages	Mill €	-2,869	-0.6	0.2	0.9	0.2	0.3
Rental value of land							
Arable land	Mill €	-2,011	-88.8	3.8	-83.4	-89.4	-89.3
Grassland	Mill €	-827	-76.6	2.8	-74.1	-78.5	-77.4
UAA	Mill €	-2,838	-85.3	3.5	-80.7	-86.2	-85.8
Income indicators							
Farm Net Value Added (FNVA)	Mill €	11,292	1.7	1.8	-0.4	-0.6	-0.8

( ) absolute values.
1) Annual production.
Source: FARMIS; INLB-EU-GD AGRI/G.3.

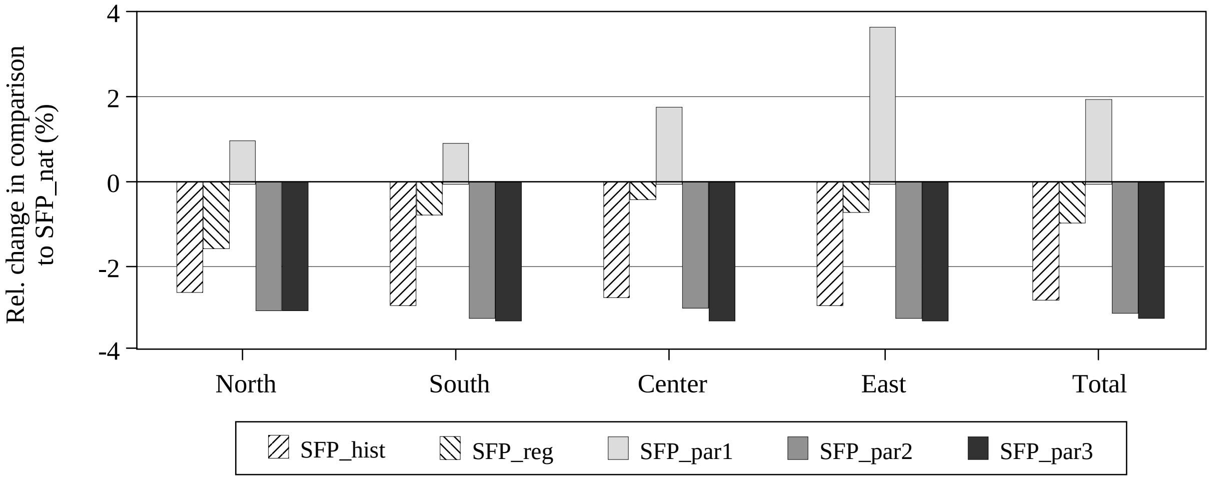
Differences between the National Implementation and the SFP_hist occur in the livestock sector as well:

– The production of suckler cows is higher in the scenario SFP_hist than in the National Implementation, although in both scenarios full decoupling is applied. This effect is caused by the simultaneous implementation of full and partial decoupling in the EU Members States. EU-FARMIS takes the implementation of different decoupling schemes partially into account even though results for other Member States are not presented here. Respectively, in the scenario National Implementation partial decoupling of suckler cow premiums in France leads to a lower economic attractiveness of suckler cow production in Germany compared to the scenario SFP_hist, where it is assumed that full decoupling is applied in all Member States. Suckler cow production in Germany consequently increases compared to the scenario SFP_nat by 6.9%.
– Bull fattening will be extended as well. This is mainly induced by higher beef prices. In western Germany the increase is more pronounced than in the East.

Sector income rises slightly (+1.7% of FNVA), mainly due to higher prices. The drop of total subsidies (0.2%) is induced by the increase of set-aside, which is assumed not to be eligible for LFA (compensatory allowance) and agri-environmental premiums. However, the reduction is more than offset by the price effect.

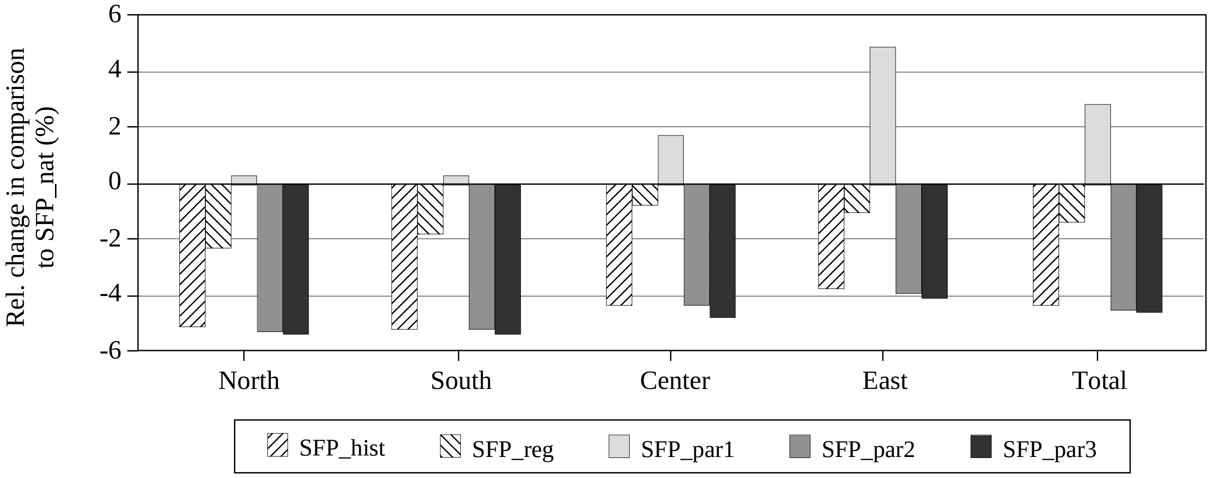
Rather than average figures; income effects at a more disaggregated level, i.e., farm type or farm size, are important (Figure 4.1.7). Arable cropping farms are better-off in the SFP_hist compared to the National Implementation, because sugar premiums are not redistributed to other farm types. Grazing livestock farms will have positive income effects as well, because they profit from higher beef and milk prices. Especially affected is the income of farms specialized on suckler cows, bulls or sheep which increases because they receive more direct payments (Figure 4.1.9).

Figure 4.1.3: Impact of alternative implementation schemes on cereal production



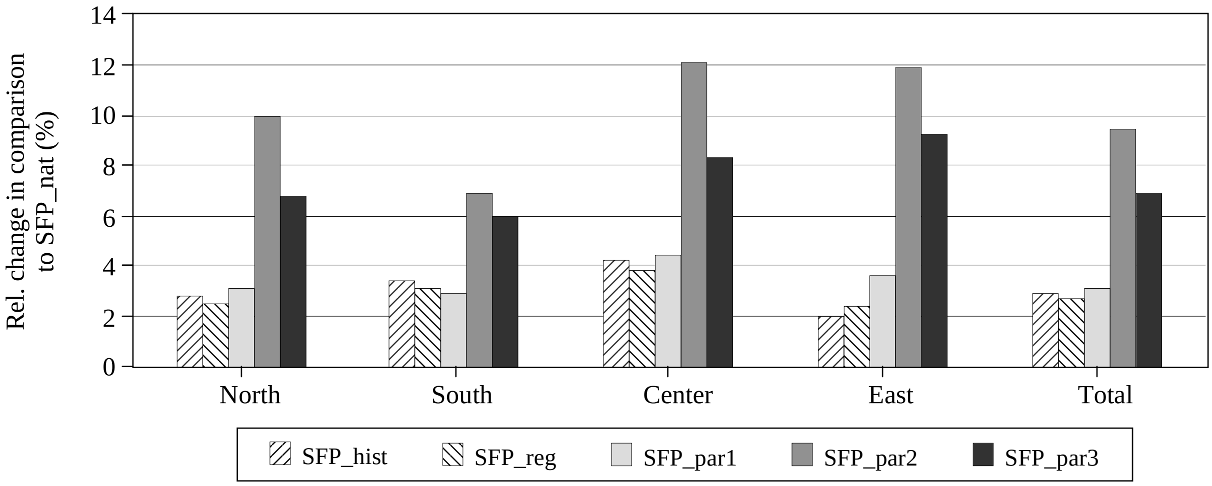
Source: FARMIS; INLB-EU-GD AGRI/G.3.

Figure 4.1.4: Impact of alternative implementation schemes on food oil seed production



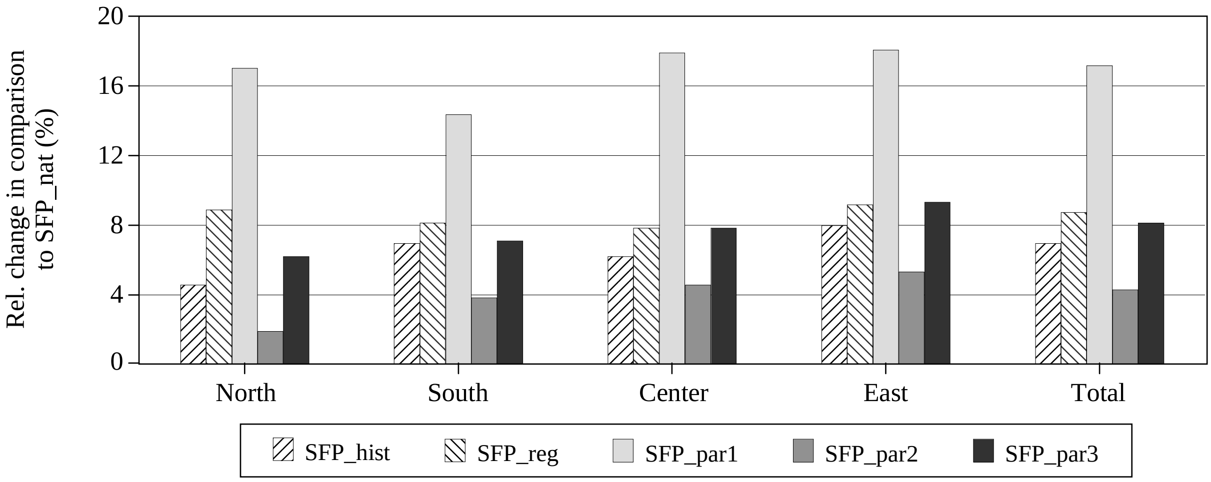
Source: FARMIS; INLB-EU-GD AGRI/G.3.

Figure 4.1.5: Impact of alternative implementation schemes on bull production



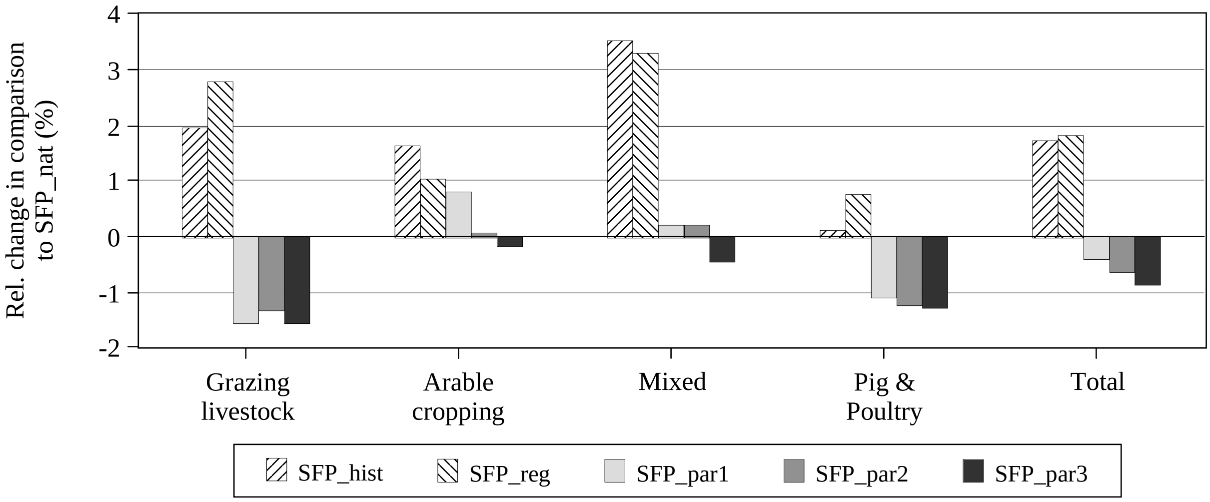
Source: FARMIS; INLB-EU-GD AGRI/G.3.

Figure 4.1.6: Impact of alternative implementation schemes on suckler cow production



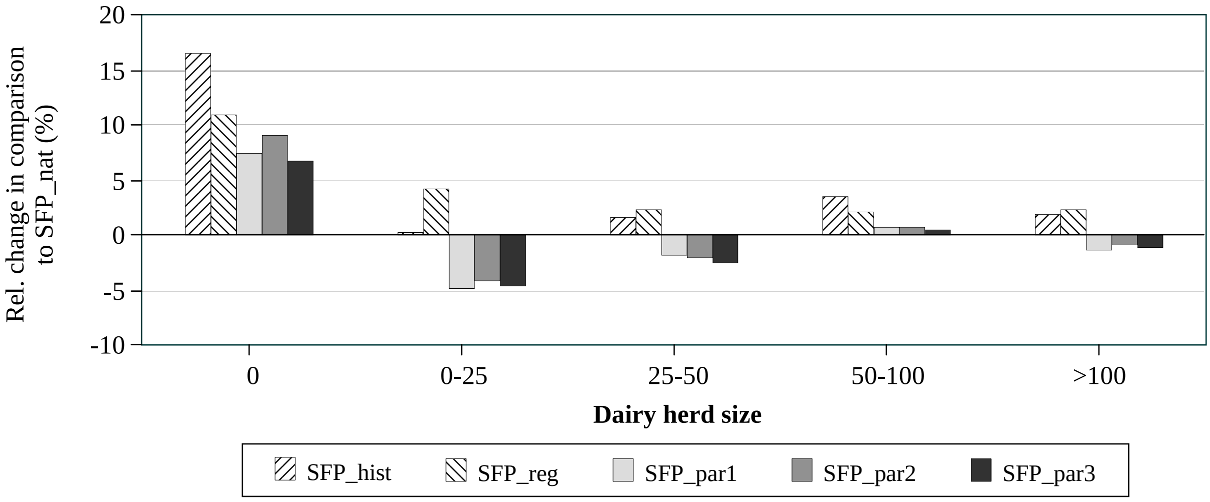
Source: FARMIS; INLB-EU-GD AGRI/G.3.

Figure 4.1.7: Impact on FNVA: Effect of alternative implementation schemes on different farm types in comparison to the National Implementation



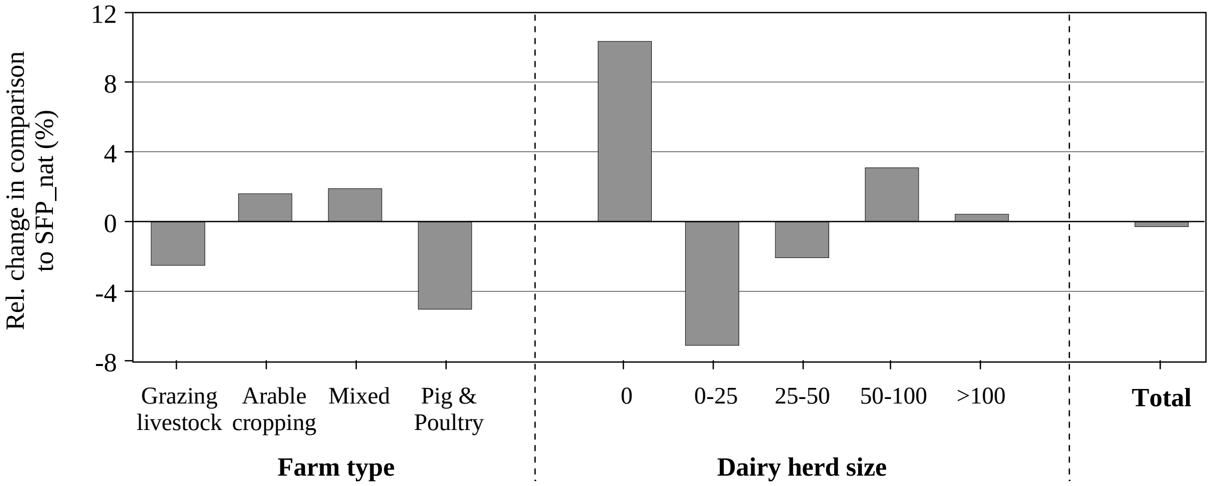
Source: FARMIS; INLB-EU-GD AGRI/G.3.

Figure 4.1.8: Impact on FNVA: Effect of alternative implementation schemes on different dairy farms size classes in comparison to the National Implementation



Source: FARMIS; INLB-EU-GD AGRI/G.3.

Figure 4.1.9: Redistribution of direct payments: SFP_hist in comparison to National Implementation



Source: FARMIS; INLB-EU-GD AGRI/G.3.

SFP_reg

This scenario differs from the National Implementation with regard to the following aspects. First, there is only one region and therefore, re-distribution effects of direct payments differ and second, full decoupling is applied in the whole EU, and consequently price assumptions are different. Therefore, allocation effects are similar to the scenario National Implementation. The most obvious changes concern the amount of set aside and mulched area. However, this is mainly due to different assumption concerning the share of set-aside.

Differences do exist in respect to the impact on income. At the sector level, changes are small and mainly induced by more favourable prices. At a more disaggregated level, however, income effects are quite significant. Effects at the federal state level, measured in NFVA, are given in Table 4.1.5. As factor allocation, prices and costs are similar, the main cause is the unified entitlement level. In the scenario SFP_reg, the payment level is equal across the sector and hence the re-distribution of direct payments is even more pronounced. The impact on the federal state level is displayed in Table 4.1.6. Compared to the National Implementation, Nordrhein-Westfalen, Schleswig-Holstein, Sachsen and Sachsen-Anhalt significantly lose premiums, while in Brandenburg, Baden-Württemberg, Hessen and especially Rheinland-Pfalz payments are higher. This corresponds to the income effects quite well.

Even more pronounced are the effects at the farm level, because not only the differences at the federal state level, but also at farm individual level, are equalized. It has to be kept in mind that due to the aggregation, re-distribution effects for farm groups are lower than for individual farms. Results at farm group level are given in Figure 4.1.10.

Table 4.1.5: Impact of regional and historical implementation on FNVA at federal state level

	SFP_nat	FNVA	
	SFP_nat Mill €	SFP_reg Relative change to SFP_nat (%)	SFP_hist
Federal states			
Bayern	2,005	1.2	1.5
Brandenburg	558	11.4	-4.4
Baden-Wuerttemberg	846	5.6	0.9
Hessen	365	6.0	1.9
Mecklenburg-Vorpommern	603	2.7	-0.3
Nordrhein-Westfalen	1,498	-0.4	5.0
Niedersachsen	2,607	1.2	1.9
Rheinland-Pfalz	381	11.0	-2.0
Schleswig-Holstein	813	-0.8	3.2
Sachsen	556	-1.4	1.7
Sachsen-Anhalt	649	-2.5	2.0
Thueringen	410	-0.6	2.2

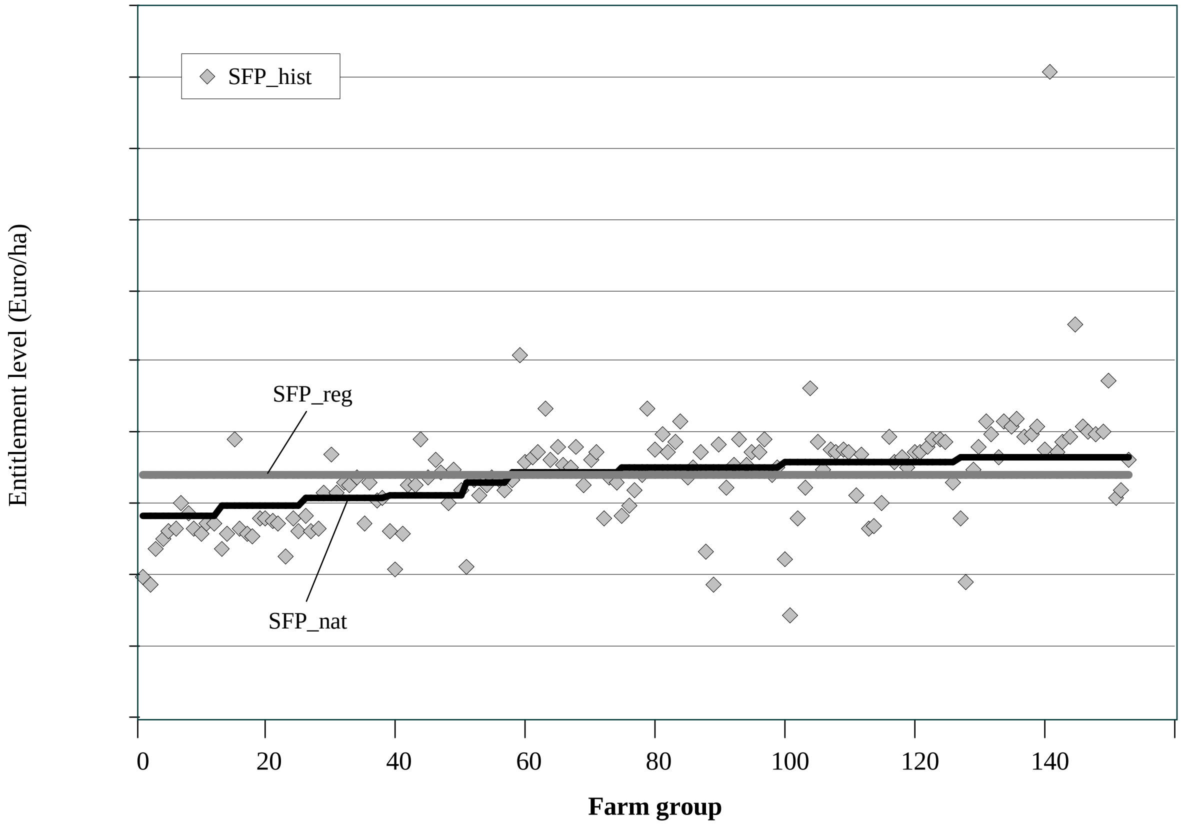
Source: FARMIS-EU, 2006 INLB-EU-DG-AGRI/G.3.

Table 4.1.6: Re-distribution of direct payments in the scenarios SFP_reg and SFP_hist at federal state level

		DP	
	SFP_nat Mill €	SFP_reg Relative change to SFP_nat (%)	SFP_hist
Federal states			
Bayern	953	-2.9	-1.9
Brandenburg	390	13.6	-9.1
Baden-Wuerttemberg	320	9.5	-2.4
Hessen	188	8.2	0.9
Mecklenburg-Vorpommern	306	2.8	-2.6
Nordrhein-Westfalen	504	-7.3	8.5
Niedersachsen	820	-1.3	0.8
Rheinland-Pfalz	173	20.4	-8.1
Schleswig-Holstein	295	-6.8	4.9
Sachsen	315	-5.0	1.1
Sachsen-Anhalt	437	-5.5	2.0
Thueringen	277	-3.2	1.4

Source: FARMIS-EU, 2006 INLB-EU-DG-AGRI/G.3.

Figure 4.1.10: Redistribution of direct payments on farm group level



Source: FARMIS; INLB-EU-GD AGRI/G.3.

Partial decoupling

Three scenarios for partial decoupling were analysed with EU-FARMIS. They represent options for the implementation of the 2003 CAP Reform that actually have been implemented in some Member States. The scenario SFP_par1 can be viewed as a scheme of ‘maximum coupling’. The Scenario is similar to the schemes applied in France and Spain. In the scenario SFP_par2, special premiums for male cattle and the sheep premium stay partially coupled. This scenario is similar to the final implementation schemes in Finland and Denmark. Finally, in the scenario SFP_par3, slaughter premiums for both calves and adult cattle stay fully coupled. This corresponds to the implementation in the Netherlands. The price projection of the National Implementation is used, meaning that prices are less favourable than in the full decoupling scenarios.

SFP_par1 induces a production incentive for both the crop and the livestock sector. Although only 25% of arable crop premiums are coupled, cereal production will increase by 2 %, and food-oilseeds and protein crops by about 3%. The rise is especially pronounced in eastern Germany. The amount of marginal land is reduced and the sum of fallow and mulched land decreases, correspondingly. Additionally, partial decoupling in the crop sector enhances the economic attractiveness of silage maize production compared to other arable fodder crops. Therefore, some of the effects observed in the total decoupling scenarios are reversed.

Concerning livestock, the most significant difference to the National Implementation is the increase in suckler cow production. Suckler cow premiums are coupled, and hence production is extended by 17 %. Bull fattening benefits from the partially coupled slaughter premium and is slightly extended. The increase in sheep production by 7.5 % is caused by production incentives of the partially coupled sheep premiums.

Changes in economic indicators can be summarized as follows: The production value increases by 0.6 %, subsidies are reduced by 0.7 %[5], variable inputs and wages slightly increase. FNVA will decrease by 0.4 % indicating that partial decoupling is, with respect to farm income, less favourable than full decoupling.

In scenarios **SFP_par2** and **SFP_par3,** direct payments concerning the livestock sector are coupled. In scenario **SFP_par2** coupling of the special premium for adult male cattle induces an increase of bull fattening by 9 %. This causes a slight rise in silage maize production. Due to partial decoupling of sheep premiums, sheep production increases in

[5] In EU-FARMIS the level of entitlement in the historical is derived from production levels in the base year 2002. As due to decoupling production of arable crops decreases, in scenarios with partial decoupling of arable crops the amount of total direct payments decreases as well.

the same magnitude. The effects on land use are similar to the effects observed for the Scenario SFP_hist.

The coupled slaughter premiums in scenario **SFP_par3** do not directly affect a specific cattle production system, but provide a more balanced production incentive. Effects of scenario **SFP_par3** in the cattle sector lie in between the effects of scenarios **SFP_par1** and **SFP_par2**. Bull fattening and suckler cow production increases by 6.8 and 8 %, respectively. The impact on sheep corresponds to the impact in the scenario **SFP_par2**. It is striking that in scenario **SFP_par1** the impact on sheep production is less pronounced than in the other scenarios with partial decoupling, despite the use of the same degree of coupling. The reason is probably the stronger competition from suckler cow production in scenario **SFP_par1**.

The impact on income does not differ significantly. In both scenarios income measured in FNVA is slightly lower than in the National Implementation. Figure 4.1.7 shows that grazing livestock farms suffer income losses in all partial decoupling scenarios while arable crop farms benefit in the case of the scenario **SFP_par1**. The reduction of income is mostly due to less favourable prices and the negative impact of coupling on efficiency.

4.1.3 Summary

Germany decided to fully decouple direct payments and made use of the option for regional implementation. 13 regions are distinguished. Entitlement levels are equal within regions, but differ among regions. The implementation scheme can be seen as one of the cornerstones of the broad range of decoupling options: others are the partial decoupling schemes introduced in France and Spain and the Irish approach based on full decoupling and entitlements derived individually for farms.

EU-FARMIS is used to quantitatively assess the impact of the broad range of implementation options on factor allocation, supply and income.

Full decoupling has significant impacts on land use and production due to the reduction of production incentives. Extensive roughage fodder production and non-production activities are extended. Main tendencies in land use are:

- Reduction of cereals, oilseeds, protein crops
- Partial substitution of silage maize by other arable fodder crops
- Transformation of both arable and grassland into mulched area
- Increase of fallow land in the case of the historical implementation

In the beef and sheep sector, the negative supply effects of decoupling are partially offset by increasing meat prices. Supply effects in the livestock sector are as follows:

- No changes in milk production
- Reduction of suckler cows and bull fattening, but a slight increase of sheep production, due to the favourable prices projections

Differences between the regional and the historical implementation are small, concerning the impact on supply and allocation. The regional implementation, however, induces a significant redistribution of direct payments from intensive livestock and arable farms to low intensity farming systems. In comparison to the National Implementation in Germany, a regional implementation scheme without regional differentiation of entitlement levels would further enhance the redistribution of direct payments.

Despite the reduction of direct payments by modulation, average income measured in FNVA increases due to decoupling. This is true for all full decoupling schemes, regional and historical implementation alike.

The analysis of three partial decoupling schemes shows that coupled payments for arable crops and livestock have significant production and allocation effects. In the case of direct payments for arable crops even a low degree of coupling prevents a significant share of land from becoming fallow or being mulched. Partial decoupling has a negative effect on income, however.

4.2 Case study Ireland

Shailesh Shrestha and Thia Hennessy

RERC, TEAGASC, Athenry

The Teagasc_model

The Teagasc_model is a dynamic linear programming model which maximizes gross margin at a farm level within different Irish regions. Regional farm level data used in the model was taken from the Irish National Farm Survey, 2002. The data was first separated according to the major farming system of the farm such as dairy, cattle, sheep or tillage farming systems; then farms in each system were further divided into different groups according to their characteristics using a cluster analysis technique. A number of farm variables such as farm size, animal number, gross margin, labour, milk yield etc were used in the cluster analysis but for the simplicity, farm types were designated in this paper at different scales of farm gross margin such as;

- Low scaled farms: < € 10,000
- Small scaled farms: €11,000 - €25,000
- Medium scaled farms: €26,000 - €50,000
- Large scaled farms: €51,000 - €75,000
- Specialist farms: > €76,000

The averaged figures for different parameters from each group were assumed to represent a particular farm type and used as input data in the model. The model runs for 16 years providing yearly outcomes. Price projections for different variables used in the model were calculated using a price index adopted from FAPRI-Ireland model.

The model consists of all possible farm activities which existed in the base year, 2002. It allows all farm groups to have individual activities based so that gross margin of the farm could be optimized. However, farms in a region were linked together with land and milk quota transfer activities. A farm could lease in land and milk quota only if there was availability due to letting out activity by other farm groups in the region.

National implication

Ireland started paying single farm payments to farmers from 2005 based on historical payments received by the farmers. The payment scheme was based on averaged number of animals and/or average hectares of land on which payments were claimed in years 2000, 2001 and 2002. These averaged figures were then multiplied by the 2002 payment rates and summed up for a farm to determine a single payment for that farm. In the model, single farm payment was calculated based on the payments received by the farmers in 2002, however, beef payments were calculated depending upon the numbers of eligible animal present on farms in that year. This was done for beef payments because the payments received by some farms differed widely from eligible amount of payments. This was due to a late payment of the previous year or partial payment in that particular year. Although, there is a full decoupling scheme implemented in Ireland, for this report two additional decoupling schemes were analyzed. The three scenarios used in the model runs are as follows.

– Full decoupling scheme: Under this scheme all farm payments received by a farm in 2002 were added up to provide a single farm payment for the farm. This payment was used in the model linked up with total farm land available on farm.

– Partial decoupling scheme: This scenario follows the partial payment rates as implemented in France; 25% arable payment, 100% suckler payment, 40% adult cattle slaughter payment, 100% calf slaughter payment and 50% sheep payment. All other farm payments were decoupled from the production.

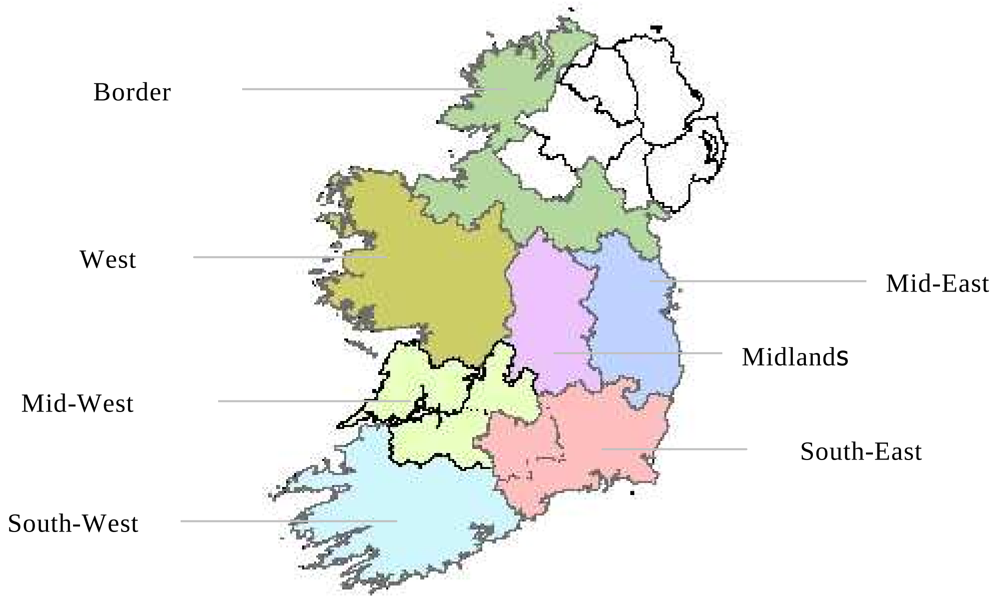
– Flat rate decoupling scheme: This scheme used a flat rate payment which was implemented over all regions. This flat rate payment was calculated as the sum of all payments paid to the weighted farm population across all eligible hectares in the country. This method of calculation provided an estimate of €270 per hectare.

As stated earlier, the price projection used in the model was based on price indices derived from FAPRI-Ireland model and same projection was used in all three scenarios. Although, as mentioned earlier, the model runs for a 16-year time frame, this report only provides results for year 2013.

Analysis

The model results are described for different regions in Ireland as listed in Figure 4.2.1.

Figure 4.2.1: Irish regions at NUTS III level



The Border region

In this region, medium scaled dairy farms which received higher milk price and had low input costs in the base year were projected to increase farm margin under the full decoupling scheme (Table 4.2.1). These farms increased their milk production by renting in milk quota in expense of less efficient dairy farms in the region. The farms benefited under all three decoupling scenarios however; increase in margin under partial decoupling scenario was lower than under other two scenarios. The small farms in this region were projected to lose more under a full decoupling scenario compared to the other two scenarios. In the case of flat rate scenario, the flat rate payment was more than the single farm payment received by these farms, hence the decrease in margin for these farms was smaller compared to the full decoupling scenario. Under the partial decoupling scenario, these farms kept on suckler cows to receive suckler payments and produced male calves to be sold at one year of age. This minimized the decrease in farm margin to some extent. The large farms had similar effects to the small farms but to a higher extent. Once payments were decoupled, beef farms reduced beef animals on farm as expected. The majority of farms had a decrease in margins, except those farms where beef production was making a loss. Once the payments were decoupled these farms had a reduction in variable costs which improved their farm margins. The beef farms in this region suffered the most under partial decoupling scenario. This was because the coupled payments under partial decoupling were not capable of increasing beef production and with lesser farm

Table 4.2.1: Percentage change in farm variables under different decoupling scenario on farms in the Border region

Farm groups	Base year		Rel. change to base year [1] (%) Full	Partial	Flat rate
	Farm margin (€)	**Direct payments (€)**			
Dairy					
Small	21,165	3,095	-27	-21	-14
Medium	33,036	7,597	27	13	28
Large	68,399	10,462	-3	-18	3
Beef					
Low	5,872	5,074	-20	-43	-17
Small	12,468	13,125	6	-34	-30
Medium	29,349	20,250	-6	-11	-3
Sheep					
Small	10,407	4,548	5	-1	-18
Tillage					
Large	62,806	32,244	1	0	-28
	Livestock (LU)				
Dairy					
Small	20		-25	-8	-25
Medium	28		33	31	21
Large	50		-8	-13	-2
Beef					
Low	23		-35	-35	-61
Small	45		-44	-44	-69
Medium	99		-32	-32	-63
Sheep					
Small	72		46	46	46
Tillage					
Large [2]	71		44	92	51
	Grassland use (ha)				
Dairy					
Small	19.5		0	-9	0
Medium	40.4		0	8	0
Large	67.6		0	-6	0
Beef					
Low	17.2		0	-10	0
Small	28.1		0	-10	0
Medium	68.5		0	-10	0
Sheep					
Small	7.1		0	0	0
Tillage					
Grassland	22.7		216	81	216
Arable land	49.1		-100	0	-100

1) Refering to farm margin, LU or ha, respectively.
2) Beef numbers.
Source: Qwn calculations.

payment, the farm margin decreased further compared to the full decoupling scheme. These farms removed all beef animals but maintained suckler cows and increased the number of male calves sold. The flat rate payment was almost same as the single farm payment, hence there was no big difference compared to full decoupled scenario except in the small beef farm group where lower rate of payment under a flat rate caused a substantial decrease in the margins. Sheep farms had a slight increase in farm margin under full decoupling. These farms increase sheep number substantially. However, these farms lose out under partial and flat rate decoupling scenario. Farm margins remained almost same under full and partial decoupling scenarios in the case of tillage farms in this region. However, under full decoupling, these farms moved arable land to grassland to expand livestock production. But in case of partial decoupling the farms carried on arable production and increased grassland by leasing in land from other farms. The tillage farm had a substantial decrease in margin under flat rate scenario as the flat rate was lower than single farm payment attached to land.

The Mid-East region

In this region (Table 4.2.2), there were three groups of dairy farms among which the specialist dairy farms were projected to benefit from full decoupling as milk production is profitable for these farms and they increased their production by renting in milk quota from other farms. The large farms although decreasing their milk production, were still producing male calves to sell, and hence were able to compensate the loss due to reduced milk production. All dairy farms decrease in farm margin under partial decoupling scenario compared to the full decoupling scheme. However, under the flat rate scenario all dairy farm groups had a slight increase in farm margin as the flat rate was higher than single farm payment received by these farms. There was a decrease in dairy animals on farms in the medium and large dairy farm groups as milk quota moved from these farms to the specialist farms. There was also a move of grassland to beef farms under the full and partial decoupling scenarios. Beef farms in this region had a profitable beef system in the base year hence these farms kept on producing beef even where the payments were decoupled. However, these farms decreased 2 year-olds on farms and increased the number of beef sold after one year of age. These farms also increased sheep numbers by 27%. These farms had a slight increase in the farm margin under partial decoupling as the number of animals increased to exploit payments attached. The margin decreased substantially under flat rate scenario compared to other two scenarios. The effect of decoupling was positive under all types of scenario in this region. These farms increased sheep number on farms substantially. Sheep farms in the region were projected to benefit more under a flat rate payment scheme. Tillage farms were benefited under both full as well as partial decoupling scenarios.

Table 4.2.2: Percentage change in farm variables under different decoupling scenarios on farms in the Mid-East region

Farm groups	Base year		Rel. change to base year [1] (%)		
			Full	Partial	Flat rate
	Farm margin (€)	**Direct payments (€)**			
Dairy					
Medium	55,809	10,127	-3	-9	5
Large	67,725	12,315	0	-2	5
Specialist	131,370	29,551	9	2	6
Beef					
Medium	36,207	21,991	42	47	3
Sheep					
Medium	41,456	14,477	0	8	7
Tillage					
Medium	55,799	34,259	8	35	-7
	Livestock (LU)				
Dairy					
Medium	9		-3	-8	5
Large	63		-11	-10	-11
Specialist	94		8	9	5
Beef					
Medium	90		88	147	92
Sheep					
Medium	194		56	47	56
Tillage					
Medium [2]	169		188	149	240
	Grassland use (ha)				
Dairy					
Medium	45.4		-10	-10	0
Large	64.4		-10	-10	0
Specialist	119.3		0	-10	0
Beef					
Medium	51.8		12	52	0
Sheep					
Medium	57.9		0	-7	0
Tillage					
Grassland	84.2		46	0	46
Arable land	38.4		-100	0	-100

1) Refering to farm margin, LU or ha, respectively.
2) Sheep numbers.
Source: Own calculations.

There was a substantial increase to farm margin under partial decoupling scenario where these farms continued arable farming whereas under other decoupling scenarios arable land was moved to grassland. Under all three scenarios, there was a substantial increase in sheep number on farms.

Table 4.2.3: Percentage change in farm variables under different decoupling scenarios on farms in the Midland region

Farm groups	Base year		Rel. change to base year [1] (%)		
			Full	Partial	Flat rate
	Farm margin (€)	**Direct payments (€)**			
Dairy					
Medium	39,769	17,990	14	-3	2
Large	73,860	18,675	19	12	15
Beef					
Medium	38,254	24,794	-6	-10	-38
Small	11,428	14,426	15	-57	-46
	Livestock (LU)				
Dairy					
Medium	22		-25	-25	-25
Large	45		10	10	10
Beef					
Medium	111		36	36	72
Small	61		-67	-67	-100
	Grassland use (ha)				
Dairy					
Medium	52.6		0	0	0
Large	74.1		0	0	0
Beef					
Medium	54.9		0	0	0
Small I	30.2		0	12	0
Small II	35.2		0	-10	0

1) Refering to farm margin, LU or ha, respectively.
Source: Own calculations.

The Midland region

There were two groups of dairy farms in this region (Table 4.2.3). Both of them were projected to improve farm margins under the full decoupling scenario although for different reasons. The large dairy farms increased their milk production by leasing in milk quota from farms in the medium dairy farm group. The medium sized farm group increased their farm margin by increasing beef animals on farms. For this dairy group beef production was more profitable than milk production. The large farms also had an increase in the margin under partial decoupling although the increase was to lesser extent. However, the medium farms suffered a loss when payments were coupled partially. There was reduction in milk production as well as beef production on farms. Under the flat rate scheme, all dairy farms in this region had an increase in margins. These farms also did not move grassland under any decoupling scenario. The medium scaled beef farms in this region did not benefit from any of decoupling scenarios. These farms reduced beef numbers when payments were decoupled, however they kept on sucklers and increased the number of calves sold. The small beef farms had an increase in margin under full decoupling as they reduced beef animals to zero and saved input costs.

Table 4.2.4: Percentage change in farm variables under different decoupling scenarios on farms in the Mid-West region

Farm groups	Base year		Rel. change to base year [1] (%)		
			Full	Partial	Flat rate
	Farm margin (€)	**Direct payments (€)**			
Dairy					
Medium	33,563	5,183	18	40	30
Large	75,105	13,049	-17	-6	-7
Beef					
Small	21,913	26,351	-5	5	-11
Low	7,292	11,132	11	48	-17
	Livestock (LU)				
Dairy					
Medium	28		35	51	35
Large	63		-2	-12	-2
Beef					
Small	118		-100	-70	-100
Low	47		-100	-64	-100
	Grassland use (ha)				
Dairy					
Medium	33.9		31	12	31
Large	76.9		0	0	0
Beef					
Small	92.3		0	0	0
Low	33.6		0	0	0

1) Refering to farm margin, LU or ha, respectively.
Source: Own calculations.

The Mid-West region

In this region, the medium sized farm groups among dairy farm groups did well under decoupling (Table 4.2.4). These were the most efficient dairy farms in the region which were also paying less for renting in milk quota than other farms in the base year. Farms in this group were also able to improve their margins under partial decoupling. All dairy farms faired better under the flat rate compared to other decoupling scenarios as the flat rate was higher than payments in other scenarios. There were only small and low scaled beef farms in this region and these farms completely removed all beef animals on farms under the full decoupling scheme. The small scaled beef farms had a small decrease in farm margin whereas the low producing farms had an increase in farm margins as their input costs was reduced. All of the beef farms improved their farm margin when partial decoupling schemes were implemented. These farms reduced beef animals substantially but maintained suckler cows. Under the flat payment scheme, all beef farms had a decrease in farm margins as the flat rate was less than the rate of single farm payment

Table 4.2.5: Percentage change in farm variables under different decoupling scenarios on farms in the South-East region

Farm groups	Base year		Rel. change to base year [1] (%)		
			Full	Partial	Flat rate
	Farm margin (€)	**Direct payments (€)**			
Dairy					
Medium	31,936	10,478	35	23	30
Large I	63,739	20,203	0	-12	-13
Specialist	118,151	49,832	31	9	-3
Beef					
Medium	52,465	30,142	7	-12	-49
Tillage					
Large	83,469	40,764	-5	-5	-56
Small	18,254	10,131	-11	-4	-12
	Livestock (LU)				
Dairy					
Medium I	24		29	36	52
Large I	50		-29	-29	-23
Specialist	66		34	31	9
Beef					
Medium	120		37	42	-100
Tillage					
Large [2]	99		-40	0	-83
Small [2]	27		-100	-67	-82
	Grassland use (ha)				
Dairy					
Medium I	32.3		0	5	0
Large I	66.4		0	0	0
Specialist	114.9		0	4	0
Beef					
Medium	54.7		0	4	0
Tillage					
Large (grassland)	60.3		0	0	54
Large (arable land)	32.8		-100	-100	-100
Small (grassland)	25.0		0	0	32
Small (arable land)	7.9		-100	-100	-100

1) Refering to farm margin, LU or ha, respectively.
2) Beef numbers.
Source: Own calculations.

The South-East region

The medium sized dairy farms in this region were benefited from decoupling in all scenarios (Table 4.2.5). They were able to increase their production by renting in milk quota from other farms and moving land within the farms from beef to dairy. The specialist dairy farms had a substantial increase in farm margin under full decoupling. These farms pooled in milk quota from other less efficient dairy farms and increased their milk production by one third. However, these farms lose out when a flat rate payment was introduced.

The South-West region

In this region, surprisingly all of the larger dairy farms decreased milk production under the full decoupling scenario (Table 4.2.6). However, the same trend was seen under the baseline scenario where Agenda 2000 was implemented. In this region larger dairy farms producing milk had a higher input costs. Hence the model predicted these farms would reduce input costs and improve margins. That is the reason why, under decoupling scenarios, these large farms cut down milk production to improve farm margins. The small farms with low input costs benefited most under decoupling where they had a chance to expand milk production by renting in milk quotas from larger farms. The sheep farms in this region were projected to fair better under all three decoupling scenarios. These farms increased substantial number of sheep on farm to exploit the low cost input and increasing sheep price under decoupling scenarios. For the beef farms, beef production did not remain profitable under any form of decoupling and animal production was reduced substantially on all beef farms.

Table 4.2.6: Percentage change in farm variables under different decoupling scenarios on farms in the South-West region

Farm groups	Base year		Rel. change to base year [1)] (%)		
			Full	Partial	Flat rate
	Farm margin (€)	**Direct payments (€)**			
Dairy					
Small	22,348	4,733	41	24	23
Medium II	55,351	14,269	0	-7	-10
Large II	84,702	15,114	1	-10	-12
Specialist	112,858	25,111	0	-7	-10
Beef					
Small	13,670	11,833	-16	-15	-21
	Livestock (LU)				
Dairy					
Small	24		48	45	48
Medium II	36		11	7	11
Large II	59		-17	-20	-17
Specialist	69		-8	-3	-8
Beef					
Small	52		-64	4	-64
	Grassland use (ha)				
Dairy					
Small	22.4		7	15	7
Medium II	65.8		-7	0	0
Large II	55.8		0	0	0
Specialist	93.3		0	0	-5
Beef					
Small	41.1		0	-7	0

1) Refering to farm margin, LU or ha, respectively.
Source: Own calculations.

Table 4.2.7: Percentage change in farm variables under different decoupling scenarios on farms in the West region

Farm groups	Base year		Rel. change to base year [1] (%) Full	Partial	Flat rate
	Farm margin (€)	**Direct payments (€)**			
Dairy					
Medium	36,964	9,684	-2	-13	3
Beef					
Low	5,710	5,662	-28	-86	-36
Small	10,980	14,175	21	-52	3
Sheep					
Small	12,161	4,806	24	57	18
	Livestock (LU)				
Dairy					
Medium	27		0	0	0
Beef					
Low	24		-100	-100	-100
Small	62		-100	-100	-100
Sheep					
Small	75		267	423	261
	Grassland use (ha)				
Dairy					
Medium	37.7		-21	0	0
Beef					
Low	16.4		0	-100	0
Small	44.3		0	-6	0
Sheep					
Small	18.2		58	115	0

1) Refering to farm margin, LU or ha, respectively.
Source: Own calculations.

The West region

There was only one type of dairy group in this region which had medium scaled farms (Table 4.2.7). There, farms had only a slight decrease in farm margin under full decoupling and partially decoupled payments, however, these farms benefited from the flat rate payments. All the beef farms, except one small group had a decrease in farm margin under full decoupling. These farms were selling male calves in the base year without any variable costs included, hence gross margin in that year was greater than later years. These farms removed all beef from farms and after decoupling these were receiving only the single farm payments. The small farms were producing beef at a loss and once payments were decoupled, they removed all animals and hence improved their farm margins. However, these farms lose out substantially under partial decoupling as the payment rate was cut down. There was only a slight improvement of farm margin under the flat rate scheme.

4.3 Effects of the 2003 CAP reform on Italian agriculture

Filippo Arfini, Michele Donati, Roberto Solazzo

Dipartimento di Studi Economici e Quantitativi, Sezione di Economia Agroalimentare, Parma

The present analysis aims to provide a perspective framework about the impact of the CAP reform on Italian agriculture. The evaluation is carried out applying a model based on Positive Mathematical Programming (PMP); a methodology widely used to assess farmers' responses to changes in agricultural policy measures.

The PMP methodology allows to capture the dynamics of those variables characterising the farmer's behaviour within a territorial context. Briefly, the PMP, through a reconstruction of the total cost function, imitates the decision process of the entrepreneur and reproduces the allocative choices of the farmers. In this way, the model can consider all relevant information about the structure of costs related to the farm production system as known or only perceived by farmers.

The information used by the model is collected from two different sources of data: the IACS databank and the FADN archive. The first collects all the administrative information about land allocation for those farms that receive a subsidy from the EU; the second is the timely and reliable source of information on the accountancy of a representative sample of EU farms.

Both kinds of information sources are jointly used in the mathematical model. Indeed, the model is developed taking into account the agricultural area information derived from the IACS databank and the economic (prices) and technology (yields) information provided by FADN. The lack of information for animal processes made it necessary to address the attention to other sources of information, in particular the National Census of Agriculture.

The PMP model, called AGRISP (Agricultural Regional Integrated Simulation Package)[6], considers all the policy measures introduced by Reg. 1782/2003 and, in particular, the decoupling system (and its various declinations) and modulation. The main results provided by the model used in this study are related to the effect on land allocation. Linked with the change in the production plan, the model is able to assess the effect of

[6] ARFINI F., DONATI M., ZUPPIROLI M. (2005). Agrisp: un modello di simulazione regionale per valutare gli effetti per l'Italia di modifiche delle politiche agricole. Edited by G. ANANIA. La riforma delle politiche agricole dell'UE ed il negoziato WTO. (pp. 81-128). ISBN: 88-464-7227-6. MILANO: Franco Angeli (ITALY).

the new organisation on the main economic variables leading the entrepreneur decisions (gross margin, GSP, level of aids and total production costs).

The evaluation process considers the new agricultural policy scenarios and the likely influence on the agricultural price perspectives provided by the estimations of ESIM.

Policy scenarios

For this analysis the scenario SFP_hist is compared to the baseline scenario "continuation of Agenda 2000 policies": The baseline is developed in order to establish a reference scenario which makes it possible to analyse the impact of the modified policy measures. The baseline represents the set of agricultural policy measures in force in 2003, the last year the application of Agenda 2000. Consequently, the ESIM price scenario for Agenda 2000 (2013) is used.

In the scenario SFP_hist it is assumed that full decoupling is applied and that entitlements are based on farm individual, historical references. For the projection of prices the ESIM estimates for full decoupling are used (see Table 3.4.1).

Land allocation

The Tables 4.3.1 and 4.3.2 highlight that the CAP reform seems to have a relevant impact on land allocation, in particular for cereals, oilseeds and fodder plants. Cereals sustain the widest reduction equal to 15.6% in the scenario (SFP_hist), with a curb in silage maize of about 20% and lighter variations for maize and other cereals. Between the scenario "SFP_hist" and the baseline, durum wheat acreage is reduced by more than 300.000 hectares although the horizontal regulation introduces 40€/ha for quality grain.

Despite the increase in prices for durum and soft wheat (+2,3% and +3,7%) the area of these crops indicates a strong reduction (soft wheat –16.3% and durum wheat –18.6%).

Table 4.3.1: Variations in crops acreage – ITALY

Activities	Baseline	SFP_hist	SFP_hist
	ha		var. %
Cereals	4,017,800	3,391,468	-15.6
Oilseeds	425,954	385,462	-9.5
Fodder plants	2,410,160	2,834,111	17.6
Other crops	541,734	581,417	7.3
Set-aside	294,610	282,505	-4.1
Good practice area	0	215,295	
Total surface	**7,690,258**	**7,690,258**	**0.0**

Source: own calculations

Decoupling induces a substitution of the crops with high production cost with crops less expensive in terms of variable input use. Relevant cases of substitution among crops are related to cereals and fodder crops, but also the substitution between cereals and the good practice area. In certain areas, like in Southern Italy, the more evident substitution is detected for the durum wheat which is substituted by sunflower. The fodder crops benefit from their relative profitability due to the single payment and the low costs of production. The good practice area[7] is eligible for the single payment as well and it is characterized by low cost for maintenance, estimated at 250 €/ha. This area reaches more than 200,000 hectares in scenario SFP_hist.

It is interesting to note that the good practice area is concentrated in the zone with the highest agricultural productivity (Region Padano-Veneta; see Table 4.3.3). This result can be attributed to the high level of specific coupled aid lost after the implementation of the single payment system. Furthermore, this result is due to the presence of a high number of part-time farms in these areas.

Table 4.3.2: Variations in crops acreage (crop details) – ITALY

Activities	Baseline	SFP_hist	SFP_hist
	ha		var. %
Cereals			
Maize	1,251,961	1,062,735	-15.1
Silage	110,101	87,820	-20.2
Durum wheat	1,722,181	1,401,844	-18.6
Barley	304,054	281,729	-7.3
Soft wheat	526,682	440,867	-16.3
Other cereals	212,922	204,293	-4.1
Oilseeds			
Soya	227,753	189,497	-16.8
Other oilseeds	198,201	195,965	-1.1
Protein crops	85,244	86,785	1.8
Rice	169,586	211,719	24.8
Fodder crops			
Meadows	1,474,449	1,784,622	21.0
Other fodder plants	935,712	1,049,489	12.2
Other crops			
Sugarbeet	172,083	181,241	5.3
Vegetables	30,310	31,671	4.5
Other vegetables	63,542	62,711	-1.3
Tobacco	20,968	7,291	-65.2

Source: own calculations

[7] Good practise area (GPA) is comparable to mulching (see Chapter 4.1).

Figure 4.3.1: Dynamics in land allocation - Italy

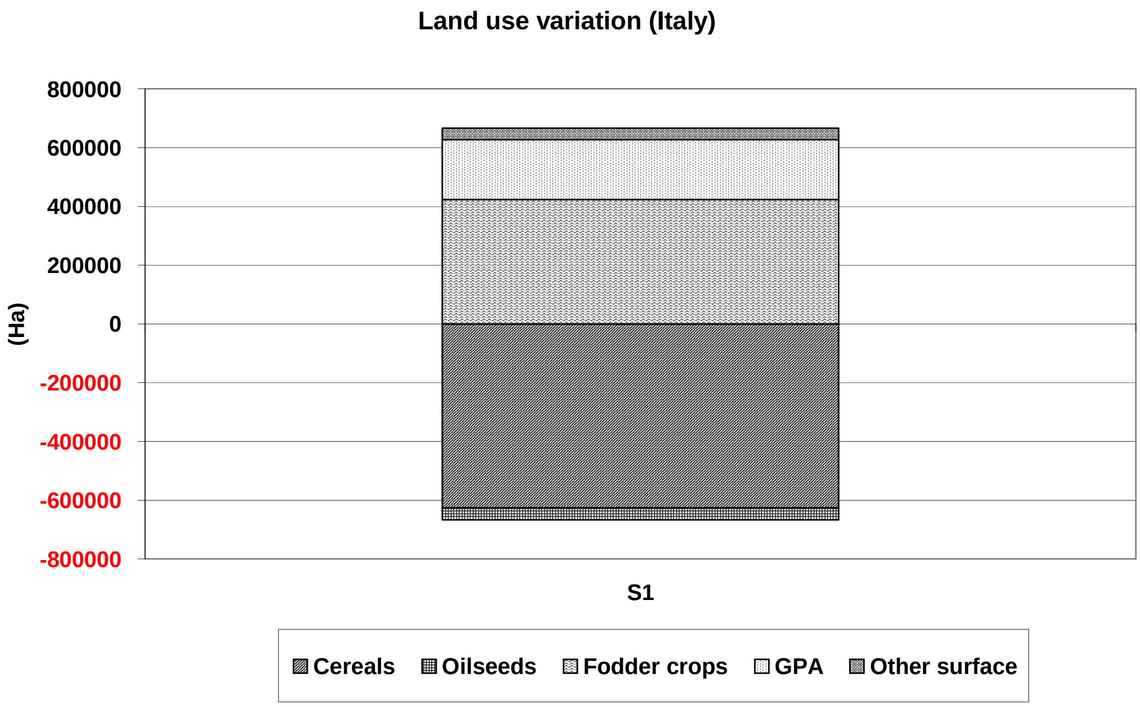


Table 4.3.3: Variations of crops acreage per geographic area – ITALY

Activities	Geographic Areas	Baseline	SFP_hist	SFP_hist
		ha		var. %
Cereals	North	1,703,538	1,459,663	-14.3
	Centre	770,063	613,345	-20.4
	South	1,544,198	1,318,460	-14.6
Oilseeds	North	261,080	215,402	-17.5
	Centre	130,109	107,655	-17.3
	South	34,764	62,404	79.5
Fodder plants	North	748,729	845,733	13.0
	Centre	446,145	606,557	36.0
	South	1,215,286	1,381,821	13.7
Other crops	North	348,903	392,558	12.5
	Centre	88,070	82,456	-6.4
	South	104,761	106,403	1.6
GPA	North	0	158,138	
	Centre	0	26,060	
	South	0	31,096	

Source: own calculations

Livestock production

The net result of the decoupling system portrayed by scenario SFP_hist shows an increase in animal stock, in particular for beef and milk cows, while for slaughter cows the trend is negative(Tables 4.3.4 - 4.3.5). The reason of this positive dynamic for milk cows and beef is the strict linkage between fodder crops and activities. This kind of relationship allows consideration of the two activities as one activity that participates in the process of maximization of the gross margin.

The reduction in beef prices proposed by scenarios SFP_hist (-4.6%) is lower than the price reduction in Agenda 2000 (2013) (-18.4%) so, despite the beef price decrease, there is an increase of this variable.

The foreseen important increase in prices for sheep production leads to an augmentation of sheep of 3.4% in SFP_hist.

It is important to remark that the livestock component of the model is related to the animals bred by farms with arable crops. For this reason, the farms specialized in beef fattening, which do not possess own land, are not considered in the present analysis.

Table 4.3.4: Dynamics for animal production - Italy

Activities	Baseline	SFP_hist	SFP_hist
	LU		var. %
Beef	1,320,459	1,565,881	18.7
Milk cows	636,116	670,010	5.3
Slaughter cows	374,768	350,818	-6.4
Sheep	531,755	549,960	3.4
Goats	178,110	145,924	-18.1

Source: own calculations

Table 4.3.5: Dynamics for animal production per geographic area - Italy

Activities	Geographic Areas	Baseline	SFP_hist	SFP_hist
		LU		var. %
Beef	North	786,527	929,043	18.1
	Centre	109,942	135,774	23.5
	South	423,990	501,064	18.2
Milk cows	North	403,996	423,185	4.7
	Centre	41,053	45,980	12.0
	South	191,066	200,845	5.1
Slaughter cows	North	132,772	128,650	-3.1
	Centre	39,872	39,489	-1.0
	South	202,124	182,679	-9.6
Sheep	North	20,240	20,530	1.4
	Centre	82,707	90,871	9.7
	South	428,808	438,560	2.3
Goats	North	34,784	25,312	-27.2
	Centre	14,111	10,911	-22.7
	South	129,215	109,700	-15.1

Source: own calculations

Economic results

The solutions of the PMP model provide information about variations of important economic variables. In this context, the analysis will focus on changes in revenue (GSP), level of aids, production costs and on modifications of gross margins.

In particular, one can observe a very small reduction of gross margin mainly due to the reduction of direct payments by modulation (Table 4.3.6).

The dynamics on gross margin are reflected in the other components of farm revenue. The gross saleable production under the application of the CAP reform shows a reduction of over 7%, and an increase of the values for the level of subsidies. Additionally, it is important to note that the level of production costs is significantly reduced.

As the price reductions in “SFP_hist” are mitigated by price reductions in the baseline, there is a low decrease of gross margin (-3%).

Table 4.3.6: Variations in economic results - Italy

Economic variables	Baseline	SFP_hist	SFP_hist
	1,000 €		var. %
GSP	24,642,942	22,808,449	-7.4
Net aids	2,437,072	2,535,218	4.0
Total variable costs	13,105,633	11,792,506	-10.0
Gross margin	13,969,232	13,544,822	-3.0

Source: own calculations

Table 4.3.7: Variation of the economic results by geographic area

Economic variables	Geographic areas	Baseline	SFP_hist	SFP_hist
		1,000 €		var. %
GSP	North	7,244,135	6,919,924	-4.5
	Centre	6,062,302	5,312,472	-12.4
	South	11,336,504	10,576,053	-6.7
Net subsidies	North	1,055,893	1,249,311	18.3
	Centre	494,699	435,736	-11.9
	South	886,479	850,170	-4.1
Production costs	North	3,915,312	3,636,575	-7.1
	Centre	3,229,643	2,734,119	-15.3
	South	5,960,678	5,421,812	-9.0
Gross margin	North	4,384,158	4,531,788	3.4
	Centre	3,327,065	3,013,703	-9.4
	South	6,258,010	5,999,331	-4.1

Source: own calculations

Table 4.3.7 shows the changes of economic results achieved in the different scenarios for each Italian geographic area. The decoupling mechanism leads to a general increase of gross margins in the North of Italy, where the new payment based on milk quota contributes to this positive performance of the farms in those areas. Meanwhile, the Centre and South Italy are characterized by a decrease of gross margins induced by more limited land allocation options than in the North, and a lower weight of the animal production systems.

4.4 Analysis of the impact of different decoupling options on Spanish agriculture

L. Júdez*, M. Ibáñez*, R. de Andrés**, E. Urzainqui**, J. L. Miguel *

* Departamento de Estadística y Métodos de Gestión en Agricultura. ETSIA/UPM, Madrid
** Departamento de Economía. Instituto de Economía y Geografía. CSIC, Madrid

4.4.1 Introduction

This report analyses the impacts of different agricultural policy options on Spanish agriculture[1]. The analysis was conducted by comparing base year figures of 2002 for the main farm types defined in the Spanish FADN to the results found by simulating different agricultural policy measures with the PROMAPA.G model[2].

The policies simulated were as follows:

– Continuation of the Agenda 2000 measures in place in the base year (Agenda)
– Partial decoupling, adjusted to conform as closely as possible to the new CAP reform measures adopted by Spain (SFP_nat)
– Full decoupling. In this scenario all crop and livestock payments were regarded to be decoupled with the exception of certain specific payments for protein crops, durum wheat, rice and cotton (SFP_hist)
– Full decoupling in which the same payment entitlement per ha was applied to all farm types (regional model). The payments listed as coupled in the preceding scenario were treated as coupled in this scenario as well (SFP_reg)

Although Spain has adopted partial decoupling for the years to come, this paper analyzes the possible effects of that policy, but also the consequences of a continuation of Agenda 2000 measures and the implementation of full decoupling. In addition to a comparison of the findings for different scenarios, this exercise provides an analysis of the consistency of the results obtained with the model.

[1] Professors Argimiro Daza and Ismael Ovejero made a significant contribution to this study. Specifically, they furnished all the information on cattle and sheep livestock, including data on feed and grassland and fodder crop yields.

[2] The measures considered for cotton refer to the scheme in place until 7 September 2006, when they were cancelled by an EU Court of Justice sentence. The results on which this report are based were obtained prior to that date.

Before describing the main results, the effects of the different calibration procedures are reviewed below. To this end, a comparison of results obtained by calibrating the model with three methods is provided: the standard PMP procedure, the technique using maximum entropy and the procedure that takes account of exogenous supply elasticities. With the exception of horticultural crops, where an elasticity of 0.1 was assumed[3], the elasticities adopted for the third method were the same values as used by FAL in the EU-FARMIS model. Finally, nearly all the results were obtained assuming real price variations. Nonetheless, a brief comparison of these findings against nominal price effects is given below.

Effect of the calibration method

As indicated above, three procedures may be used to calibrate PROMAPA.G, including or excluding exogenous information on the dual values of land: the standard method, entropy maximization and the inclusion of supply elasticities. In this study, exogenous information on the dual values of land was not used because of the results of a preliminary study[4]. A summary of the variations in the aggregate results of 86 farm types (under the partial decoupling scenario adopted by Spain), depending on the calibration method used, is given in Table 4.4.1.

Table 4.4.1: Variations in key variables with respect to the base year, in per cent

	Calibration method		
	Elasticities	Standard	Max. entropy
Total utilised area	-2.31	-1.76	-1.79
Livestock units (LU)	0.20	1.09	1.04
Gross margin	-1.23	-1.02	-1.05

At first glance, the almost identical results obtained with the maximum entropy[5] and standard methods may appear surprising (the similarity is even clearer in the results shown in Table 4.4.2). This finding, however, proves the results obtained by GOCHT (2005) and earlier by HECKELEI and BRITZ (2000). As a general rule, the same pattern of variations is observed for all three methods compared, even though horticultural crops show a slighter variation with the method incorporating supply elasticities, due to the small elasticity assumed for these crops.

[3] As estimated by IBÁÑEZ and PÉREZ (1999).

[4] See JUDEZ et al. (2005 b).

[5] The support values required to estimate the elements in the cost quadratic function symmetric matrix were obtained by applying the first set of weighting factors used by Paris and Howitt (1998).

Table 4.4.2: Results of SFP_nat (Partial decoupling adopted by Spain) with different calibration methods - National aggregation

		Base year 2002	Calibration methods					
			Elasticities		Standard		Max entropy	
			Value	Variation (%)	Value	Variation (%)	Value	Variation (%)
Crops								
Non-Irrigated chickpea	1000 ha	25.37	26.59	4.81	26.95	6.23	27.12	6.92
Irrigated rice	1000 ha	28.89	28.35	-1.86	28.23	-2.26	28.32	-1.97
Irrigated sugar beet	1000 ha	96.02	83.25	-13.30	84.43	-12.07	84.58	-11.92
Irrigated cotton	1000 ha	89.92	80.81	-10.14	77.15	-14.21	77.71	-13.58
Irrigated paprika pepper	1000 ha	2.32	2.34	0.58	2.45	5.57	2.45	5.26
Irrigated early potato	1000 ha	8.32	7.35	-11.63	5.55	-33.25	5.81	-30.09
Irrigated medium season potato	1000 ha	12.29	11.18	-9.07	8.87	-27.82	8.95	-27.19
Irrigated late season potato	1000 ha	14.54	13.49	-7.23	11.26	-22.58	11.44	-21.33
Irrigated asparagus	1000 ha	0.54	0.55	1.42	0.65	20.75	0.64	18.37
Irrigated melon	1000 ha	1.60	1.62	1.04	1.84	14.61	1.78	11.21
Irrigated tomato	1000 ha	16.51	16.57	0.39	17.09	3.51	17.07	3.40
Irrigated pepper	1000 ha	0.20	0.20	0.36	0.21	2.92	0.20	1.87
Irrigated artichoke	1000 ha	3.61	3.63	0.49	3.72	2.84	3.70	2.27
Irrigated cauliflower	1000 ha	0.53	0.53	0.57	0.56	5.65	0.55	4.52
Irrigated garlic	1000 ha	10.95	10.99	0.37	11.30	3.20	11.25	2.74
Irrigated onion	1000 ha	2.47	2.48	0.71	2.65	7.61	2.54	2.99
Irrigated green bean	1000 ha	0.31	0.39	23.63	0.39	24.47	0.38	19.75
Irrigated pea	1000 ha	1.91	2.03	6.42	1.92	0.82	1.93	1.07
Non-Irrigated durum wheat	1000 ha	355.44	282.48	-20.53	287.32	-19.16	287.76	-19.04
Irrigated durum wheat	1000 ha	47.26	47.39	0.28	45.78	-3.13	45.65	-3.40
Non-Irrigated soft wheat	1000 ha	897.36	944.45	5.25	959.03	6.87	957.51	6.70
Irrigated soft wheat	1000 ha	120.86	149.13	23.39	162.07	34.10	159.92	32.31
Non-Irrigated rye	1000 ha	50.72	47.67	-6.01	47.07	-7.20	46.60	-8.12
Irrigated rye	1000 ha	3.90	3.99	2.27	3.95	1.35	3.84	-1.50
Non-Irrigated barley	1000 ha	2882.61	2861.11	-0.75	2854.79	-0.97	2853.65	-1.00
Irrigated barley	1000 ha	188.51	227.42	20.64	247.91	31.51	247.59	31.34
Non-Irrigated oats	1000 ha	157.24	142.47	-9.39	139.30	-11.41	139.31	-11.40
Irrigated oats	1000 ha	0.55	0.58	5.84	0.59	5.98	0.58	4.68
Non-Irrigated grain maize	1000 ha	2.73	2.87	5.15	2.92	7.05	3.08	13.07
Irrigated grain maize	1000 ha	374.37	331.91	-11.34	318.33	-14.97	318.88	-14.82
Non-Irrigated sunflower	1000 ha	496.41	476.18	-4.08	499.90	0.70	500.83	0.89
Irrigated sunflower	1000 ha	103.82	115.75	11.49	117.33	13.01	115.23	10.98
Non-Irrigated vetch	1000 ha	34.16	33.69	-1.36	33.46	-2.03	34.41	0.75
Non-Irrigated alfalfa	1000 ha	158.21	117.78	-25.56	118.20	-25.29	118.68	-24.99
Irrigated alfalfa	1000 ha	138.22	88.26	-36.15	89.32	-35.38	90.77	-34.33
Non-Irrigated winter forage cereals	1000 ha	3.16	3.17	0.03	3.17	0.03	3.18	0.51
Non-Irrigated forage maize	1000 ha	2.17	1.72	-20.81	1.68	-22.25	1.71	-20.91
Irrigated forage maize	1000 ha	8.03	7.73	-3.74	7.46	-7.17	7.45	-7.27
Non-Irrigated temporary grassland	1000 ha	247.03	240.03	-2.83	239.75	-2.95	239.82	-2.92
Irrigated temporary grassland	1000 ha	21.89	22.35	2.11	22.33	2.03	22.26	1.70
Non-Irrigated permanent grassland	1000 ha	1817.11	1817.11	0.00	1817.11	0.00	1817.11	0.00
Irrigated permanent grassland	1000 ha	23.32	23.32	0.00	23.32	0.00	23.32	0.00
Livestock								
Suckler cows	1000 heads	961.35	926.36	-3.64	919.60	-4.34	919.48	-4.36
Dairy cows	1000 heads	999.59	969.24	-3.04	965.40	-3.42	965.26	-3.43
Dairy sheep	1000 heads	5430.28	5535.45	1.94	5538.07	1.99	5533.13	1.89
Non dairy sheep	1000 heads	8385.38	8840.94	5.43	9178.37	9.46	9172.74	9.39
LU	1000 LU	4348.58	4357.07	0.20	4395.90	1.09	4394.01	1.04
Non utilized area								
Non irrigable non used area	1000 ha	0.00	157.33	Inf	124.02	Inf	124.12	Inf
Irrigable non used area	1000 ha	0.00	38.09	Inf	25.02	Inf	26.91	Inf
Utilized area (summary)								
Non irrigated other crops area	1000 ha	59.52	60.28	1.27	60.41	1.49	61.54	3.39
Non irrigated COP crops area	1000 ha	4842.51	4757.23	-1.76	4790.32	-1.08	4788.75	-1.11
Non irrigated grassland and fodder crops area	1000 ha	2227.69	2154.88	-3.27	2154.96	-3.26	2155.31	-3.25
Irrigated other crops	1000 ha	289.03	263.73	-8.75	256.35	-11.31	257.36	-10.96
Total irrigated COP crops	1000 ha	841.18	878.20	4.40	897.89	6.74	893.61	6.23
Irrigated grassland and fodder crops area	1000 ha	191.47	141.67	-26.01	142.43	-25.61	143.80	-24.90
Dual values of land								
Mean dual value of non irrigated land	€	254.51	78.52	-69.15	78.99	-68.96	78.97	-68.97
Mean dual value of irrigated land	€	568.57	189.11	-66.74	215.89	-62.03	211.49	-62.80
Economic results								
Target function	Mill €	5231.64	6949.30	0.90	5302.02	1.35	5298.19	1.32
Coupled aid	Mill €	1977.75	735.03	-62.84	735.98	-62.79	736.21	-62.78
Decoupled aid	Mill €	0.00	1551.27	Inf	1550.97	Inf	1551.00	Inf
Total aid before modulation	Mill €	1977.75	2286.30	15.60	2286.95	15.63	2287.22	15.65
Modulation reduction	Mill €	0.00	50.70	Inf	50.73	Inf	50.74	Inf
Total aid after modulation	Mill €	1977.75	2235.59	13.04	2236.22	13.07	2236.48	13.08
Gross margin after modulation	Mill €	6359.78	6281.78	-1.23	6295.04	-1.02	6292.79	-1.05
Mean % of aid in margin		31.10	35.59		35.52		35.54	
Average payment entitlement per ha	€	0.00	172.23		172.22		172.22	

Table 4.4.3: Results for scenarios SFP_nat and SFP_hist assuming real and nominal price forecasts (calibration via supply elasticities). National aggregation.

		Base year 2002	Partial decoupling				Full decoupling			
			Nominal		Real		Nominal		Real	
			Value	Variation (%)	Value	Variation (%)	Value	Variation (%)	Value	Variation (%)
Crops										
Non-Irrigated chickpea	1000 ha	25.37	27.25	7.43	26.59	4.81	29.20	15.13	29.20	15.12
Irrigated rice	1000 ha	28.89	28.09	-2.77	28.35	-1.86	28.30	-2.03	28.62	-0.91
Irrigated sugar beet	1000 ha	96.02	83.42	-13.12	83.25	-13.30	84.12	-12.39	84.10	-12.42
Irrigated cotton	1000 ha	89.92	74.94	-16.66	80.81	-10.14	74.94	-16.66	81.19	-9.71
Irrigated paprika pepper	1000 ha	2.32	2.34	0.69	2.34	0.58	2.34	0.69	2.34	0.59
Irrigated early potato	1000 ha	8.32	7.35	-11.61	7.35	-11.63	7.36	-11.49	7.36	-11.52
Irrigated medium season potato	1000 ha	12.29	11.18	-9.06	11.18	-9.07	11.20	-8.88	11.20	-8.88
Irrigated late season potato	1000 ha	14.54	13.50	-7.18	13.49	-7.23	13.54	-6.84	13.54	-6.84
Irrigated asparagus	1000 ha	0.54	0.55	1.64	0.55	1.42	0.55	1.68	0.55	1.47
Irrigated melon	1000 ha	1.60	1.62	1.23	1.62	1.04	1.63	1.41	1.62	1.21
Irrigated tomato	1000 ha	16.51	16.60	0.54	16.57	0.39	16.60	0.55	16.58	0.41
Irrigated pepper	1000 ha	0.20	0.20	0.40	0.20	0.36	0.20	0.38	0.20	0.34
Irrigated artichoke	1000 ha	3.61	3.63	0.57	3.63	0.49	3.63	0.56	3.63	0.48
Irrigated cauliflower	1000 ha	0.53	0.53	0.66	0.53	0.57	0.53	0.65	0.53	0.55
Irrigated garlic	1000 ha	10.95	10.99	0.40	10.99	0.37	10.99	0.42	10.99	0.39
Irrigated onion	1000 ha	2.47	2.48	0.73	2.48	0.71	2.48	0.72	2.48	0.70
Irrigated green bean	1000 ha	0.31	0.39	25.88	0.39	23.63	0.40	26.25	0.39	24.13
Irrigated pea	1000 ha	1.91	2.01	5.20	2.03	6.42	1.97	3.15	1.99	4.12
Non-Irrigated durum wheat	1000 ha	355.44	275.21	-22.57	282.48	-20.53	244.41	-31.24	248.07	-30.21
Irrigated durum wheat	1000 ha	47.26	46.98	-0.60	47.39	0.28	45.93	-2.80	46.18	-2.29
Non-Irrigated soft wheat	1000 ha	897.36	943.50	5.14	944.45	5.25	904.47	0.79	904.46	0.79
Irrigated soft wheat	1000 ha	120.86	149.18	23.44	149.13	23.39	148.36	22.75	148.28	22.69
Non-Irrigated rye	1000 ha	50.72	47.65	-6.04	47.67	-6.01	45.20	-10.88	45.20	-10.88
Irrigated rye	1000 ha	3.90	3.98	1.98	3.99	2.27	3.91	0.21	3.91	0.21
Non-Irrigated barley	1000 ha	2882.61	2858.80	-0.83	2861.11	-0.75	2764.26	-4.11	2764.17	-4.11
Irrigated barley	1000 ha	188.51	226.93	20.38	227.42	20.64	223.06	18.33	223.04	18.32
Non-Irrigated oats	1000 ha	157.24	142.43	-9.42	142.47	-9.39	140.40	-10.71	140.39	-10.72
Irrigated oats	1000 ha	0.55	0.58	5.47	0.58	5.84	0.57	2.93	0.57	2.93
Non-Irrigated grain maize	1000 ha	2.73	2.84	4.02	2.87	5.15	2.62	-3.87	2.62	-3.87
Irrigated grain maize	1000 ha	374.37	330.36	-11.76	331.91	-11.34	320.74	-14.33	320.64	-14.35
Non-Irrigated sunflower	1000 ha	496.41	475.44	-4.22	476.18	-4.08	447.14	-9.92	447.11	-9.93
Irrigated sunflower	1000 ha	103.82	115.53	11.27	115.75	11.49	112.06	7.93	111.88	7.76
Non-Irrigated vetch	1000 ha	34.16	34.54	1.12	33.69	-1.36	35.91	5.14	35.91	5.14
Non-Irrigated alfalfa	1000 ha	158.21	118.83	-24.89	117.78	-25.56	126.05	-20.33	126.04	-20.34
Irrigated alfalfa	1000 ha	138.22	88.68	-35.84	88.26	-36.15	94.02	-31.98	94.00	-32.00
Non-Irrigated winter forage cereals	1000 ha	3.16	3.17	0.03	3.17	0.03	3.17	0.03	3.17	0.03
Non-Irrigated forage maize	1000 ha	2.17	1.71	-21.15	1.72	-20.81	1.70	-21.67	1.70	-21.69
Irrigated forage maize	1000 ha	8.03	7.75	-3.57	7.73	-3.74	7.86	-2.16	7.86	-2.16
Non-Irrigated temporary grassland	1000 ha	247.03	240.17	-2.78	240.03	-2.83	245.20	-0.74	245.16	-0.76
Irrigated temporary grassland	1000 ha	21.89	22.35	2.11	22.35	2.11	22.34	2.06	22.34	2.06
Non-Irrigated permanent grassland	1000 ha	1817.11	1817.11	0.00	1817.11	0.00	1817.11	0.00	1817.11	0.00
Irrigated permanent grassland	1000 ha	23.32	23.32	0.00	23.32	0.00	23.32	0.00	23.32	0.00
Livestock										
Suckler cows	1000 heads	961.35	916.66	-4.65	926.36	-3.64	858.50	-10.70	858.51	-10.70
Dairy cows	1000 heads	999.59	968.95	-3.07	969.24	-3.04	961.20	-3.84	961.19	-3.84
Dairy sheep	1000 heads	5430.28	5479.86	0.91	5535.45	1.94	5430.70	0.01	5430.70	0.01
Non dairy sheep	1000 heads	8385.38	8713.97	3.92	8840.94	5.43	8431.00	0.54	8431.03	0.54
LU	1000 LU	4348.58	4318.48	-0.69	4357.07	0.20	4194.21	-3.55	4194.22	-3.55
Non utilized area										
Non irrigable non used area	1000 ha	0.00	166.03	Inf	157.33	Inf	383.79	Inf	380.33	Inf
Irrigable non used area	1000 ha	0.00	46.21	Inf	38.09	Inf	60.74	Inf	54.38	Inf
Utilized area (summary)										
Non irrigated other crops area	1000 ha	59.52	61.79	3.81	60.28	1.27	65.12	9.40	65.11	9.39
Non irrigated COP crops area	1000 ha	4842.51	4745.87	-2.00	4757.23	-1.76	4548.51	-6.07	4552.02	-6.00
Non irrig. grassl. and fodder crops area	1000 ha	2227.69	2156.03	-3.22	2154.88	-3.27	2132.29	-4.28	2132.26	-4.28
Irrigated other crops	1000 ha	289.03	257.82	-10.80	263.73	-8.75	258.82	-10.45	265.32	-8.20
Total irrigated COP crops	1000 ha	841.18	875.55	4.09	878.20	4.40	856.60	1.83	856.47	1.82
Irrigated grassland and fodder crops area	1000 ha	191.47	142.10	-25.79	141.67	-26.01	145.52	-24.00	145.50	-24.01
Dual values of land										
Mean dual value of non irrigated land	€	254.51	86.90	-65.85	78.52	-69.15	62.15	-75.58	52.84	-79.24
Mean dual value of irrigated land	€	568.57	212.13	-62.69	189.11	-66.74	175.98	-69.05	150.80	-73.48
Economic results										
Target function	Mill €	6887.45	7788.33	13.08	6949.30	0.90	7903.10	14.75	7046.77	2.31
Coupled aid	Mill €	1977.75	722.29	-63.48	735.03	-62.84	113.65	-94.25	121.39	-93.86
Decoupled aid	Mill €	0.00	1551.26	Inf	1551.27	Inf	2162.47	Inf	2162.48	Inf
Total aid before modulation	Mill €	1977.75	2273.55	14.96	2286.30	15.60	2276.11	15.09	2283.87	15.48
Modulation reduction	Mill €	0.00	50.09	Inf	50.70	Inf	50.30	Inf	50.68	Inf
Total aid after modulation	Mill €	1977.75	2223.46	12.42	2235.59	13.04	2225.81	12.54	2233.19	12.92
Gross margin after modulation	Mill €	6359.78	6973.54	9.65	6281.78	-1.23	7013.44	10.28	6298.65	-0.96
Mean % of aid in margin		31.10	31.88		35.59		31.74		35.45	
Average payment entitlement per ha	€	0.00	172.23		172.23		240.09		240.09	

Real versus nominal prices

In order to facilitate comparison of the results of PROMAPA.G to the findings provided by other partners' models using nominal prices, it is assumed that costs[6] vary at the rate equal to the deflation rate, i.e., 1.5% per year. Under these conditions, the solution provided by the model with nominal prices should be identical to the results obtained with real prices when decoupling is adopted. This can be verified empirically by comparing the results found for this scenario with the model under the two price assumptions (Table 4.4.3). Although the differences are minor[7], the results are not exactly the same because even under full decoupling, some payments are still regarded as coupled (i.e. protein crops' or energy crop supplement).

Table 4.4.3 also compares the results for the two price assumptions under partial decoupling arrangements. While the pattern is almost the same, the use of nominal prices penalizes activities linked to coupled payments.

4.4.2 Analysis of results assuming different agricultural policy scenarios

This section contains an analysis of the nation-wide effects of the various agricultural policies as well as regional results where differences among autonomous communities require an explanation. Changes of real prices are used in the underlying scenarios.

The calibration method used for this analysis involves the introduction of exogenous supply elasticities. Nonetheless, the use of the results obtained with the standard calibration procedure generates no significant variation in the cause-effect relationships discussed in this study.

The first subsection below analyzes the results obtained for crops, the second the results for livestock, and the third the economic variables.

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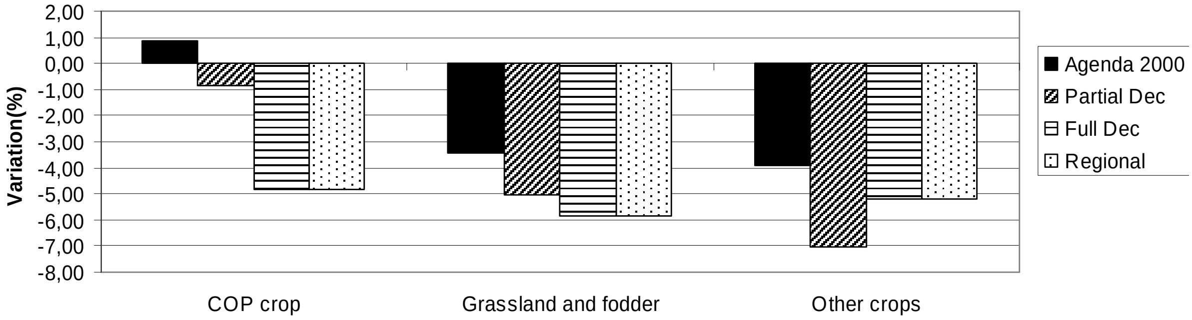
[6] Actually, estimated costs used to calibrate the model.

[7] The 10.28% increase in gross margin with respect to the base year with the nominal prices shown in the table translates into a variation of -1.09% when the gross margin, less aid, is deflated at 1.5% yearly.

Figure 4.4.1: Variation in crop area with respect to the base year, by crop group



4.4.2.1 Impacts on crop production

The decline in forecast prices for most of the crops considered goes hand-in-hand with a decline in farming activity with respect to the base year. Quantified in terms of land use, this translates into a reduction of over 0.5% of the area used for farming, even assuming the continuation of the Agenda 2000 measures without decoupling. In decoupling scenarios, the decline is steeper, coming to more than 2% under partial and over 5% under full decoupling arrangements.

As Figure 4.4.1 shows, the results for the main crop groups are practically identical for the SFP_hist and the SFP_reg. These similarities are likewise found when analyzing individual crops and livestock in all the regions of Spain. The findings only differ in the economic results at the regional level.

According to the variations observed for crop groups in (full or partial) decoupling scenarios, the greater the degree of decoupling, the steeper the decline in area used for cereals, oilseeds and protein crops (COP), grassland and fodder crops, all of which are affected by that policy. No such trend is observed for “other crops” which, as discussed below, are less dependent on decoupling. For these crops, the decline is smaller under full decoupling because their potential replacements (essentially COP crops) have higher coupled revenues per ha under partial decoupling arrangements.

In the Agenda 2000 scenario direct payments are coupled and the area devoted to COP crops, which is reduced in the decoupling scenarios, is extended. The reasons for the smaller declines in area devoted to grassland and fodder crops and “other crops” under Agenda 2000 compared to the decoupling scenarios will be addressed below.

Table 4.4.4: Mean loss (€/ha) of coupled revenues for COP crops in decoupling scenarios, with respect to the base year

	Partial decoupling	Total decoupling
Non irrigated wheat	123.12	159.86
Non irrigated barley	147.39	184.06
Non irrigated sunflower	144.07	181.33
Non irrigated durum wheat	259.66	343.66
Irrigated wheat	204.76	262.82
Irrigated barley	242.57	300.72
Irrigated sunflower	312.60	395.11
Irrigated durum wheat	409.80	539.06
Irrigated maize	541.76	635.87

Variations in cereals, oilseeds and protein crop production

Figures 4.4.2 to 4.4.4 show the variations in the area used for the main irrigated and non-irrigated COP crops. The following remarks refer to these results. Focusing on the partial and full decoupling scenarios only, the graphs show that:

- Due to decoupling of arable crop payments, the greater the extent of decoupling, the slighter are the increases in cultivated area and the steeper the decreases.
- The declines in coupled revenues in the different scenarios due to price forecasts and decoupling, as shown in Table 4.4.4[8], are a key factor in the explanation of the irrigated and non-irrigated COP crop variations depicted in Figures 4.4.3 and 4.4.4. Although the loss is greater for irrigated than for non-irrigated crops, greater increases are observed for COP crops area in the former category. This is because in irrigated farming COP crops compete with other crops that are more penalized in terms of price reductions (sugar beet, potatoes, alfalfa) or decoupling (such as cotton, whose coupled payment is only half of the payment received in the base year under the deficiency payment scheme).
- The only non-irrigated crop with an increase in area in all scenarios is wheat (the least penalized one). The case of non irrigated maize, which also rises with partial decoupling, is in fact exceptional, inasmuch the area involved is very small and concentrated in Galicia, where, in addition to this crop, there is mainly temporary and permanent grassland.
- The area for the three irrigated crops least penalized by the combination of price and decoupling (wheat, barley and sunflower) increase at the expense of the area of other COP and non COP crops.

[8] The table was drawn up with data on the mean farm type for Spain as a whole.

Figure 4.4.2: Variation in total COP crop area with respect to the base year

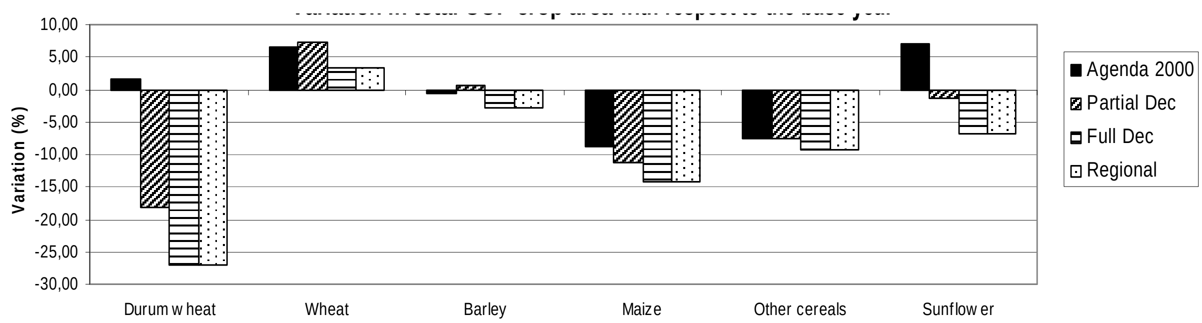


Figure 4.4.3: Variation irrigated COP crop area with respect to the base year

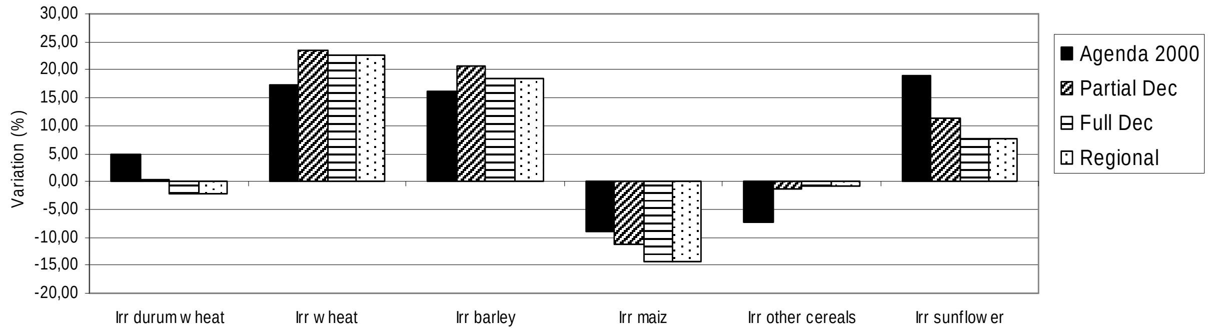


Figure 4.4.4: Variation non irrigated COP crop area with respect to the base year

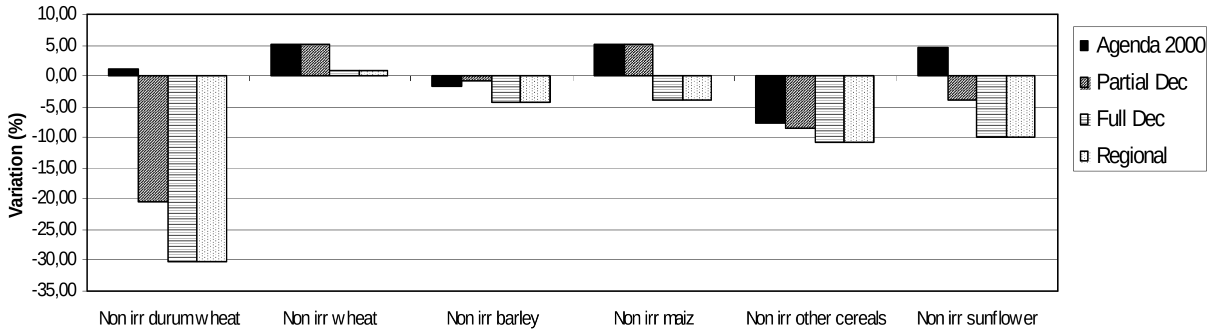


Table 4.4.5: Mean loss (€/ha) of coupled revenues for COP crops in the Agenda 2000 scenario, with respect to the base year

	Non irrigated	Irrigated
Wheat	7.08	11.89
Durum Wheat	17.17	29.70
Sunflower	19.73	35.68
Barley	33.53	50.56
Maize	-	276.49

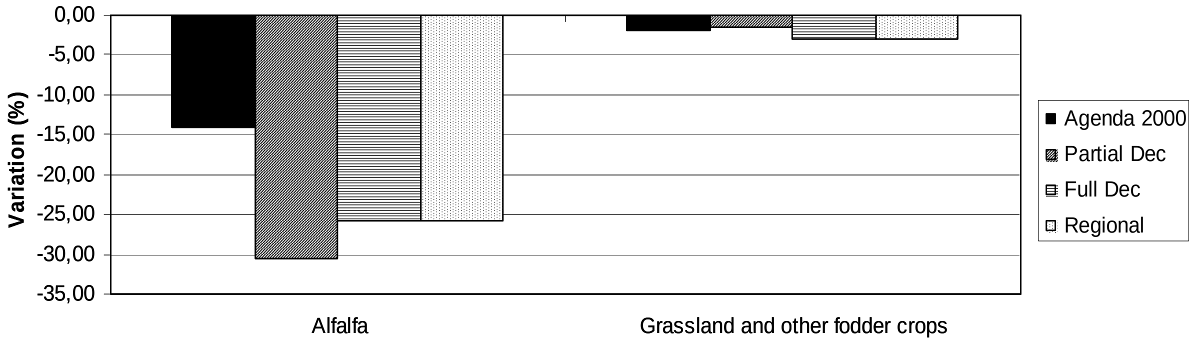
Assuming the continuation of the Agenda 2000 measures, the loss of coupled revenues per ha, solely due to the decline in prices, is shown in Table 4.4.5.[9]

Since, as in the preceding case, no exact inverse relationship can be drawn between mean loss and area increase[10], the crops with the smaller losses are the ones that exhibit crop area increases, both in non-irrigated (wheat, durum wheat and sunflower) and irrigated (the above three plus barley) farming. The greatest increases of irrigated crops can be attributed to the causes discussed above referring to decoupling scenarios.

[9] Like table 4.4.4, this table was drawn up with data on the mean farm type for Spain as a whole.

[10] This is because the figures in Tables 4.4.4 and 4.4.5 are means and in each of the 86 farm types studied in this paper, the crops have different yields, prices and competing crops.

Figure 4.4.5: Variation in grassland and fodder crop area with respect to the base year



Grassland and fodder crop variations

In the analysis of this group, the most important fodder crop, namely alfalfa, must be studied separately from all other forage crops, essentially comprising temporary and permanent grassland (but also forage maize and forage winter cereals, which account, however, for less than 1% of the total). While alfalfa may be used as fodder on-farm or sold the other crops can only be used as feed.

Figure 4.4.5 shows the variation in the crop area for these two subgroups. Since most of the alfalfa is grown to be sold, the area used to grow this crop depends on price and the revenues per ha earned with competing crops, essentially COPs. In all the scenarios studied, alfalfa is less profitable than the other crops. At the same time the substantial decline in price in decoupling scenarios based on ESIM (over 45%) is nearly twice as large as the decrease under the Agenda 2000 assumption. Consequently, alfalfa crop area drops more when the former scenarios are assumed, with the largest decrease found for partial decoupling, where the COP crops generate larger direct revenues per ha than under full decoupling.

The variation in the remaining forage crops is closely associated with livestock variations (essentially cattle) studied below.

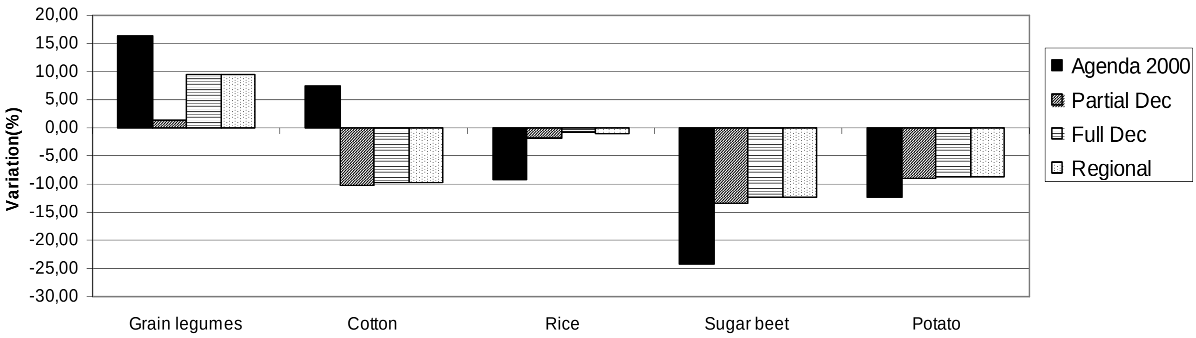
Attention should be drawn to the fact that variation of grassland is only referring to areas used for livestock production. The model distinguishes between existing and used area. The fact that not all available grassland is used may be due to a) grassland conservation, b) reduction of stocking density to a level eligible for additional livestock premiums or c) to the lack of alternative crops. In this study, the unused forage area amounts to 1.25% under the continuation of Agenda 2000 scenario, around 1% under partial decoupling and over 2.5% under full decoupling arrangements.

Finally, it has to be noted that a substantial share of uncultivated low-yield land (800 kg of dry matter per hectare or less) is used essentially for sheep grazing.

Variations of other crops

Grain legumes (chickpea and vetch), cotton, rice, sugar beet and potatoes account for over 85% of the area of the non-COP / non-fodder crops considered in the model. The variations in these crops under the different agricultural policies scenarios are shown in Figure 4.4.6.

Figure 4.4.6: Variation in the main non-COP, non-fodder crops area with respect to the base year



All these crops, except grain legumes, are irrigated; variation of crop areas depend on the agricultural policy implemented.

Assuming constant prices for **grain legumes** (under Agenda 2000) gives them a clear advantage to competing COP crops, whose prices decline. This is the reason for the substantial rise of grain legume areas under the Agenda 2000 scenario. Since the constant price assumption makes these crops more profitable than some of the non-irrigated COPs, in the decoupling scenarios, their area rises as well, although not as steeply as under the Agenda 2000 measures. Since decoupling for grain legumes is regarded to be the same under partial and full decoupling arrangements, the increase in the respective area is much greater in the latter.

This study assumes that the world price of **cotton** remains the same as in the base year. Under that assumption, its area increases in the Agenda 2000 scenario. In the decoupling scenarios, the deficiency payment scheme is replaced by an area payment whose coupled portion accounts for around half of formerly paid deficiency payments. As a result, cotton crop area declines under these scenarios.

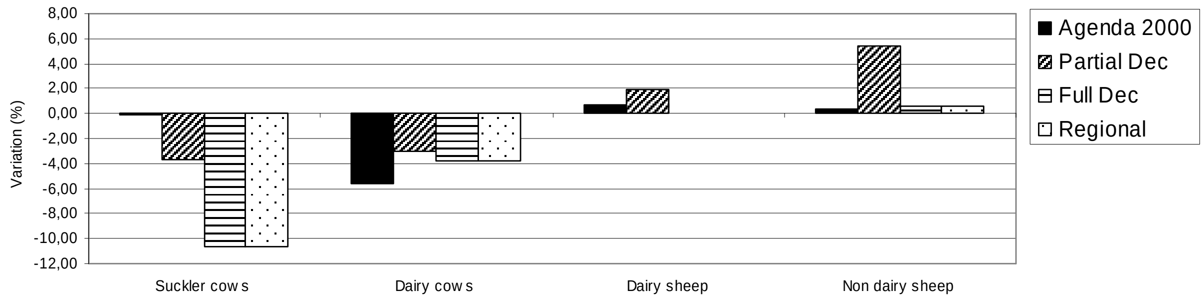
The steep decline in prices assumed for **rice, sugar beet** and **potatoes** induces a reduction in crop area in all scenarios. The loss is more pronounced under Agenda 2000 arrangements due to the higher revenue per hectare earned with competing crops (essentially COPs). Despite the substantial slide in rice prices, however, its area declines very little in both the partial and full decoupling scenarios because the direct aid per ha is nearly double of the amount received in the base year.

All other crops in this group (**paprika pepper, asparagus, melon, tomato, pepper, artichoke, cauliflower, garlic, onion and green bean**) are to be found essentially in farm type 1430 (specialist field vegetable) in Navarre, Castile-La Mancha, Murcia and Extremadura. In such farm types these crops are preponderant and they replace irrigated COP and non-COP crops in the simulated year. The scale of the substitution is, however, rather small, as shown by the minor increase of less than 0.8% in any of the simulated scenarios.

4.4.2.2 Livestock results under different agricultural policy scenarios

Figure 4.4.7 shows the change with respect to the base year, under the various agricultural policy scenarios, for the different categories of livestock included in the model.

Figure 4.4.7: Variation in herd size (number of head) for the different categories of livestock with respect to the base year



Due to the reduction in milk and beef prices, the number of cows declines in all scenarios, whereas the sheep herd size increases because of the upward trend in prices. This general observation is discussed in greater detail below.

Suckler cows

The pattern of variation in the number of head shown in the figure is not equally representative for all the regions of Spain, which differ substantially depending on parameters such as stocking density, meat prices and the proportion and price of off-farm feed.

The sum of the revenues per head from the sale of young animals[11] and coupled aid[12] depends on stocking density:

– For high stocking densities that receive no aid, the highest revenues are found under the full decoupling scenario and the lowest under continuation of the Agenda 2000 arrangements.

– With densities between 1.4 and 1.9 LU/ha in the base year (and between 1.5 and 1.9 in the simulated year) which qualify farms for beef and suckler cow premia excluding extensification premium, the highest revenues are obtained with partial and the lowest with full decoupling.

– With low stocking densities, that qualify farms for additional premiums, the highest revenues are found for the continuation of Agenda 2000 measures and the lowest for the full decoupling scenario.

Low livestock densities are generally found in central and southern Spain. These are the regions where variation follows the pattern shown in Figure 4.5.7, with different degrees of intensity.

In the regions of northern or so-called “wet Spain”, the density per ha is much higher and many farm types opt for the general payment scheme, while others maintain a stocking density that disqualifies them for aid altogether.

Herd size varies very little in the farm types in the regions comprising “wet Spain” (Galicia, Asturias, Basque Country and Navarre), where pastures dominate and very little off-farm feed is purchased (under 7% of the total dry matter consumed)[13].

The largest variations for this type of livestock are observed under decoupling policies in other Spanish regions where substantial portions of off-farm feed are purchased.

The decline in the price of feed with respect to the base year mitigates the decrease in herd size. This explains why herd size variation is small under Agenda 2000 arrangements (where there is no decoupling) in southern and central Spain, where large proportions of feed have to be purchased. In some exceptional cases this decline prompts an increase in the herd size in certain types of holdings in northern Spain where stocking

[11] It is greater with higher degrees of decoupling, since beef prices decline less.

[12] It is smaller at higher degrees of decoupling.

[13] For all farm types in these regions taken as a whole, the variation with respect to the base year is-0.07% under Agenda 2000, 0.15% with partial decoupling and -0.19% with full decoupling.

densities are high[14]. Another aspect observed on some farms in this region is the increase in the number of suckler cows at the expense of the number of dairy cows in an attempt to maximize profits from grassland use.

Dairy cows

The parameters affecting this type of livestock, in addition to milk prices, are the price of beef (since dairy farms also sell young animals) and the price and proportion of off-farm feed purchased. The coupled aid received by such farms under partial decoupling arrangements is too little to have any significant effect on livestock trends.

Referring to the revenue per head generated by milk and young animals sales in all types of farm holdings, better results (smaller declines with respect to base year revenues) are obtained under the Agenda 2000 than with the decoupling scenarios. The steeper decline in the price of purchased feed, which represents in all cases over 30% of the total dry matter consumed, leads in the decoupling scenarios, in many cases, to higher coupled revenue per head, corrected for the cost of purchased feed. This holds true, particularly in the regions outside “wet Spain” where the proportion of off-farm feed inputs is larger. This would explain the pattern of variations for the different agricultural policy scenarios shown in Figure 4.4.7.

The pattern is not the same, however, in all the Spanish Autonomous Communities. In some regions of wet Spain, such as Navarre, with high milk yields per cow and relatively small amounts of off-farm feed purchased, the decline in feed prices does not suffice to make dairy cows more profitable in decoupling scenarios than in Agenda 2000 scenario.

Sheep

Considering only the revenues per head from the sale of young animals and milk (in the case of dairy sheep) and coupled aid, the most favourable agricultural policy is the partial decoupling scheme, which preserves nearly 50% of the coupled payments and provides for a substantial increase in the sale of young animals. The second most favourable conditions are found under the Agenda 2000 scenario, where the increase in the price of young animals is much smaller, but the total aid is coupled.

The coupled revenues per head are higher in both above mentioned scenarios than in the base year; whereas under the full decoupling arrangements such revenues are lower than

[14] Such is the case in Navarre, for instance, where under full decoupling direct revenues less cost of purchased feed per suckler cow in TF 8000 are approximately 4% higher than the base year, prompting an increase of around 7% in the number of head.

in that year, as the rise in the price of lamb does not wholly offset the total lack of coupled payments.

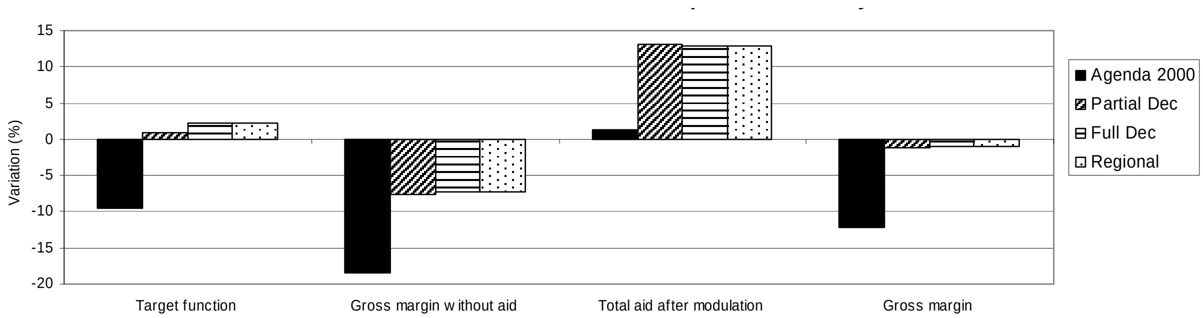
When the cost of purchased feed, which declines in all scenarios (although more under decoupling arrangements) is subtracted from the above direct revenues per head, the advantage of partial decoupling over the base year widens. This greater advantage translates into substantial increases in non-dairy livestock in regions with a high proportion of off-farm feed. The lesser impact on dairy sheep is due to the fact that, as mentioned above, the price of sheep's milk was assumed to be the same as in the base year.

When the cost of purchased feed is subtracted from the proceeds from the sale of young animals and milk, the revenues per head under full decoupling arrangements are higher than in the base year and close to the figures obtained for the Agenda 2000 scenario. In some regions revenues for non-dairy sheep are actually higher under full decoupling than with the Agenda 2000 measures, but in any event the variations observed for all types of sheep livestock under these two agricultural policies are small or even nil.

4.4.2.3 Economic results under different agricultural policy scenarios

Figure 4.4.8 shows the variations in the target function, gross margin with and without aid and total aid (area payment and premiums) after modulation.

Figure 4.4.8: Variation in economic results with respect to the base year



The target function is the gross margin with costs represented by a quadratic function estimated in such a way that the model is calibrated with the base year results. It differs from what has been referred to as gross margin, in that the latter costs are linear and constitute part of the data used. Moreover, the gross margin includes all aid, coupled and decoupled; and although the latter is not strictly associated with each of the farm's activities, it is related to the farm's business *per se*, inasmuch as it depends on the eligible area devoted by the farm to receive such aid.

Target function

Assuming constant prices and a constant sum of aid (coupled and decoupled) per production unit, this function, which is assumed to be maximized by farmers, should be larger at higher degrees of decoupling. As a result of the price and aid forecasts, however, this is not always the case in the present study. Nonetheless, as Figure 4.4.8 shows, although this functions declines under the Agenda 2000 assumption, it rises slightly in the partial decoupling scenarios and more intensely under the full decoupling scheme.

Results with the scenario regional model

As noted earlier, this scenario consists of the full decoupling of aid with the assumption that all farm types are paid the same entitlement payment per hectare.

Although the national aggregated results, given the total aid received and gross margin are the same under this scenario as with full decoupling, the results for the various regions fluctuate widely. These variations are due to the fact that, although farming, which depends essentially on coupled payments per unit of activity, is the same as under full decoupling in the different farm holdings, the sum of decoupled aid differs. Such a sum is higher in regions where the entitlement payment per hectare under full decoupling is smaller than obtained for Spain as a whole (such as in Castile and Leon, Madrid and Castile-La Mancha). Everywhere else the payment is higher (see Table 4.5.9[15]).

Gross margin net of aid

Under the Agenda 2000 scenario, only sheep prices rise slightly, while the price of all other products declines more or less sharply[16]. As a result, the gross margin net of aid declines substantially with respect to the base year. As Table 4.4.6 shows, this downturn is visible to a greater or lesser extent in nearly all regions. The one exception is Murcia, where sheep husbandry is a predominant activity and off-farm feed purchases constitute a very high proportion of the total feed.

Similar variations in this economic variable are observed in the partial and full decoupling scenarios, both nation-wide and in the various regions.

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[15] The high figures for Murcia and Valencia stand out in the table. The sum for the former is due to the high sheep density per ha and for the latter to the large area devoted to rice.

[16] With the exception of products for which no price information was available, which were regarded to be constant.

Table 4.4.6: Gross Margin without aid (% variation)

	Agenda 2000	Partial	Full	Regional
01. Galicia	-22.35	-17.09	-16.23	-16.23
02. Asturias	-19.93	-17.76	-16.35	-16.35
03. Cantabria	-22.82	-21.4	-20.41	-20.41
04. Basque Country	-18.28	-15.09	-13.56	-13.56
05. Navarre	-13.53	-3.21	-1.06	-1.06
06. La Rioja	-28.29	5.01	6.22	6.22
07. Aragón	-18.87	1.67	3.31	3.31
08. Catalonia	-31.38	-33.86	-35.13	-35.13
09. Balearic Isles	-36.23	-17.58	-17.62	-17.62
10. Castile-Leon	-18.22	-6.47	-7.12	-7.12
11. Madrid	-13.47	-1.74	-2.51	-2.51
12. Castile-La Mancha	-7.77	6.64	7.04	7.02
13. Valencian C.	-60.77	-59.58	-59.51	-59.51
14. Murcia	12.52	41.09	42.11	42.14
15. Extremadura	-10.01	10.76	13.48	13.53
16. Andalusia	-25.88	-12.45	-12.99	-12.99
00. Spain	-18.41	-7.66	-7.22	-7.22

Compared to the Agenda 2000 scenario, the decoupling arrangements, excepting for fodder crops, show fewer declines in prices (with a slight rise in the price of wheat) and a substantial increase in the price of sheep products. This explains why the gross margin net of aid is generally higher in all regions under the decoupled aid scenarios[17].

As mentioned above, in the decoupling scenarios only wheat and sheep product prices are higher than in the base year. The outcome is that the gross margin net of aid is lower than in the base year in most regions. The margin is higher only in La Rioja, Aragon, Castile-La Mancha, Murcia and Extremadura, regions where sheep husbandry is dominating.

[17] The sole exception is Catalonia, where the alfalfa sold plays a predominant role.

Table 4.4.7: Total aid after modulation (% variation)

	Agenda 2000	Partial	Full	Regional
01. Galicia	0.27	294.99	294.02	278.79
02. Asturias	0.00	183.03	183.08	150.68
03. Cantabria	0.00	189.35	190.84	124.28
04. Basque Country	0.00	50.48	50.76	39.09
05. Navarre	0.88	8.65	8.69	-3.33
06. La Rioja	0.71	33.38	30.79	-39.96
07. Aragón	1.41	0.91	-1.21	-1.67
08. Catalonia	2.06	16.00	17.98	14.52
09. Balearic Isles	65.59	7292.95	7282.80	6711.34
10. Castile-Leon	1.42	11.62	11.36	26.87
11. Madrid	-0.02	-16.07	-39.77	-27.47
12. Castile-La Mancha	-0.05	-1.59	-1.78	24.30
13. Valencian C.	0.37	344.37	344.45	195.08
14. Murcia	0.36	4.67	0.18	-86.53
15. Extremadura	0.33	-1.96	0.21	-4.86
16. Andalusia	2.97	9.66	10.56	-11.35
00. Spain	1.39	13.04	12.92	12.90

Aid and modulation

As Table 4.4.7 shows, under the Agenda 2000 scenario direct payment level is approximately the same as in the base year in most regions (the result for the Balearic Isles is not significant in light of the small amounts involved) which would explain the small nation-wide variation. The most prominent upward variation is observed in Andalusia, due essentially to the increase in the area devoted to cotton.

The nation-wide increase in aid observed in the **decoupling scenarios** is largely due to the fact that of the products receiving coupled and/or decoupled aid, some (rice) obtain more than in the base year, while for others (milk and sugar beet) no aid existed in 2002. This also explains the substantial increase in aid observed in the Balearic Isles and Valencia. In the former, the only activity of any importance that is eligible for aid under the decoupled scenario is dairy farming which, as noted, received no aid in the base year. In Valencia, the increase is due to the substantial rise in aid for rice. In addition to these regions, substantial increases in aid are recorded in the northern regions of Spain (Galicia, Asturias and Cantabria), where dairy production prevails. Finally, it should be noted, that aid declines in some regions, most visibly in Madrid, because the assumptions made in this study would lead to a substantial decrease in the number of suckler cows, and none of the products receiving higher payments is grown or raised in this region.

The reduction in aid due to modulation accounts for slightly more than 2% of total aid. This proportion differs from one region to another, however, ranging from 1% in Cantabria to about 3% in Andalusia, when we consider only the regions with an amount of aid large enough to be affected by aid reductions.

Finally, it should be noted that modulation is not, in most cases, responsible for the decline in the aid received in the base year. And when it is, such as in Aragon and Murcia (full decoupling) and Castile-La Mancha (both full and partial decoupling), the effect is very minor.

Gross margin

This economic indicator (the sum of gross margin net of aid, plus aid) shows that decoupling policies produce better results than continuation of the Agenda 2000 measures in all regions (Table 4.4.8). The downward variation of this variable under the latter scenario is observed both nation-wide (Figure 4.4.8) and in all regions except Murcia, which benefits from the aforementioned increase in earnings from sheep.

Under decoupling policies, the variation in gross margin is likewise negative in most regions. The exceptions are the regions with upward variations in the gross margin net of aid (La Rioja, Aragon, Castile-La Mancha, Murcia and Extremadura) and Navarre, where aid offsets the tiny loss in the gross margin net of such support.

– In most regions, full decoupling yields higher gross margins than partial decoupling. Where this is not the case, the move from partial to full decoupling entails often a loss of agricultural activity, such as in Madrid[18]. The loss in this region translates into a substantial decline in the number of suckler cows.

Dual values of land and entitlement level per hectare

The PROMAPA.G model generates two land value-related indicators: the dual value (one for non-irrigated and the other for irrigated land) and the entitlement level per hectare, which is qualified to receive decoupled payments. Both nation-wide and for all regions, the former indicator, associated with the revenues per hectare derived from land use in farming, declines with increasing degrees of decoupling, while the latter, which is linked to decoupled payments, follows an upward trend.[19]

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[18] The same situation exists in La Rioja, Aragon, Murcia, Catalonia, Balearic Isles and Castile-Leon, but here the difference in the gross margins under the two scenarios is small.

[19] For a theoretical study of these questions, see JÚDEZ et al. (2006).

Table 4.4.8: Gross Margin (% variation)

	Agenda 2000	Partial	Full	Regional
01. Galicia	-21.47	-4.94	-4.15	-4.74
02. Asturias	-18.90	-7.37	-6.03	-7.70
03. Cantabria	-21.44	-8.67	-7.64	-11.66
04. Basque Country	-15.52	-5.19	-3.85	-5.62
05. Navarre	-9.56	0.06	1.62	-1.68
06. La Rioja	-18.69	14.41	14.36	-9.08
07. Aragón	-9.88	1.33	1.31	1.10
08. Catalonia	-22.93	-21.26	-21.71	-22.59
09. Balearic Isles	-36.01	-1.85	-1.91	-3.14
10. Castile-Leon	-11.89	-0.64	-1.17	3.83
11. Madrid	-8.60	-6.93	-16.01	-11.55
12. Castile-La Mancha	-5.07	3.76	3.96	13.06
13. Valencian C.	-52.97	-8.06	-7.98	-27.04
14. Murcia	9.58	32.28	31.96	11.01
15. Extremadura	-5.82	5.61	8.11	6.09
16. Andalusia	-11.20	-1.20	-1.00	-12.15
00. Spain	-12.26	-1.23	-0.96	-0.96

Table 4.4.9: Average entitlement level per ha (€)

	Agenda 2000	Partial	Full	Regional
01. Galicia	0.00	181.99	249.74	240.09
02. Asturias	0.00	163.86	271.12	240.09
03. Cantabria	0.00	212.68	312.59	240.09
04. Basque Country	0.00	173.83	261.09	240.09
05. Navarre	0.00	185.85	270.72	240.09
06. La Rioja	0.00	384.81	530.83	240.09
07. Aragón	0.00	165.33	241.34	240.09
08. Catalonia	0.00	195.34	248.34	240.09
09. Balearic Isles	0.00	234.45	260.98	240.09
10. Castile-Leon	0.00	152.18	210.01	240.09
11. Madrid	0.00	145.19	198.16	240.09
12. Castile-La Mancha	0.00	137.88	188.61	240.09
13. Valencian C.	0.00	580.12	584.49	240.09
14. Murcia	0.00	1052.64	1960.11	240.09
15. Extremadura	0.00	134.22	253.42	240.09
16. Andalusia	0.00	264.80	322.18	240.09
00. Spain	0.00	172.23	240.09	240.09

4.4.3 Final remarks

Based on PROMAPA.G results the impact of different agricultural policy measures on Spanish agriculture is analysed. Although this analysis was conducted with the results obtained by calibrating the model using exogenous supply elasticities, it would not have varied significantly if either of the other calibration methods presently available in PROMAPA.G had been employed instead.

One general conclusion is that while farming activity is lower in the partial and full decoupling scenarios than in the Agenda 2000 scenario, farmers' earnings are higher in the former. A great part of this improvement is due to the more favourable prices as well as to the increased aid for some products and new forms of aid not provided for under Agenda 2000 arrangements.

Irrespective of the results, the PROMAPA.G model is presently a flexible model, relatively quick and easy to use for the nation-wide and regional analysis associated with different agricultural policy assumptions and price forecasts.

The model is essentially designed to be a tool for reflection about the expected consequences of implementing agricultural policy measures. An illustrative example of such use of the model is given in the preceding pages, in an attempt to explain how the results obtained are affected by the assumptions proposed.

4.5 Different options for decoupling of direct payments: Analysis of impacts through the use of the AROPAj model

Elodie Debove and Pierre-Alain Jayet

4.5.1 Introduction

This paper is devoted to the impacts of decoupling on gross margin, land use and production estimated by the AROPAj model. Results are delivered at the Member State level and for EU-15. Two decoupling options are taken into account:

– The first one is based to the Luxembourg agreement and denoted by "LX15". It is similar to the scenario SFP_nat.

– The second one takes the form of a single area payment and is based on historical subsidies. Direct payments are fully decoupled. It is assumed that there is no constraint limiting the access to the entitlements. Therefore, the activity level of crop and livestock production does not depend on entitlements, although the latter influence gross margins and the dual values of land. Entitlements are equal to the historical subsidies. The scenario is very similar to the stylized "Bond Scheme" analysed in Chapter 4.6 and is denoted "FD15".

These two options and their implementation in the AROPAj model are described in detail in Deliverable "D4" of GENEDEC[20]. We also take into consideration the "Agenda 2000" being used as reference for the analysis of decoupling. In the following, this scenario is denoted as "AG15". In all AROPAj simulations used in this paper, activities of livestock production are assumed to be adjustable in a range of +/-15% of their reference level. However, the initial simulation corresponding to the calibration of the AROPAj model with the "Agenda 2000" policy does not allow a livestock adjustment and is denoted "AG00". The price scenarios are based on results delivered by ESIM, a model applied within IDEMA - another project of the 6th Framework programme (see Table 3.4.1)[21]. In order to deliver more realistic estimations and not to present too many figures and tables, results are only displayed for changes of gross margin, land use and production.

[20] See Chapters "The Luxembourg agreement seen through the core model" and "Impact of the Luxembourg agreement on the shadow prices of the land through the use of the AROPAj model".

[21] Alternatively we used price projections based on the interactive use of AROPAj and the PEATSim model (see delivery D4 entitled "Coupling of the AROPAj model and the partial equilibrium PEATSim model". Results are given in the annex of this report (see Tables A.4.5.1-A.4.5.4).

4.5.2 Gross margins and subsidies

Tables 4.5.1 and 4.5.2 show the impacts of the livestock adjustment (comparison between scenarios AG00 and AG15) and the cumulative impacts of livestock adjustment and decoupling. The underlying livestock adjustment induces considerable positive effects on the gross margin while the total amount of subsidies is only marginally affected.

The coupling of the European agricultural model –AROPAj– and the partial equilibrium model ESIM leads to a significant change compared to the reference situation (AG00). This differential is as important as the change induced by the livestock adjustment. It is now difficult to conclude about the cause of the differences, is it a model effect or a market effect?

The impact on the agricultural subsidies is also significant when the Luxembourg agreement is implemented. In most Member States the Luxembourg agreement will have a negative impact on the total of direct payments. However, in Germany direct payments increase significantly. The latter is mainly due to the specification of regional premia in AROPAj.

Table 4.5.1: Change in gross margin and net agricultural support (subsidy minus the tax related to the sugar regime) when livestock adjustment is implemented in the AROPAj model

	Gross margin			Direct payments		
	Mil. €	Δ Mil. € 1)	% 2)	Mil. €	Δ Mil. € 1)	% 2)
EU-15	85,093	5,704	*6.7*	27,249	95	*0.3*
Belgium	765	247	*32.3*	429	-15	*-3.5*
Denmark	1,751	223	*12.7*	779	-3	*-0.4*
Germany	16,128	564	*3.5*	4,743	12	*0.3*
Greece	2,575	172	*6.7*	776	55	*7.1*
Spain	3,035	628	*20.7*	1,993	40	*2.0*
France	18,246	1,133	*6.2*	7,853	-63	*-0.8*
United Kingdom	8,464	594	*7.0*	3,098	2	*0.1*
Ireland	1,984	178	*9.0*	904	32	*3.5*
Italy	16,350	1,463	*8.9*	2,692	15	*0.6*
Luxembourg	119	6	*5.0*	35	0	*0.0*
Netherlands	5,328	235	*4.4*	478	-1	*-0.2*
Austria	1,743	73	*4.2*	580	-1	*-0.2*
Portugal	1,762	76	*4.3*	496	2	*0.4*
Finland	1,577	32	*2.0*	374	8	*2.1*
Sweden	1,942	80	*4.1*	584	11	*1.9*

1) Change AG15 to AG00.
2) Relative change to AG00.

Table 4.5.2: Change of gross margin and net agricultural support (subsidy minus the tax related to the sugar regime) in the decoupling scenarios

	Gross Margin				Direct payments			
	LX15		FD15		LX15		FD15	
	Δ Mil. € 1)	% 2)	Δ Mil. € 1)	% 2)	Δ Mil. € 1)	% 2)	Δ Mil. € 1)	% 2)
EU-15	4,369	5.1	5,931	7.0	293	1.1	-104	-0.4
Belgium	7	0.9	41	5.4	0	0.0	15	3.5
Denmark	23	1.3	69	3.9	3	0.4	3	0.4
Germany	836	5.2	358	2.2	740	15.6	-15	-0.3
Greece	398	15.5	482	18.7	-55	-7.1	-56	-7.2
Spain	683	22.5	925	30.5	-66	-3.3	-40	-2.0
France	622	3.4	1,522	8.3	-252	-3.2	61	0.8
United Kingdom	898	10.6	1,141	13.5	-3	-0.1	-3	-0.1
Ireland	186	9.4	212	10.7	-32	-3.5	-32	-3.5
Italy	793	4.9	1,014	6.2	-16	-0.6	-16	-0.6
Luxembourg	1	0.8	4	3.4	0	0.0	0	0.0
Netherlands	-222	-4.2	-133	-2.5	-1	-0.2	0	0.0
Austria	36	2.1	64	3.7	-3	-0.5	1	0.2
Portugal	73	4.1	138	7.8	-8	-1.6	-2	-0.4
Finland	-8	-0.5	7	0.4	-8	-2.1	-9	-2.4
Sweden	43	2.2	77	4.0	-10	-1.7	-12	-2.1

1) Change AG15 to AG00.
2) Relative change to AG00.

The net social benefit (gross margin minus budget) of both decoupling options is positive for all Member States except for the Netherlands. Table 4.5.3 provides the Member States net social benefit per hectare comparing the first scenario AG00 to the AG15 (meaning that only AROPAj is considered) and referring to the AG15 scenario in other cases. The net social benefit is taken into account only partially because only farmers and taxpayers but not consumers are considered. Nevertheless it should provide useful information to estimate the potential impact of decoupling.

Table 4.5.3: Net social benefit (gross margin minus the budget) per hectare

	Reference	Decoupling	
	Ag15 - AG00	LX15 - AG15	FD15 - AG15
	€/ha	€/ha	€/ha
EU-15	64	47	69
Belgium	183	5	19
Denmark	93	8	27
Germany	37	7	25
Greece	95	372	440
Spain	52	66	85
France	50	36	61
United Kingdom	51	77	98
Ireland	46	68	76
Italy	192	107	136
Luxembourg	47	6	25
Netherlands	156	-146	-82
Austria	42	22	35
Portugal	37	41	70
Finland	12	0	8
Sweden	26	20	34

4.5.3 Change in land allocation and production

The other focus of the analysis is the possible impact of decoupling options on the use of agricultural land. We also take production (marketed and on-farm use) into consideration.

In Tables 4.5.4 and 4.5.5, the effects of the scenarios LX15 and the FD15 on land allocation are given. Tables 4.5.6 and 4.5.7 provide results concerning production. Table 4.5.8 delivers synthetic results on greenhouse gas emissions. All results are given in comparison to the AG15 scenario.

It is to be noticed first that the total used agricultural area (UAA) taken into account by the AROPAj model is lower than 88 millions hectares. This is significantly less than the total UAA of the European Union (EU15). For instance, AROPAj covers less than 80% of the total UAA. But the model covers more than 90% of the area devoted to “grandes cultures”. Arable fodder areas and meadows are well covered by the model, too.

Table 4.5.4: Change in land use between the scenarios AG15 and LX15

	Cereals	Oilseed & proteins	Sugarbeet & potatoes	Fodder crops	Meadows	Set-aside	Fallow
	1,000 ha	1,000 ha	1,000 ha	1,000 ha	1,000 ha	1,000 ha	1,000 ha
				Change AG15 to LX15			
EU-15	-2,572	-513	248	-1,740	3,549	-169	1,200
Belgium	-28	-1	40	-34	-10	1	31
Denmark	-69	-5	2	-17	67	2	20
Germany	-676	-123	98	-135	682	-63	217
Greece	-25	1	9	-49	29	0	34
Spain	-69	-90	74	-109	157	-3	40
France	-636	-242	5	-559	1,185	-4	251
United Kingdom	-258	-21	2	-311	465	1	122
Ireland	-47	0	-7	-131	223	-1	-37
Italy	-194	-3	2	-329	234	-2	292
Luxembourg	-21	-3	-1	1	25	0	-1
Netherlands	-11	0	-2	-38	59	0	-7
Austria	-80	-3	-4	-23	119	-2	-7
Portugal	-157	-3	17	-34	233	-98	42
Finland	-53	0	14	-6	2	0	43
Sweden	-248	-19	0	33	77	0	159
				Relative change AG15 to LX15 (%)			
EU-15	*-7.0*	*-11.9*	*5.1*	*-18.3*	*14.9*	*-2.6*	*57.6*
Belgium	*-10.0*	*-20.0*	*17.7*	*-11.9*	*-1.9*	*2.1*	*62.0*
Denmark	*-4.7*	*-7.5*	*1.2*	*-7.6*	*27.9*	*0.7*	*0.0*
Germany	*-9.6*	*-13.7*	*7.7*	*-15.1*	*22.5*	*-4.6*	*86.1*
Greece	*-3.1*	*5.3*	*13.0*	*-50.5*	*13.2*	*0.0*	*1,133.3*
Spain	*-1.9*	*-34.7*	*25.7*	*-21.6*	*10.0*	*-0.6*	*121.2*
France	*-6.9*	*-12.4*	*0.6*	*-16.1*	*19.7*	*-0.2*	*49.6*
United Kingdom	*-6.8*	*-4.6*	*1.0*	*-24.4*	*10.7*	*0.2*	*17.3*
Ireland	*-16.5*	*0.0*	*-14.6*	*-66.2*	*9.0*	*-1.4*	*-33.9*
Italy	*-5.1*	*-2.0*	*0.7*	*-58.8*	*11.0*	*-0.5*	*149.7*
Luxembourg	*-40.4*	*-50.0*	*-25.0*	*12.5*	*51.0*	*0.0*	*-100.0*
Netherlands	*-5.9*	*0.0*	*-0.6*	*-20.3*	*8.3*	*0.0*	*-21.2*
Austria	*-10.2*	*-4.1*	*-2.4*	*-48.9*	*21.6*	*-1.9*	*-10.8*
Portugal	*-26.1*	*-15.0*	*9.5*	*-15.0*	*43.8*	*-24.4*	*144.8*
Finland	*-5.0*	*0.0*	*8.6*	*-1.1*	*10.0*	*0.0*	*537.5*
Sweden	*-18.3*	*-22.1*	*0.0*	*8.7*	*22.4*	*0.0*	*407.7*

Table 4.5.5: Change in land use between the scenarios AG15 and FD15

	Cereals	Oilseed & proteins	Sugarbeet & potatoes	Fodder crops	Meadows	Set-aside	Fallow
	1,000 ha	1,000 ha	1,000 ha	1,000 ha	1,000 ha	1,000 ha	1,000 ha
				Change AG15 to FD15			
EU-15	-2,728	-109	407	-2,139	5,548	-6,476	5,497
Belgium	-11	-1	44	-30	-25	-47	69
Denmark	-32	9	22	7	95	-271	169
Germany	-619	-60	102	-37	1,060	-1,382	936
Greece	-22	1	9	-50	31	-18	48
Spain	-169	54	165	-637	206	-777	1,158
France	-794	-125	37	-545	2,231	-2,043	1,240
United Kingdom	-262	17	1	-273	577	-598	537
Ireland	-50	0	-9	-136	243	-71	23
Italy	-195	-2	8	-278	334	-440	573
Luxembourg	-19	-2	-1	2	28	-9	2
Netherlands	-10	0	-3	-38	60	-39	29
Austria	-66	15	1	-23	132	-107	47
Portugal	-211	-3	15	-56	439	-406	221
Finland	-26	0	14	-23	2	-56	89
Sweden	-243	-12	0	-24	136	-213	356
				Relative change AG15 to FD15 (%)			
EU-15	*-7.5*	*-2.5*	*8.3*	*-22.5*	*23.4*	*-100.6*	*264.0*
Belgium	*-3.9*	*-20.0*	*19.5*	*-10.5*	*-4.7*	*-97.9*	*138.0*
Denmark	*-2.2*	*13.4*	*13.7*	*3.1*	*39.6*	*-99.6*	*0.0*
Germany	*-8.8*	*-6.7*	*8.0*	*-4.1*	*35.0*	*-101.7*	*371.4*
Greece	*-2.8*	*5.3*	*13.0*	*-51.5*	*14.2*	*-100.0*	*1,600.0*
Spain	*-4.7*	*20.8*	*57.3*	*-126.4*	*13.1*	*-163.2*	*3,509.1*
France	*-8.6*	*-6.4*	*4.5*	*-15.7*	*37.1*	*-100.2*	*245.1*
United Kingdom	*-6.9*	*3.7*	*0.5*	*-21.4*	*13.3*	*-99.8*	*76.3*
Ireland	*-17.5*	*0.0*	*-18.8*	*-68.7*	*9.8*	*-101.4*	*21.1*
Italy	*-5.1*	*-1.3*	*2.8*	*-49.6*	*15.7*	*-100.2*	*293.8*
Luxembourg	*-36.5*	*-33.3*	*-25.0*	*25.0*	*57.1*	*-100.0*	*200.0*
Netherlands	*-5.3*	*0.0*	*-0.9*	*-20.3*	*8.4*	*-100.0*	*87.9*
Austria	*-8.4*	*20.5*	*0.6*	*-48.9*	*24.0*	*-101.9*	*72.3*
Portugal	*-35.0*	*-15.0*	*8.4*	*-24.7*	*82.5*	*-101.2*	*762.1*
Finland	*-2.5*	*0.0*	*8.6*	*-4.1*	*10.0*	*-101.8*	*1,112.5*
Sweden	*-17.9*	*-14.0*	*0.0*	*-6.3*	*39.5*	*-100.0*	*912.8*

Table 4.5.6: Change in production between the scenarios AG15 and LX15

	Marketed cereals	On-farm cereals	Cereal production	Concentr. feed	Raw feed	Animal product	Livestock	Marketed feed	Milk
	1,000 t	1,000 t	1,000 t	1,000 t	1,000 t	1,000 €	1,000 LSU	1,000 €	1,000 t
					Change AG15 to LX15				
EU-15	-2,629	-8,502	-11,130	-5,885	20,720	2,130	1,946	-66	69
Belgium	-253	5	-249	-164	859	-10	84	-1	0
Denmark	-84	-206	-291	-49	256	-39	32	-15	0
Germany	-1,499	-1,141	-2,640	-884	1,127	-106	-77	-138	35
Greece	176	-185	-8	-102	220	393	-21	-60	-1
Spain	575	-855	-280	-1,063	3,995	355	192	47	0
France	-1,089	-2,378	-3,466	-827	3,286	206	632	54	0
United Kingdom	-586	-944	-1,530	-1,549	4,433	685	308	-56	10
Ireland	-30	-214	-244	-539	1,753	209	288	-29	1
Italy	328	-1,270	-942	-394	2,464	438	203	90	-12
Luxembourg	-24	-65	-88	-20	17	-1	-1	-3	0
Netherlands	-33	-20	-53	-6	963	60	182	23	0
Austria	-62	-229	-291	-95	186	-8	27	-23	0
Portugal	17	-117	-100	-9	304	40	23	12	0
Finland	318	-515	-197	-98	459	-54	9	20	2
Sweden	-383	-370	-752	-87	397	-37	64	13	34
					Relative change AG15 to LX15 (%)				
EU-15	*-1.6*	*-22.7*	*-5.6*	*-6.2*	*41.9*	*6.3*	*2.3*	*-0.3*	*0.1*
Belgium	*-21.2*	*0.6*	*-12.6*	*-3.0*	*25.7*	*3.7*	*2.4*	*-0.1*	*0.0*
Denmark	*-1.6*	*-7.3*	*-3.6*	*-0.9*	*14.6*	*-8.2*	*1.0*	*-1.1*	*0.0*
Germany	*-5.7*	*-11.7*	*-7.3*	*-5.0*	*31.6*	*-1.5*	*-0.6*	*-3.3*	*0.1*
Greece	*5.7*	*-34.3*	*-0.2*	*-7.6*	*8.0*	*34.2*	*-1.0*	*-10.3*	*-0.4*
Spain	*5.1*	*-67.3*	*-2.2*	*-10.0*	*81.3*	*-81.4*	*2.9*	*1.7*	*0.0*
France	*-2.0*	*-28.4*	*-5.6*	*-5.5*	*55.4*	*3.5*	*3.2*	*1.4*	*0.0*
United Kingdom	*-2.6*	*-21.5*	*-5.6*	*-17.5*	*44.6*	*19.5*	*2.5*	*-1.9*	*0.1*
Ireland	*-2.5*	*-44.3*	*-14.4*	*-40.6*	*35.0*	*17.6*	*7.4*	*-3.5*	*0.0*
Italy	*1.8*	*-37.2*	*-4.3*	*-4.7*	*66.2*	*3.8*	*3.0*	*4.2*	*-0.1*
Luxembourg	*-27.0*	*-55.1*	*-42.5*	*-24.4*	*56.7*	*-1.1*	*-0.7*	*-14.3*	*0.0*
Netherlands	*-3.2*	*-13.9*	*-4.5*	*-0.1*	*24.2*	*10.9*	*3.7*	*0.9*	*0.0*
Austria	*-2.4*	*-19.1*	*-7.8*	*-5.8*	*15.4*	*-1.1*	*1.7*	*-4.8*	*0.0*
Portugal	*1.6*	*-42.9*	*-7.4*	*-0.7*	*36.5*	*9.4*	*1.8*	*3.4*	*0.0*
Finland	*13.9*	*-38.8*	*-5.5*	*-15.1*	*308.1*	*-5.4*	*1.0*	*12.7*	*0.1*
Sweden	*-9.3*	*-25.1*	*-13.4*	*-6.5*	*95.4*	*-3.9*	*4.9*	*4.0*	*0.9*

Table 4.5.7: Change in production between the scenarios AG15 and FD15

	Marketed cereals	On-farm cereals	Cereal production	Concentr. feed	Raw feed	Animal product	Livestock	Marketed feed	Milk
	1,000 t	1,000 t	1,000 t	1,000 t	1,000 t	1,000 €	1,000 LSU	1,000 €	1,000 t
					Change AG15 to FD15				
EU-15	403	-9,953	-9,551	-5,735	17,977	3,163	2,339	-174	95
Belgium	-296	170	-126	-108	757	-6	115	8	0
Denmark	177	-253	-76	-51	170	-27	40	-23	0
Germany	-20	-1,475	-1,495	-1,002	494	38	-77	-228	35
Greece	192	-192	0	-92	208	467	-21	-50	-1
Spain	573	-857	-284	-1,091	3,594	476	172	25	48
France	191	-3,686	-3,495	-1,079	3,299	452	830	12	-22
United Kingdom	-607	-926	-1,533	-1,532	4,265	843	348	-31	10
Ireland	-10	-256	-266	-433	1,748	228	325	12	1
Italy	335	-1,321	-985	-99	1,640	603	261	78	-12
Luxembourg	-8	-67	-75	-19	5	1	-1	-4	0
Netherlands	-8	-22	-29	-7	959	76	182	30	0
Austria	14	-245	-231	-76	271	-15	40	-7	0
Portugal	-37	-131	-169	4	77	79	43	-5	0
Finland	222	-339	-118	-69	160	-27	13	-2	2
Sweden	-314	-354	-668	-80	330	-23	67	10	34
					Relative change AG15 to FD15 (%)				
EU-15	*0.2*	*-26.6*	*-4.8*	*-6.1*	*36.3*	*9.4*	*2.8*	*-0.7*	*0.1*
Belgium	*-24.8*	*21.9*	*-6.4*	*-2.0*	*22.7*	*2.2*	*3.3*	*0.5*	*0.0*
Denmark	*3.4*	*-8.9*	*-0.9*	*-0.9*	*9.7*	*-5.7*	*1.2*	*-1.6*	*0.0*
Germany	*-0.1*	*-15.1*	*-4.1*	*-5.6*	*13.9*	*0.6*	*-0.6*	*-5.4*	*0.1*
Greece	*6.2*	*-35.6*	*0.0*	*-6.9*	*7.6*	*40.6*	*-1.0*	*-8.6*	*-0.4*
Spain	*5.1*	*-67.4*	*-2.3*	*-10.3*	*73.2*	*-109.2*	*2.6*	*0.9*	*0.8*
France	*0.4*	*-44.0*	*-5.6*	*-7.2*	*55.7*	*7.7*	*4.2*	*0.3*	*-0.1*
United Kingdom	*-2.6*	*-21.1*	*-5.6*	*-17.3*	*42.9*	*24.0*	*2.8*	*-1.0*	*0.1*
Ireland	*-0.8*	*-53.0*	*-15.7*	*-32.6*	*34.9*	*19.2*	*8.3*	*1.4*	*0.0*
Italy	*1.8*	*-38.7*	*-4.5*	*-1.2*	*44.1*	*5.2*	*3.9*	*3.6*	*-0.1*
Luxembourg	*-9.0*	*-56.8*	*-36.2*	*-23.2*	*16.7*	*1.1*	*-0.7*	*-19.0*	*0.0*
Netherlands	*-0.8*	*-15.3*	*-2.5*	*-0.1*	*24.1*	*13.8*	*3.7*	*1.2*	*0.0*
Austria	*0.5*	*-20.4*	*-6.2*	*-4.7*	*22.4*	*-2.1*	*2.6*	*-1.4*	*0.0*
Portugal	*-3.4*	*-48.0*	*-12.5*	*0.3*	*9.2*	*18.6*	*3.3*	*-1.4*	*0.0*
Finland	*9.7*	*-25.5*	*-3.3*	*-10.6*	*107.4*	*-2.7*	*1.4*	*-1.3*	*0.1*
Sweden	*-7.6*	*-24.0*	*-11.9*	*-6.0*	*79.3*	*-2.4*	*5.1*	*3.0*	*0.9*

Decoupling options and price projections lead to a significant change in land use especially in Germany, United Kingdom, France and Portugal. In these countries, cereal area is decreasing and pastures are increasing. In these countries, as well as in Italy and Sweden, a significant part of the cereal area turns into fallow. The decrease of cereals is estimated at between 7 % and 8 % of the total European cereal area represented by the model. This is 3 % to 3.3 % of the total European UAA.

In the case of “full decoupling” (FD15), set-aside disappears and is turned into fallow at the macro-level. As explained in the Deliverable D4 (Chapter 2), the effect differs at the regional level. In less favourable agricultural regions, crops, set-aside and fodder are often turned into fallow, while in other regions former set-aside area is replaced by crops.

The impact of the scenarios LX15 and FD15 on oilseeds and protein crops is also significant, but it differs between scenarios. The change between LX15 and AG15 2000 is five times the change between the FD15 and AG15.

The area change related to pasture is highly significant as well, even at the European scale, where the variation existent at the local level is often hidden. Depending on the chosen decoupling option the total area transformed into pasture reaches 4 to 6% of total European UAA. Half of this effect is due to a reverse effect on the fodder area, which sharply decreases.

Another effect of interest is the change in the use of crop products. All decoupling scenarios lead to a dramatic decrease of the on-farm use of cereals for animal feeding. This is true for any Member State (except Belgium in one scenario). The decrease of total production does not necessarily imply a decrease of marketed quantities. We observe an increase of cereal sales in several southern countries (Greece, France, Spain, Italy) and in Denmark and Finland in the case of full decoupling. This is partially due to the fodder prices projected by ESIM.

The results show that the markets involved in the equilibrium market analysis are quite important. The two decoupling options considered lead to a strong increase of livestock. Considering feed quantities and feed market value, the question of the feed price appears to be crucial. Results related to price scenarios based on PEATSim are given in the annex. Supply and allocation effects differ with regard to ESIM scenarios as PEATSim scenarios do not include price changes for livestock and feed input.

Table 4.5.8: Change in greenhouse gas emissions compared to the AG15 scenario (1000 t CO_2 equivalents)

	LX15 - AG15 1,000 t	FD15 - AG15 1,000 t
EU-15	2,163	6,136
Belgium	497	615
Denmark	49	245
Germany	-1,103	71
Greece	-174	-168
Spain	357	759
France	31	1,222
United Kingdom	-264	5
Ireland	765	864
Italy	859	955
Luxembourg	-34	-21
Netherlands	989	992
Austria	6	167
Portugal	-143	-51
Finland	156	212
Sweden	172	270

Finally, change in animal production and in animal feed should have a strong impact on greenhouse gas emissions (see table 4.5.8). Simulations based on ESIM and calling for a more complete set of balanced markets could lead to higher emissions, up to 0.6% (Luxembourg agreement) and 1.7% (full decoupling) of the AG15 emissions. As shown in Deliverable D4 a reverse result is achieved when AROPAj is coupled with PEATSim. There, the GHG emissions decrease by 1.5% of the emissions in the reference.

4.6 Analysis of alternative decoupling options beyond the scope of the 2003 CAP reform

Bernd Kuepker and Werner Kleinhanss

Federal Agricultural Research Centre; Institute of Farm Economics

4.6.1 Sensitivity analysis of varying degrees of partial decoupling

In order to obtain information about the magnitude of the production incentives and welfare losses induced by coupled direct payments, the impact of varying degrees of partial decoupling is analysed in this Chapter. The analysis is done for the example of the German agricultural sector. Direct payments for arable crops, the suckler cow premium and the special premium for adult male cattle are considered. For each premium type four scenarios with decoupling degrees ranging from 25 to 100% are analysed. The SFP_hist is taken as reference to determine partial impacts. Results at sectoral level are summarized in Tables 4.6.1 to 4.6.3. In Figures 4.6.1 to 4.6.3. the impact on farm types and dairy cow size classes is given. Regional impacts considering selected activities are given in Figures 4.6.4 to 4.6.13.

Partial decoupling of arable crop premiums

Coupled direct payments give an economic incentive to produce crops included in the arable crops payment scheme. Competitiveness against grassland, formerly not supported arable fodder crops and mulching improves. The main effects are as follows:

– With the increasing degree of coupling, mulched area and fallow is reduced stepwise by roughly 40, 60, 80, and 90 %. Mulching loses its economic attractiveness even on marginal areas (see Figure 4.6.13). With 100% coupling, the amount of fallow land is diminished to the level in the base year. Even a small degree of coupling (25 %) significantly reduces the tendency for land abandonment.

– Set aside is reduced by about 4% and is almost cut down to the mandatory level.

– Cereal area will be extended by 5, 9, 11 and 12 % (see Figure 4.6.4). Rye area will increase by up to 24 % profiting from the significant reduction of mulching. This is especially the case in the sandy soil regions in eastern Germany. Here, the cereal acreage increases by up to 20 %.

– Food oilseeds and protein crops seem to be even more sensitive to coupled premiums, as acreage increases by about 8, 15, 17 and 20 %.

- As potatoes, by assumption[1], are not included in the arable crops premium scheme, their competitiveness will become lower, resulting in lower production.
- The competitiveness of arable fodder production will be reduced resulting in a drop of up to 8%. Silage maize, being eligible for coupled premiums, will be reduced less, while other arable fodder crops will be reduced by up to 18%.
- Grassland area – including the mulching areas – will be reduced by up to 9 % and the remaining grassland use will be intensified.

Although partial decoupling of arable crops primarily affects land use, it does have considerable effects on the livestock sector as well. Due to the intensification of land use and the reduction of grassland; sucker cow and sheep production is influenced. They will be reduced by up to 11 and 4 %, respectively. The impact on bull fattening is less pronounced; it is lowered by up to 3.2 %.

According to economic theory, agricultural support via coupled direct payments leads to welfare losses, because it offers incentives for producers to realize an output level which is well above the free market equilibrium. For a comprehensive measurement of the total effect on welfare it would be necessary to take the effect on producer rents, consumer rents and public expenditure into account. As EU-FARMIS is a supply model, effects on the consumer rents cannot be considered. Therefore, only the costs caused by overspecialisation can be measured. It is assumed that the prices in the ESIM scenario “full decoupling” represent the free market equilibrium and that these stay constant in all scenarios. Public spending remains roughly constant as well. If both prices and public spending stay constant, the impact on producers’ income should be a good estimate for the costs induced by overspecialisation. The income indicator FNVA, however, is not adequate for this type of analysis because it assumes constant marginal costs. It is necessary to use an indicator which takes the nonlinearity of the cost function applied in EU-FARMIS into account.

The indicator chosen is, therefore, closely related to the EU-FARMIS objective function. It is called ‘Object’ in the following. The impact on the indicator “Object” depends on the assumptions about price elasticities applied in EU-FARMIS. Therefore, results can only give a broad idea of the costs induced by overspecialisation. Looking at Table 4.6.1 it is shown that, according to the indicator ‘Object’, income in Germany drops with increasing level of coupling. In the case of 100 % coupled arable payments, income drops by 2.2%. Taking the change of direct payment into account this corresponds to 104.5 Mil. € which is about 4 % of the total amount of coupled payments.

[1] Starch potatoes are not represented in the model because FADN does not distinguish between food and starch potatoes. Therefore, only the aggregate of food potatoes and starch potatoes is included.

Partial decoupling of special bull premiums

The special premium for male adult cattle gives an incentive for bull fattening. In the underlying scenarios bull fattening increases by 4, 8, 11 and 15% (see Figure. 4.6.11). The increases are proportional to coupled premium shares. Production in eastern Germany will increase above the average, whilst changes in the South are below the average. Increases in bull fattening has only minor side effects on other activities:

– sectoral suckler cow production will be reduced up to 1.2%
– the acreage of silage maize is extended by up to 3%, partially replacing mulching and other arable crops.

The impact on the income indicator ‘Object’ is limited due to the comparatively low volume of the premium scheme. In the case of full coupling of special premium for male adult cattle, income drops by 0.7 %, which corresponds to 39 Mil. €. However, it has to be taken into account that in this scenario the amount of total direct payments is about 20 Mil. € lower due to a general reduction of bull fattening in comparison to the base year 2002[2].

Partial decoupling of suckler cow premiums

Compared to bull fattening, suckler cow production seems to be more sensitive to coupled premiums. In the case of the 25 % coupling scenario suckler cow production rises by 6.7%; with an increasing degree of coupling production rises by 13, 18 and 23%, respectively. Due to the lower importance of suckler cow production in Germany, substitution effects with other production activities are quite limited. Sheep production is effected most and decreases by up to 4.3 %.

As suckler cow production is a system of pasture use, its production level influences grassland use as well. The production increase induced by coupled payments consequently lowers the amount of mulched area and increases the amount of extensive and intensive grassland. The amount of fallow land is reduced as well (see 4.6.10).

The effect of coupled direct payments on the indicator ‘Object’ is very small due to the low importance of suckler cow production in Germany. However, compared to the amount of direct payments involved, the effect is comparable to the effect of the other

[2] The entitlement level in the Scenario SFP_hist is derived from the 2002 farm accounts. As bull fattening is reduced over time, the amount of coupled direct payments is reduced as well and is derived from production levels in the base year 2002. As the production of arable crops decreases due to decoupling,, in scenarios with partial decoupling of arable crops the amount of total direct payments decreases as well.

premium schemes. In Member States like France, where suckler cow production is of major importance, income/welfare effects would be significant.

Table 4.6.1: Impact of coupled arable direct payments on agricultural production and income

		SFP_hist	ARAB_25	ARAB_50	ARAB_75	ARAB_100
			rel. change to SFP_hist (%)			
Land use						
Cereals	1000 ha	5,997	5.3	8.8	10.6	11.8
Wheat	1000 ha	2,884	4.8	7.7	9.2	10.2
Barley	1000 ha	1,734	6.0	10.1	12.2	13.6
Rye	1000 ha	516	8.6	15.4	20.5	23.7
Oats	1000 ha	148	7.6	13.2	16.5	18.9
Oilseeds (Food)	1000 ha	896	8.1	13.5	16.5	18.4
Protein crops	1000 ha	200	8.6	15.2	18.9	21.0
Potatoes	1000 ha	211	-0.6	-1.6	-2.6	-3.7
Sugarbeets	1000 ha	354	0.0	0.0	0.0	0.0
Arable forrage crops	1000 ha	1,543	-1.2	-2.8	-5.1	-7.6
Fodder maize	1000 ha	1,031	-0.4	-1.0	-1.8	-2.6
Other fodder	1000 ha	513	-2.7	-6.4	-11.6	-17.7
Non-Food	1000 ha	373	-3.5	-4.3	-4.4	-4.4
Set-aside	1000 ha	1,100	-2.2	-3.3	-3.9	-4.2
Grassland	1000 ha	4,390	-4.1	-6.7	-7.9	-8.5
Intensive grassland	1000 ha	2,439	0.1	0.1	0.5	1.0
Extensive grassland	1000 ha	1,775	-5.5	-9.5	-11.9	-13.7
Mulched area	1000 ha	168	-51.2	-76.4	-88.2	-92.6
Fallow	1000 ha	212	-32.8	-49.0	-60.7	-67.4
UAA	1000 ha	15,083	0.5	0.7	0.9	0.9
Arable land	1000 ha	10,692	2.3	3.7	4.4	4.8
Grassland	1000 ha	4,222	-2.2	-3.9	-4.7	-5.2
Livestock production						
Dairy cows	1000 heads	3,945	0.0	0.0	0.0	-0.1
Suckler cows	1000 heads	348	-3.6	-6.7	-8.8	-10.9
Bulls [1)]	1000 heads	1,532	-0.6	-1.3	-2.2	-3.2
Fattening pigs[1)]	1000 heads	54,844	0.0	0.0	0.0	0.1
Poultry	1000 heads	49,854	0.0	0.0	0.0	0.0
Sheep	1000 heads	1,447	-1.2	-2.2	-3.4	-4.3
Economic indicators						
Production value	Mill €	29,399	0.9	1.4	1.6	1.7
Total subsidies	Mill €	6,570	-0.2	-0.1	-0.3	-0.3
Direct payments	Mill €	4,977	-0.2	-0.1	-0.3	-0.3
Variable input	Mill €	-18,529	0.9	1.4	1.5	1.5
Other costs	Mill €	-3,445				
Depreciation	Mill €	-5,407	0.6	0.9	0.9	0.8
Interest	Mill €	-835	0.7	1.0	1.1	1.1
Wages	Mill €	-2,852	0.6	0.8	0.5	0.1
Income indicators						
Farm Net Value Added (FNVA)	Mill €	11,485	0.4	0.8	1.0	1.2
Object	Mill €	5,475	-0.5	-0.9	-1.6	-2.2

1) Annual production.
Source: FARMIS; INLB-EU-GD AGRI/G.3.

Table 4.6.2: Impact of coupled special premiums for bulls on agricultural production and income in Germany

		SFP_hist	BULL_25	BULL_50	BULL_75	BULL_100
				rel. change to SFP_hist (%)		
Land use						
Cereals	1000 ha	5,997	-0.1	-0.1	-0.2	-0.2
Wheat	1000 ha	2,884	0.0	-0.1	-0.1	-0.2
Barley	1000 ha	1,734	-0.1	-0.1	-0.2	-0.2
Rye	1000 ha	516	-0.1	-0.2	-0.3	-0.4
Oats	1000 ha	148	0.0	-0.1	-0.1	-0.2
Oilseeds (Food)	1000 ha	896	-0.1	-0.1	-0.2	-0.2
Protein crops	1000 ha	200	0.0	-0.1	-0.1	-0.2
Potatoes	1000 ha	211	0.0	0.0	0.0	0.0
Sugarbeets	1000 ha	354	0.0	0.0	0.0	0.0
Arable forrage crops	1000 ha	1,543	0.5	1.1	1.6	2.1
Fodder maize	1000 ha	1,031	0.8	1.7	2.6	3.3
Other fodder	1000 ha	513	-0.1	-0.1	-0.2	-0.3
Non-Food	1000 ha	373	0.0	-0.1	-0.1	-0.1
Set-aside	1000 ha	1,100	0.0	0.0	-0.1	-0.1
Grassland	1000 ha	4,390	-0.1	-0.1	-0.2	-0.2
Intensive grassland	1000 ha	2,439	-0.1	-0.1	-0.2	-0.1
Extensive grassland	1000 ha	1,775	0.0	-0.1	-0.1	-0.2
Mulched area	1000 ha	168	-0.5	-1.1	-1.6	-2.5
Fallow	1000 ha	212	-0.3	-0.7	-1.1	-1.6
UAA	1000 ha	15,083	0.0	0.0	0.0	0.0
Arable land	1000 ha	10,692	0.0	0.1	0.1	0.1
Grassland	1000 ha	4,222	-0.1	-0.1	-0.1	-0.1
Livestock production						
Dairy cows	1000 heads	3,945	0.0	0.0	0.0	0.0
Suckler cows	1000 heads	348	-0.3	-0.6	-0.9	-1.2
Bulls [1)]	1000 heads	1,532	3.8	7.5	11.3	15.3
Fattening pigs[1)]	1000 heads	54,844	0.0	0.0	0.0	0.0
Poultry	1000 heads	49,854	0.0	0.0	0.0	0.0
Sheep	1000 heads	1,447	-0.2	-0.4	-0.6	-0.9
Economic indicators						
Production value	Mill €	29,399	0.1	0.3	0.4	0.6
Total subsidies	Mill €	6,570	-0.2	-0.3	-0.4	-0.3
Direct payments	Mill €	4,977	-0.2	-0.4	-0.5	-0.4
Variable input	Mill €	-18,529	0.2	0.5	0.7	0.9
Other costs	Mill €	-3,445				
Depreciation	Mill €	-5,407	0.1	0.2	0.3	0.4
Interest	Mill €	-835	0.1	0.3	0.4	0.5
Wages	Mill €	-2,852	0.6	1.2	1.8	2.5
Income indicators						
Farm Net Value Added (FNVA)	Mill €	11,485	-0.2	-0.3	-0.4	-0.5
Object	Mill €	5,475	-0.2	-0.4	-0.6	-0.7

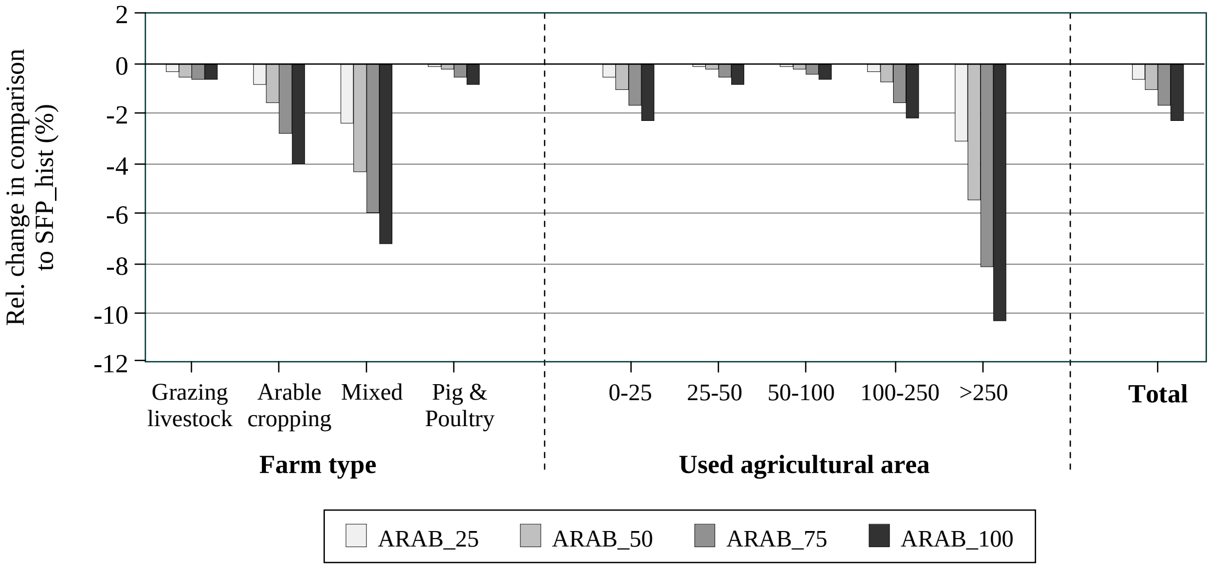
1) Annual production.
Source: FARMIS; INLB-EU-GD AGRI/G.3.

Table 4.6.3: Impact of coupled premiums for suckler cows on agricultural production and income in Germany

		SFP_hist	Suckler_25	Suckler_50	Suckler_75	Suckler_100
				rel. change to SFP_hist (%)		
Land use						
Cereals	1000 ha	5,997	-0.1	-0.2	-0.2	-0.3
Wheat	1000 ha	2,884	-0.1	-0.1	-0.2	-0.2
Barley	1000 ha	1,734	-0.1	-0.2	-0.2	-0.3
Rye	1000 ha	516	-0.2	-0.3	-0.5	-0.6
Oats	1000 ha	148	-0.2	-0.4	-0.5	-0.7
Oilseeds (Food)	1000 ha	896	-0.1	-0.2	-0.3	-0.4
Protein crops	1000 ha	200	-0.1	-0.3	-0.4	-0.5
Potatoes	1000 ha	211	0.0	0.0	0.0	0.0
Sugarbeets	1000 ha	354	0.0	0.0	0.0	0.0
Arable forrage crops	1000 ha	1,543	0.2	0.3	0.5	0.6
Fodder maize	1000 ha	1,031	0.0	0.0	0.0	0.0
Other fodder	1000 ha	513	0.5	0.9	1.4	1.7
Non-Food	1000 ha	373	-0.1	-0.1	-0.1	-0.2
Set-aside	1000 ha	1,100	0.0	-0.1	-0.1	-0.2
Grassland	1000 ha	4,390	0.2	0.4	0.5	0.6
Intensive grassland	1000 ha	2,439	0.7	1.3	1.9	2.3
Extensive grassland	1000 ha	1,775	0.1	0.1	0.2	0.1
Mulched area	1000 ha	168	-6.4	-11.3	-15.6	-18.8
Fallow	1000 ha	212	-1.0	-2.0	-2.8	-3.4
UAA	1000 ha	15,083	0.0	0.0	0.0	0.0
Arable land	1000 ha	10,692	-0.1	-0.1	-0.1	-0.2
Grassland	1000 ha	4,222	0.4	0.8	1.1	1.4
Livestock production						
Dairy cows	1000 heads	3,945	0.0	0.0	0.0	0.0
Suckler cows	1000 heads	348	6.7	12.7	18.1	22.7
Bulls [1)]	1000 heads	1,532	-0.1	-0.2	-0.2	-0.3
Fattening pigs[1)]	1000 heads	54,844	0.0	0.0	0.0	0.0
Poultry	1000 heads	49,854	0.0	0.0	0.0	0.0
Sheep	1000 heads	1,447	-1.0	-2.2	-3.3	-4.3
Economic indicators						
Production value	Mill €	29,399	0.0	0.0	0.0	0.0
Total subsidies	Mill €	6,570	0.0	0.1	0.1	0.1
Direct payments	Mill €	4,977	0.0	0.0	0.0	0.0
Variable input	Mill €	-18,529	0.0	0.1	0.1	0.1
Other costs	Mill €	-3,445				
Depreciation	Mill €	-5,407	0.0	0.0	0.1	0.1
Interest	Mill €	-835	0.0	0.0	0.0	0.0
Wages	Mill €	-2,852	0.1	0.2	0.2	0.3
Income indicators						
Farm Net Value Added (FNVA)	Mill €	11,485	0.0	0.0	0.0	0.0
Object	Mill €	5,475	0.0	0.0	-0.1	-0.1

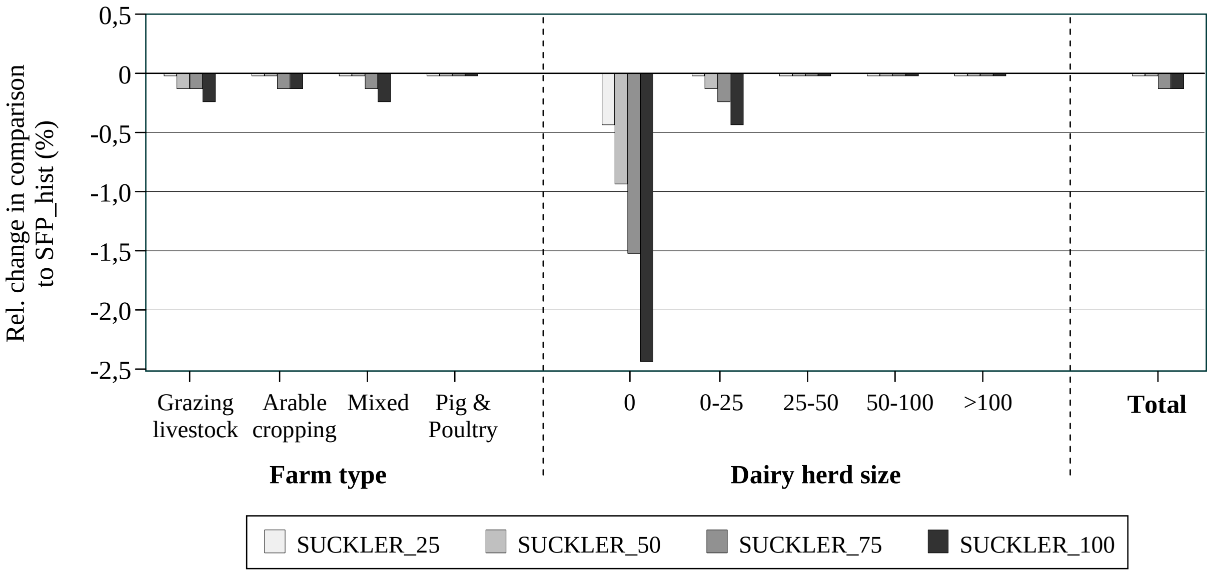
1) Annual production.
Source: FARMIS; INLB-EU-GD AGRI/G.3.

Figure 4.6.1: Implications of the degree of decoupling on income: the case of arable aid



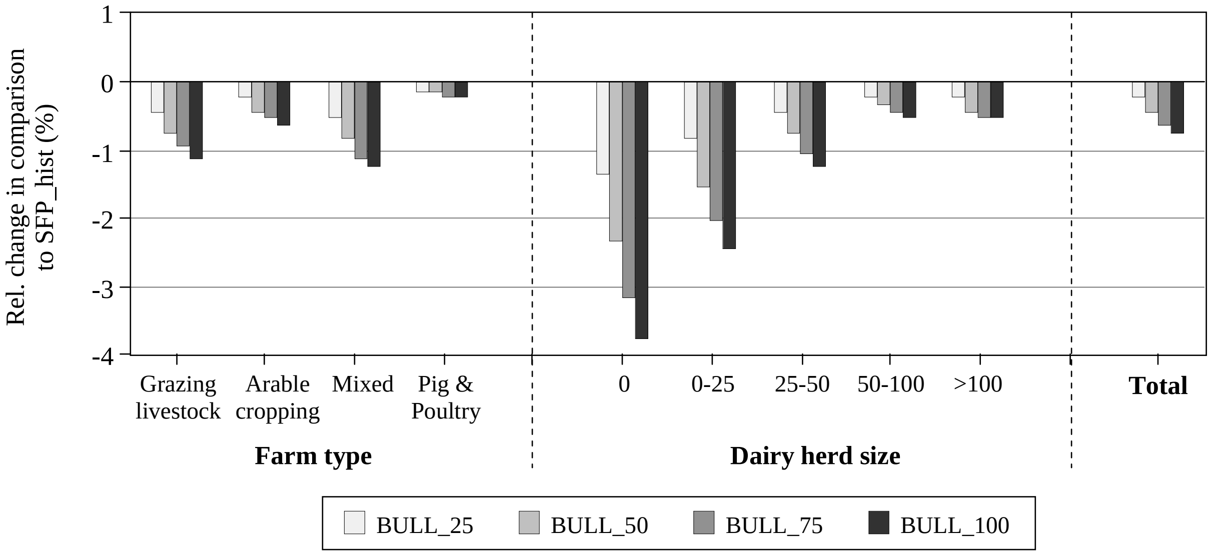
Source: FARMIS; INLB-EU-GD AGRI/G.3.

Figure 4.6.2: Implications of the degree of decoupling on income: the case of suckler cow premia



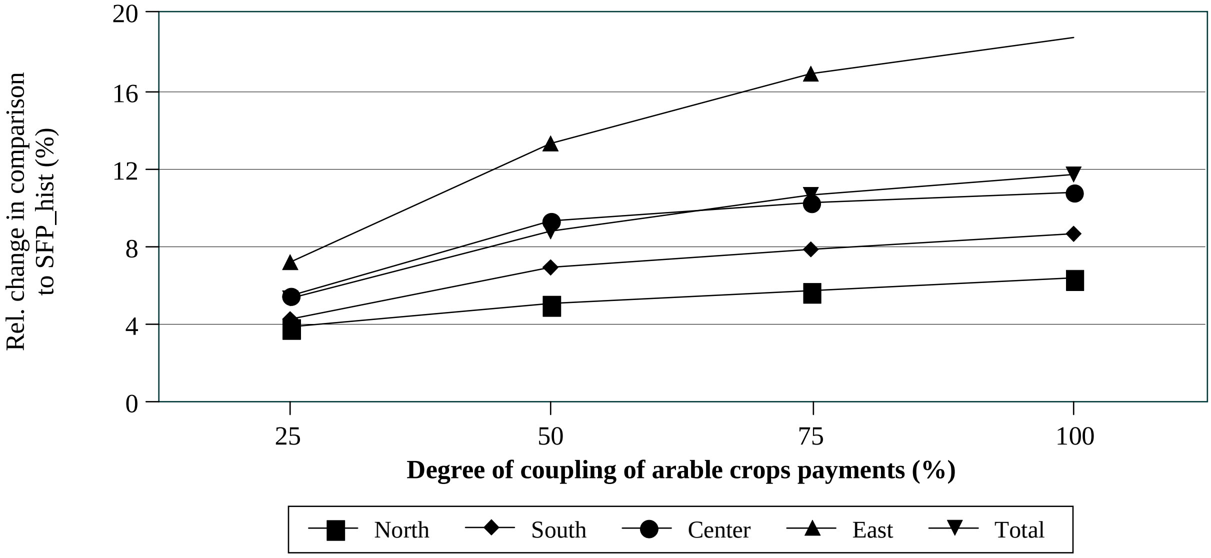
Source: FARMIS; INLB-EU-GD AGRI/G.3.

Figure 4.6.3: Implications of the degree of decoupling on income: the case of bull premia



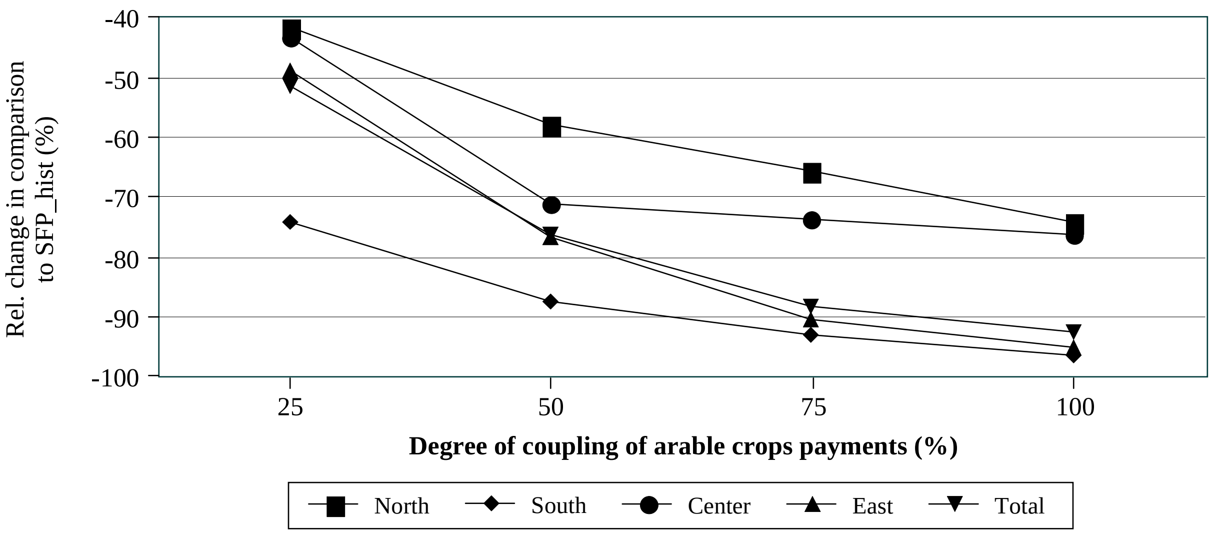
Source: FARMIS; INLB-EU-GD AGRI/G.3.

Figure 4.6.4: Effect of coupled direct payments for arable crops on cereal production



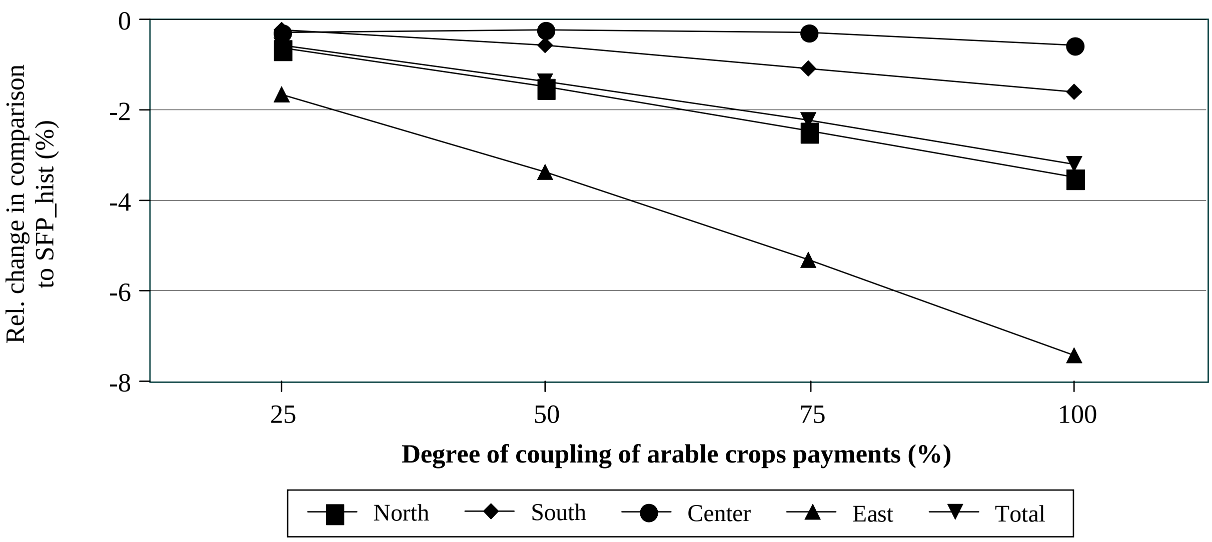
Source: FARMIS; INLB-EU-GD AGRI/G.3.

Figure 4.6.5: Effect of coupled direct payments for arable crops on the area of mulching, i.e., managed according to cross compliance



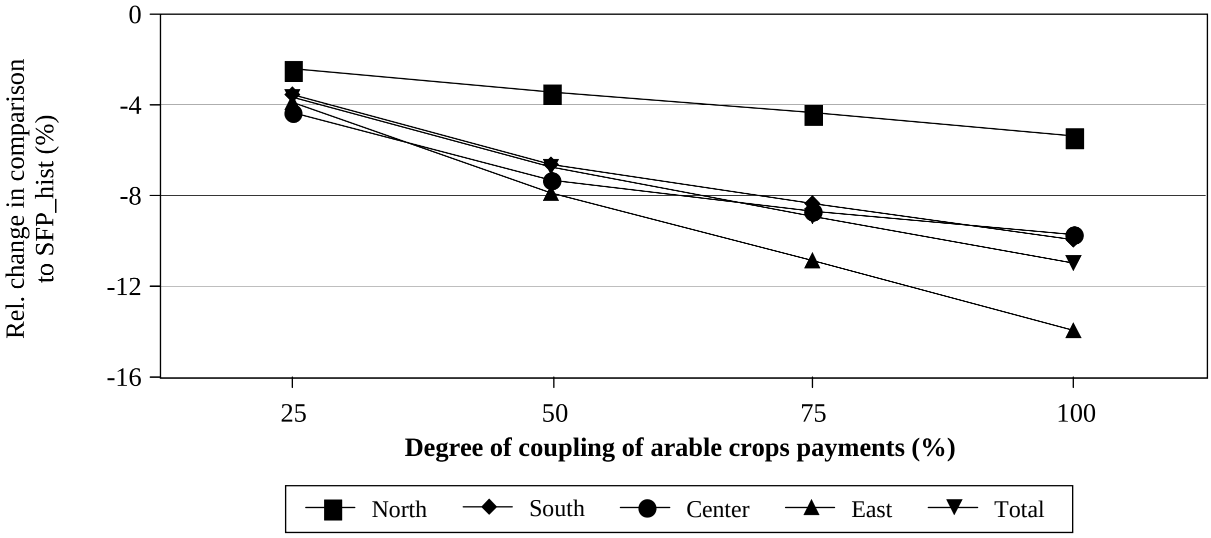
Source: FARMIS; INLB-EU-GD AGRI/G.3.

Figure 4.6.6: Effect of coupled direct payments for arable crops on bull fattening



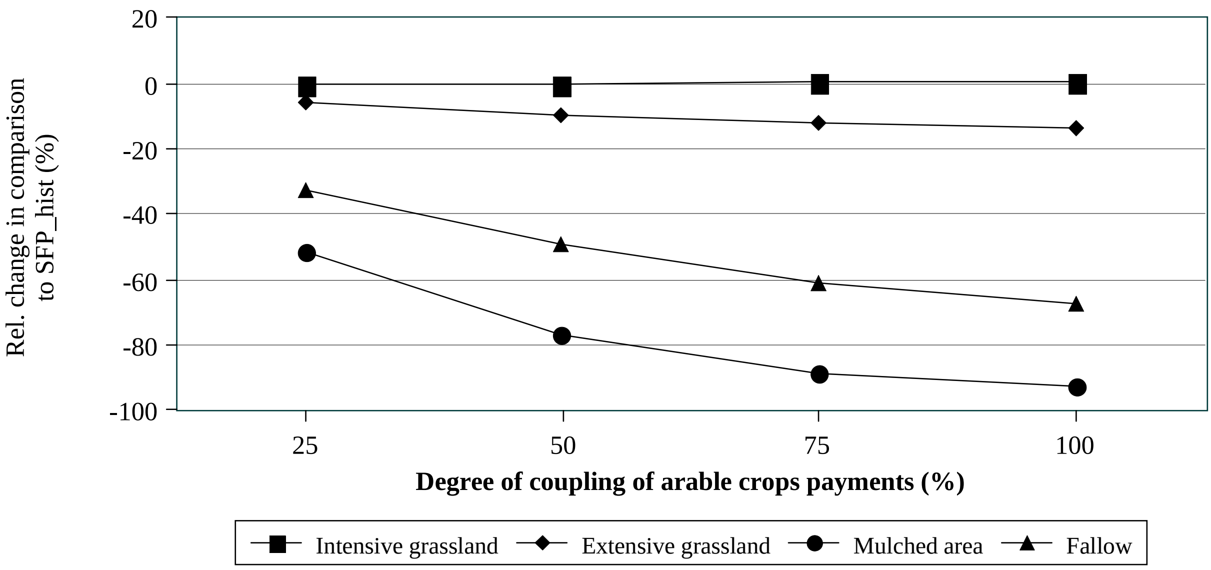
Source: FARMIS; INLB-EU-GD AGRI/G.3.

Figure 4.6.7: Effect of coupled direct payments for arable crops on suckler cow production



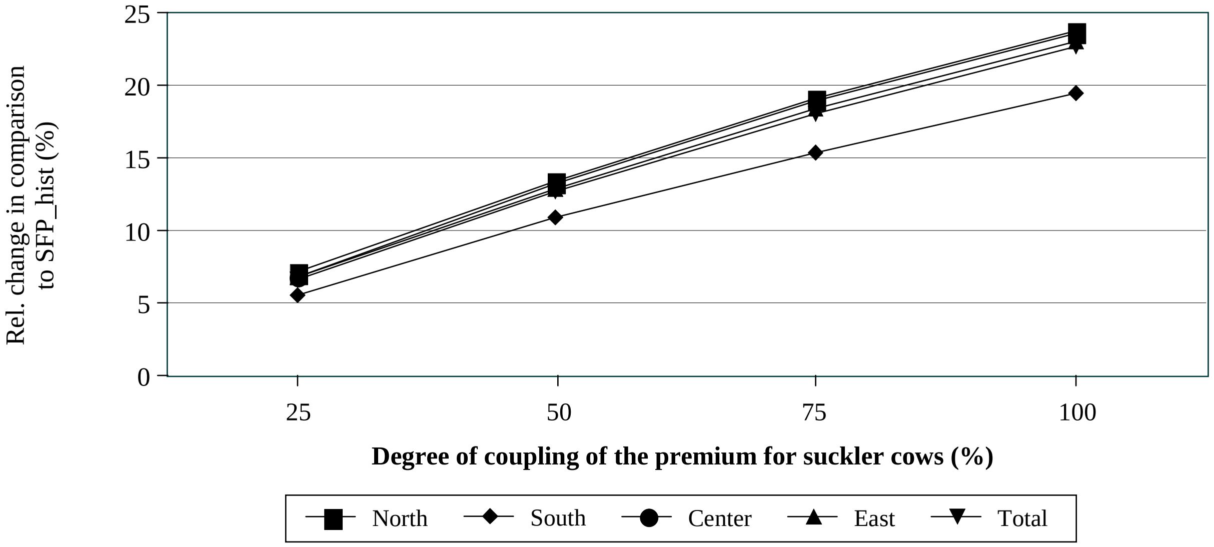
Source: FARMIS; INLB-EU-GD AGRI/G.3.

Figure 4.6.8: Effect of coupled direct payments for arable crops on the intensity of grassland usage and fallow



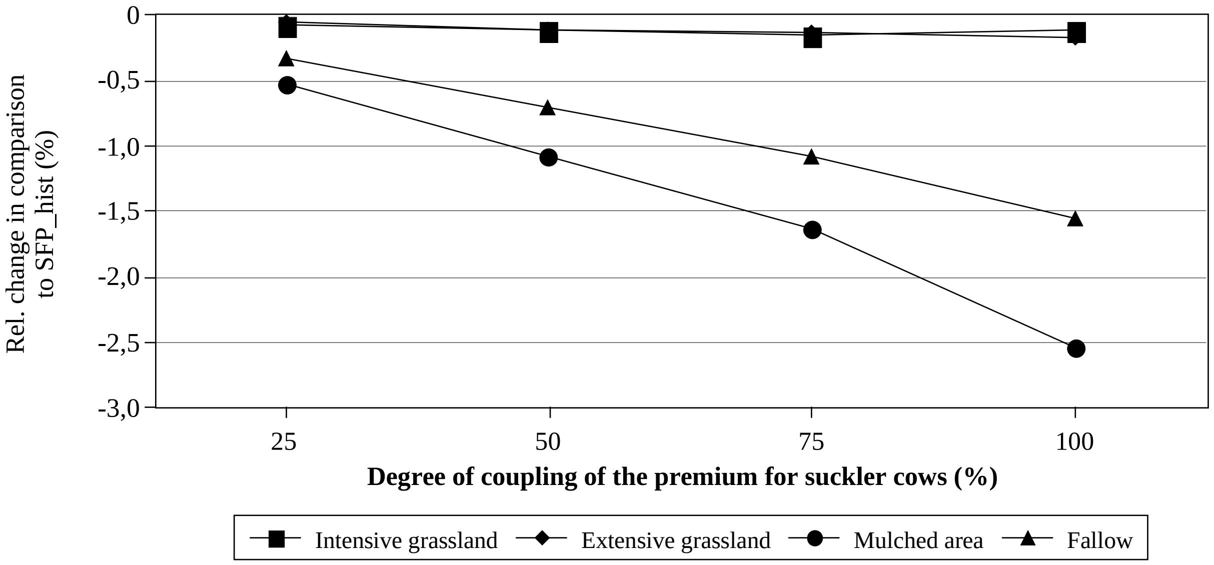
Source: FARMIS; INLB-EU-GD AGRI/G.3.

Figure 4.6.9: Effect of coupled premiums for suckler cows on suckler cow production



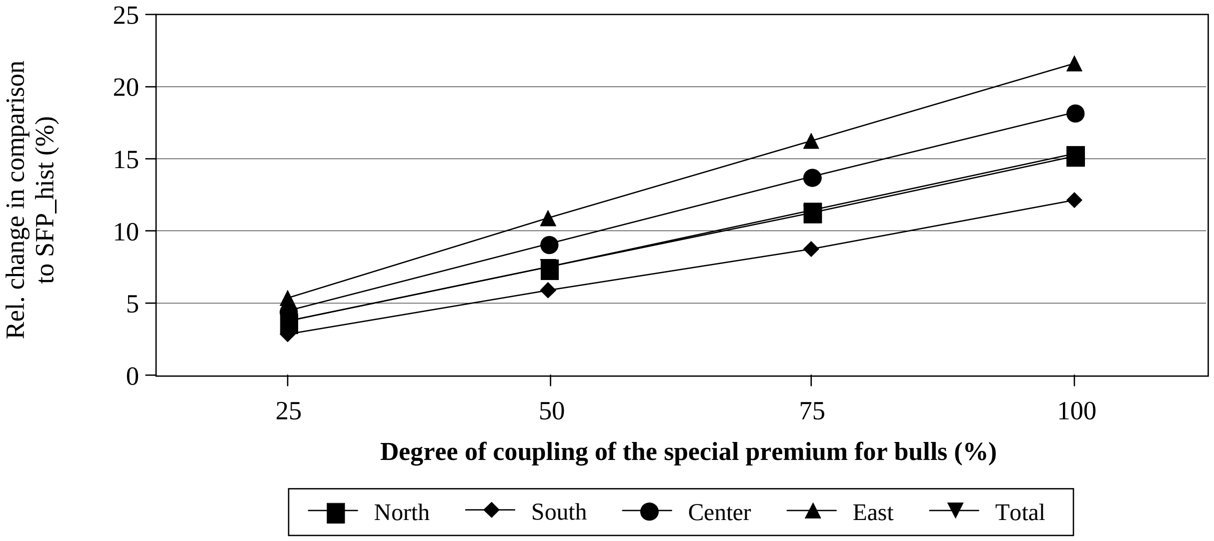
Source: FARMIS; INLB-EU-GD AGRI/G.3.

Figure 4.6.10: Effect of coupled premiums for suckler cows on the intensity of grassland usage and fallow



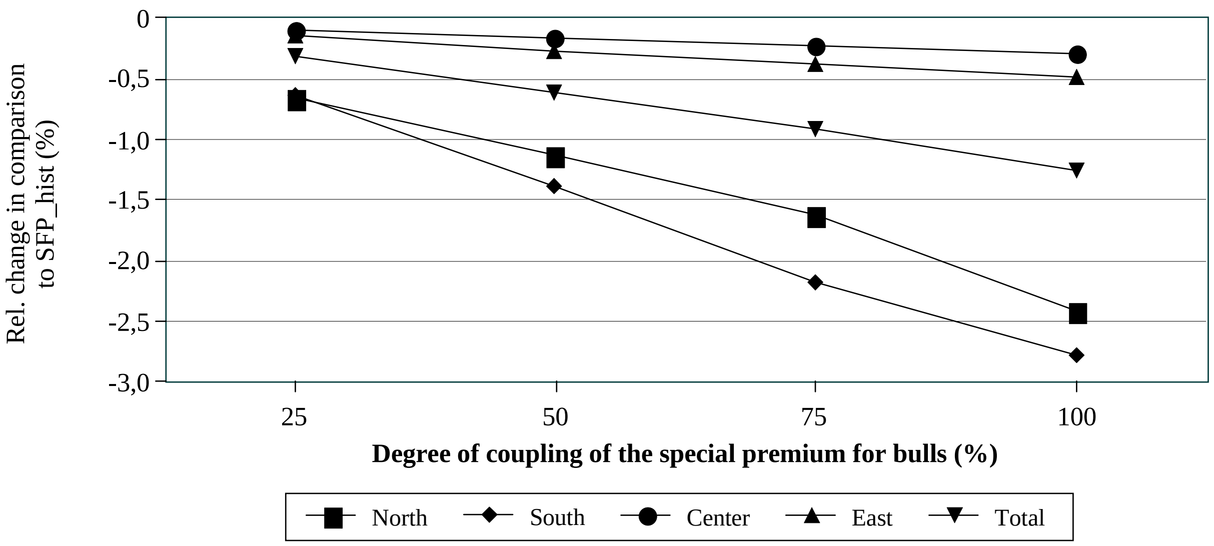
Source: FARMIS; INLB-EU-GD AGRI/G.3.

Figure 4.6.11: Effect of coupled premiums for bulls on bull fattening



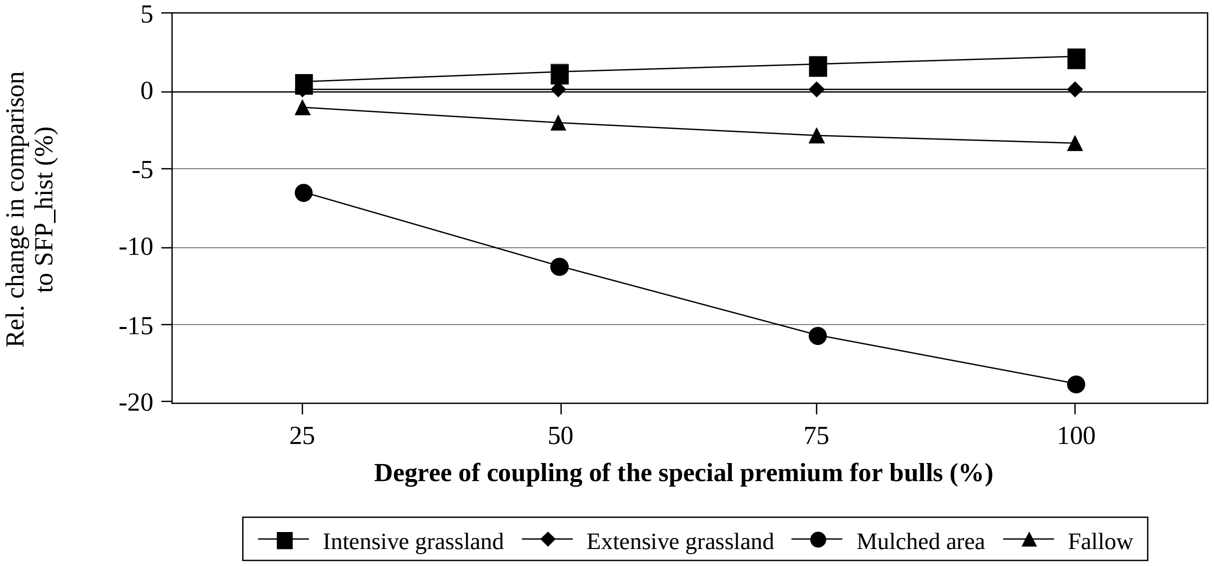
Source: FARMIS; INLB-EU-GD AGRI/G.3.

Figure 4.6.12: Effect of coupled premiums for bulls on suckler cow production



Source: FARMIS; INLB-EU-GD AGRI/G.3.

Figure 4.6.13: Effect of coupled premiums for bulls on the intensity of grassland use and the amount of fallow land



Source: FARMIS; INLB-EU-GD AGRI/G.3.

4.6.2 Impacts of a stylized Bond Scheme

In the scenario Bond Scheme, decoupled premiums are given to farmers without the restriction to keep their land in good agricultural condition. Results of the scenario Bond Scheme are compared to the scenario National Implementation in Table 4.6.4. It is shown that full decoupling - without the requirement to maintain the land in good agricultural condition - causes an important share of land (1.4 mil hectares, respectively 9 % of UAA) to become fallow. This would happen especially in eastern Germany in regions with poor soil quality, e.g., Brandenburg.

Effects on land use are as follows:

– Cereals are reduced by 10%. Rye, which is grown predominantly in regions with poor soil quality, decreases by 22%.

– Oilseeds and protein crops will be negatively affected as well.

– The level of intensive grassland use will stay at the level of the base year, while extensive grassland will be reduced.

The abolition of the requirement to keep land in good agricultural condition affects both arable land and grassland. In the case of grassland, however, mainly extensive and mulched area is reduced while the area of intensive grassland is slightly extended in order to ensure roughage fodder production for the livestock sector.

Both, the scenario National Implementation and the scenario Bond Scheme are “full decoupling” scenarios. However, output in the Bond Scheme is much lower than in the National Implementation. The main reason is that in the case of the Bond Scheme it is more attractive to stop production due to the lack of costs of land management. However, the difference in land use seems to be too big to be explained by the differences in costs alone. Another reason might be model specification: EU-FARMIS uses a nonlinear cost function, meaning costs increase with increasing production level. Therefore, with increasing level of mulching the costs rise and the attractiveness of mulching in comparison to, e.g., soft wheat is reduced. As this might not be entirely plausible, the differences between the Bond Scheme and the National Implementation might be overestimated. It makes sense that there is a difference in production level but its magnitude is more difficult to foresee. This shows that due to Cross Compliance, decoupled payments in the scenario National Implementation still have an impact on farmers’ production decisions. Thus, they are not fully decoupled in the original sense of the word and might distort the market equilibrium.

Income measured in FNVA is not affected because specialisation gains are not covered by FNVA. However the result changes if the analysis focuses on the primary target of agricultural support: the active farmer. It is one of the goals of agricultural policy to improve the income of active farmers. Therefore, it is important to check whether active farmers actually benefit from support. In the past, direct payments were coupled and led to an increase of land rents. As farmers often rent large parts of their land, the direct payments were mostly transmitted to the land owners. Consequently the transfer efficiency of support for farmers used to be rather poor.

Table 4.6.4: Impact of the scenario Bond Scheme on agricultural production and income in Germany

		SFP_nat abs	BOND abs	rel. change %
Land use				
Cereals	1000 ha	5,997	5,384	-10.2
Wheat	1000 ha	2,884	2,645	-8.3
Barley	1000 ha	1,734	1,569	-9.5
Rye	1000 ha	516	402	-22.1
Oats	1000 ha	148	130	-11.9
Oilseeds (Food)	1000 ha	896	738	-17.6
Protein crops	1000 ha	200	156	-22.3
Potatoes	1000 ha	211	210	-0.5
Sugarbeets	1000 ha	354	354	0.0
Arable forrage crops	1000 ha	1,543	1,533	-0.7
Fodder maize	1000 ha	1,031	1,028	-0.2
Other fodder	1000 ha	513	505	-1.6
Non-Food	1000 ha	373	358	-4.1
Set-aside	1000 ha	1,100	1,063	-3.3
Grassland	1000 ha	4,390	4,055	-7.6
Intensive grassland	1000 ha	2,439	2,435	-0.2
Extensive grassland	1000 ha	1,775	1,612	-9.2
Mulched area	1000 ha	168	0	-100.0
Fallow	1000 ha	212	1,634	671.1
UAA	1000 ha	15,083	13,661	-9.4
Arable land	1000 ha	10,692	9,606	-10.2
Grassland	1000 ha	4,222	4,055	-4.0
Livestock production				
Dairy cows	1000 heads	3,945	3,944	0.0
Suckler cows	1000 heads	348	319	-8.4
Bulls [1)]	1000 heads	1,532	1,513	-1.2
Fattening pigs [1)]	1000 heads	54,844	54,872	0.1
Poultry	1000 heads	49,854	49,890	0.1
Sheep	1000 heads	1,447	1,367	-5.5
Production				
Cereals	1000 t	41,616	37,878	-9.0
Rape	1000 t	2,432	2,068	-15.0
Non-Food	1000 t	1,354	1,303	-3.8
Sugarbeets	1000 t	23,951	23,951	0.0
Milk	1000 t	30,006	29,999	0.0
Beef	1000 t	1,027	1,016	-1.1
Pork	1000 t	5,491	5,494	0.1
Poultry meat	1000 t	819	819	0.0
Economic indicators				
Production value	Mill €	29,399	28,779	-2.1
Total subsidies	Mill €	6,570	6,507	-0.9
Direct payments	Mill €	4,977	4,966	-0.2
Variable input	Mill €	-18,529	-17,998	-2.9
Other costs	Mill €	-3,445	-3,445	0.0
Depreciation	Mill €	-5,407	-5,253	-2.8
Interest	Mill €	-835	-813	-2.7
Wages	Mill €	-2,852	-2,703	-5.2
Income indicators				
Farm Net Value Added (FNVA)	Mill €	11,485	11,486	0.0

1) Annual production.
Source: FARMIS; INLB-EU-GD AGRI/G.3.

Table 4.6.5: Impact on the dual values for land in the scenarios SFP_nat, SFP_hist und Bond Scheme

		Agenda abs	SFP_nat	SFP_hist rel. change to Agenda 2000 (%)	Bond
Rental value of land					
Arable land	Mill €	-1,638	28.3	-88.6	-91.1
Grassland	Mill €	-248	188.0	-76.2	-81.6
UAA	Mill €	-1,886	49.3	-86.9	-89.9

Source: FARMIS; INLB-EU-GD AGRI/G.3.

Looking at the dual values for land the results might be different in some of the analysed scenarios. Table 4.6.5 shows the dual values for land in the scenarios Agenda 2000, SFP_nat, SFP_hist and Bond. Compared to Agenda 2000 they rise significantly in the case of the National Implementation, while they collapse in the scenarios SFP_hist and Bond. As dual values for land can be viewed as an indicator for land rents, the results imply that both the SFP_hist and the Bond Scheme offer better transfer efficiency than the National Implementation in Germany. However, in the scenario SFP_hist, the reduction of land rents is probably overestimated because the model cannot take all the details of the land market into account. First, it assumes that the number of entitlements is slightly lower than the amount of eligible land. Therefore, in the model, entitlements, and not land, are the restrictive factor in order to receive payments, and consequently in many farm groups the entitlement is not reflected in the land rent at all. However, in reality, the difference between the number of entitlements and the amount of eligible land might be insufficient to have an effect of this magnitude, because the amount of land available for agriculture diminishes over time. Additionally, the trade of entitlements is often restricted if they are sold without land. In the latter case in France, 50% of the sales value is retracted by the state. This, of course, lowers the bargaining power of the entitlement owner in comparison to the land owner. Thus, it is not plausible that land rents will decrease in the case of the historical implementation of the 2003 CAP Reform by this magnitude. This is different in the case of the Bond Scheme because there the link between payments and land is abolished completely. Therefore, it can be assumed with the necessary confidence that transmission effects of direct payments to the land owners would be significantly reduced if a policy like the Bond Scheme was introduced.

Under the conditions of a Bond Scheme, farmers who are active at the time of the reform would greatly benefit and land owners would sustain substantial losses. Additionally, it can be assumed that structural change would be significantly accelerated because the costs of farm expansion would be much lower.

5 Conclusions and recommendations

The objective of Delivery 7 is to quantitatively assess the impacts of decoupling options on land use, livestock production and income. The analysis was done using quantitative models. At EU-15 level AROPAj was used. At national level, the involved partners applied four different quantitative models to analyse the impact on their respective home countries.

The applied models differ in many aspects: First, in most cases, the models were built to analyse the agricultural sectors of partners' home countries. As the respective agricultural sectors vary in structure, the focus of models' research varies as well. Furthermore, the models make use of distinct methodological approaches. For example three of the models are based on Positive Mathematical Programming (PMP) and two on Linear Programming (LP). Additionally, the models approached typical modelling challenges like the inclusion of factor markets and model calibration in different ways. Therefore, despite much effort to harmonize the models, the model results will necessarily differ. From the scientific perspective, however, this must not necessarily be a disadvantage, because it shows the complexity of the research task and allows more insight into the linkages of cause and effect.

Price scenarios are based on price projections from the partial equilibrium model ESIM[1]. All models are used for comparative static scenario analysis. In the case of FAL, not only price scenarios but also model parameters like yields and input costs are projected to the target year. Other models leave yields constant and change only the prices projected by ESIM.

In the following the results are summarized. First, findings concerning the impact of the decoupling options within the scope of the 2003 CAP Reform are described. Then, the results of the sensitivity analysis and the impact assessment of a Bond Scheme type of scenario are presented. Finally, the objectives of the 2003 CAP reform are compared to the effects of the applied policy tools and recommendations for the future development of the CAP are elaborated.

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[1] TEAGASC used the price projections produced by the FAPRI-TEAGASC partnership.

Impacts of decoupling options within the scope of the 2003 CAP Reform

Impacts on land use

In all models, decoupling leads to a reduction of **cereals, oilseeds, and protein crops** (COP crops). This is irrespective of the way premiums levels are determined. Partial decoupling, in comparison to full decoupling, softens the impact but does not change the trend. Although the trend is the same, the size of the impact differs among COP crops. Durum wheat is reduced to a higher extent because durum wheat used to receive a very high level of coupled direct payments. Consequently, the impact of decoupling is more pronounced. Rye production is significantly decreased as well. The reduction is induced by comparatively low price for rye which is caused by the abolishment of rye intervention. Although impacts on aggregate COP production among Member States are similar, model results differ within some cases with respect to the impact on individual crops. This is mostly due to regional properties of the agricultural sectors and differences in model specification.

It is shown that **irrigated crops** are affected differently from non-irrigated crops. In Spain the acreage of irrigated COP crops is extended or less reduced than the acreage of their non-irrigated counterparts. The reason for this is not the relative increase of the competitiveness of irrigation but the increase in the economic attractiveness of irrigated COP crop production in comparison to other irrigated production systems like sugar beets, potatoes, alfalfa and cotton.

The impact on **fodder crops** depends on model specification. In some models fodder production is reduced due to decreasing fodder demand induced by lower livestock numbers. In FARMIS the acreage of fodder crops is increased because the competitiveness of some fodder crops is extended in comparison to COP crops. Consistency between fodder production and fodder demand is established by the adjustment of feed rations and the adjustment of the production intensity. The impact differs among different types of fodder crops. Silage maize production is reduced because silage maize production benefited from coupled direct payments and consequently loses economic attractiveness due to decoupling.

The impact on **grassland** differs among models as well because some models allow for the conversion of arable land to grassland while grassland is kept constant in others. In AROPAj and FARMIS the conversion is possible and grassland is extended because decoupling increases its attractiveness. This results in a more pronounced reduction of COP crops in both models.

In all models part of the land is not used for production because it becomes economically unattractive. Instead the land is either managed according to the criteria of Cross-Compliance (without realizing any output) or it becomes fallow.

Impacts on Livestock production

In the livestock sector the results differ partially as well. In EU-FARMIS, **milk production** is not affected by decoupling, while milk production decreases in Spain as well as in Italy. The reason is that EU-FARMIS takes the increase of the milk yield until the year 2013 into account. This leads to a significant cost reduction and to a rise of the shadow values of milk quota. Hence, decoupling and the reduction of milk prices are not sufficient to make milk quotas redundant. Therefore, in contrast to the other models production is not affected.

In the case of full decoupling **suckler cow** production is expected to decrease. However, in the case of partial decoupling model results differ. For Germany, EU-FARMIS projects an increase of the number of suckler cows while PROMAPA.G projects a decrease in Spain. Experiences drawn from simulation runs show that suckler cow production is rather sensitive to price and premium changes; therefore even small differences in model specification and assumptions can lead to differing projections.

Bull fattening plays an important role in Germany. In the case of full decoupling production is expected to decrease by about 10%, despite the increase of beef prices. Bull production is sensitive to beef prices and the degree of coupling.

Sheep production is extended due to favourable price projections in all models. However, the price projections are questionable since it does not make much sense that prices increase in such magnitude if production is extended. In the case of sheep production, results of the farm group models and of the market model results are therefore inconsistent.

Regional versus farm individual determination of entitlement level

The analysis shows that differences of allocation effects between the historical and the regional implementation of decoupling are marginal. The main difference appeared with respect to the use of marginal land. In the case of the historical implementation the amount of fallow land is higher than in the regional implementation because of the lower number of entitlements and the spread in the level of entitlements. Due to this spread - in some cases - the level of the entitlements might not be sufficient to induce farmers to keep land in good agricultural condition.

According to the results of EU-FARMIS the implementation options differ significantly with respect to the dual values of land. In the historical implementation the dual values are significantly lower than in the regional implementation. As dual values are an indicator for land rents, it can be assumed that in the regional implementation farms with high shares of rented land will have higher production costs. If the reform is aimed at increasing active farmers' income the historical implementation is therefore preferable.

Partial decoupling

Several Member States introduced partial decoupling schemes. They made use of available options for partial decoupling: in some Member States a part of the premiums for arable crops stayed coupled. Others used one of the options for partial decoupling available in the cattle sector or for sheep and goat. Spain and France opted for a strategy of maximum coupling using all available options. Another way for partial decoupling was to make use of Art. 69 of EU-Regulation 1782/2003. It allows Member States to retain part of the premium plafonds and to use it to support specific productions systems which provide positive externalities on the environment or on quality. Italy makes excessive use of this option to support, e.g., the growing of non genetically modified durum wheat.

Coupled premiums provide incentives for production. Therefore, it is not surprising that compared to full decoupling, partial decoupling leads to an increase of crop or livestock production. It was shown that the increase can be quite substantial. Especially the partial decoupling of arable and suckler cow premiums has a significant impact on land use. The chances of marginal land becoming fallow are reduced. This is especially the case if only part of the land is provided with entitlements or if entitlement levels are very low. Hence, partial decoupling is one option to ensure that land is used for production. This approach, however, has several disadvantages:

– Partial decoupling contradicts the idea of decoupling. Agricultural support should not have any impact on production, because this leads to market distortions and welfare losses. Maintaining production does not inherently represent any value. The value of production has to be determined by the market and not by a policy instrument.

– The size of the economic damage inflicted by partial decoupling is not only determined by the degree of coupling of a specific premium scheme but by the whole set of applied measures in EU Member States. The effect is the worse the more diverse the policies are, and respectively, the higher the impact on production is. If, for example, suckler cow production is supported by coupled payments in all EU Member States, the economic attractiveness of suckler cow production among Member States is not distorted, but only the attractiveness of suckler cow production compared to other production activities. The problem is that EU Member States applied different decoupling strategies. It is shown that this has a significant effect on competitiveness among Member States and consequently a substantial effect on production.

- Goals of the implementation of partial decoupling such as the preservation of the cultural landscape in less favoured areas should be mostly accomplished by Cross Compliance. If there is additional need, specific target-oriented agri-environmental measures can be applied. A nationwide approach via partial decoupling is ineffective.

Income effects

All models show an increase in sector income due to decoupling, although the amount of direct payments is reduced by modulation. Under the conditions of partial decoupling income increases in comparison to Agenda 2000, but decreases compared to full decoupling. This is caused by both better prices in the full decoupling scenarios and an increase of efficiency. Results concerning income are not directly comparable among models because different income indicators are applied. In the case of the National Implementation in Germany, income effects differ by regions and farm types. Arable farms are negatively affected due to income losses by the sugar market reform, but also specialized dairy farms due to the milk market reform. Income losses for both farm types are more pronounced in the case of the regional model due to considerable redistributions of direct payments. On the sector level, income effects between the regional and the historical implementation do not differ significantly concerning FNVA. However, the regional model induces an increase of land rents, especially for grassland. This implies that landowners who are not necessarily active farmers are the main beneficiaries of a regional implementation. In the case of the historical implementation, where entitlement levels are based on farm individual historical references and consequently differ among farms, tenants are more likely to benefit.

Sensitivity analysis and alternative decoupling schemes

Sensitivity analysis of the degree of decoupling

EU-FARMIS is applied to assess the partial effects of an increase of the degree of decoupling. This is done for three chosen payment schemes. The analysis yielded several insights:

- Even a low degree of decoupling has a significant impact on production.
- Partial decoupling leads to overspecialisation of production. If, for example, a situation with 100% coupling of arable crop premiums is compared to a full decoupling scenario, sector income in Germany decreases by 2.2% or about 104.5 Mil. €. In the case of the special premium for adult male cattle and the suckler cow premium effects in Germany are less pronounced because the volume of the schemes is lower.
- Coupled premiums have significant cross effects on other farm activities even in cases where it is not expected at first sight. For example, coupled premiums for arable crops have an impact on suckler cow production and vice versa.

Impacts of a stylised Bond Scheme

The analysis with EU-FARMIS shows that schemes base on the idea of the Bond Scheme would induce more pronounced reductions of land use. Furthermore, it is demonstrated that the effect on dual values of land, i.e., land rents would be even more pronounced than in the case of a scheme based on farm individual historical entitlements. Therefore, with respect to a policy aiming at supporting the income of active farmers, the transfer efficiency of the Bond Scheme is superior to options available in the 2003 CAP Reform. This is especially the case if factors are considered which are not captured by farm models. One factor is for example non-agricultural land use: due to non-agricultural land use the amount of eligible land decreases over time while the amount of entitlements stays constant. Hence, the relative scarcity of land increases in comparison to the scarcity of entitlements. Entitlements only expire if the amount of entitlements is already higher than the amount of available land. If entitlements expire, the entitlements with the lowest level are the first because farmers will try to maximise income and hence, will stop to activate the low level entitlements, first. Other factors limiting the bargaining power of tenants are rules to inhibit the trade of entitlements without land. Such a measure is applied, e.g., in France. In France, part of the sales value for the entitlement is retained by the state. Consequently, the tenant has fewer options to sell the entitlements and his bargaining power decreases. These factors together strengthen the position of land owners and consequently lead to an increase of land rents.

In a Bond Scheme entitlements or bonds do not have to be activated and therefore, these issues are absent. Consequently, it can be assumed with the necessary confidence that transmission effects of direct payments from active farmers to the land owners will be significantly reduced. Under conditions of a Bond Scheme, farmers who are active at the time of the reform would greatly benefit and land owners would sustain substantial losses.

Evaluation of current policies and recommendations for future reform

The EU pursued several aims with the 2003 CAP Reform. One object was to make the CAP fit for the Doha Round of WTO negotiations. The other was to increase the competitiveness and market orientation of the European agricultural sector without destabilising the income situation of farmers. Cross Compliance was introduced to ensure that land is kept in good agricultural and ecological condition and to increase the legitimacy of agricultural support to the tax payer. Modulation was introduced to reduce support for large farms and to use these funds for rural development. Finally, the administrative burden of the CAP should be lowered (EUROPEAN COMMISSION, 2003a; 2003b).

The 2003 CAP Reform can be considered a fundamental step towards more market orientation and enhanced competitiveness of the European agricultural sector. However, the reform fails to fulfil all identified goals. More precise judgements about the impact of the reform can only be made with respect to the individual implementation options and policy instruments: Results of the farm models show that full decoupling induces more severe changes in production than partial decoupling. Partial decoupling, therefore, still distorts the factor allocation und the market equilibrium and is therefore less efficient. On the other hand, partial decoupling reduces the risk of land falling idle. However, with respect to partial decoupling it is problematic that the Member States implemented different decoupling schemes. The more the coupling rates in the Common Market differ, the more the competitiveness of market participants is distorted.

The historical and the regional implementation have similar allocation effects and are, thus, equally preferable with respect to their impact on common markets. However, it is shown that a regional implementation causes more severe transmission effects of direct payments to the landowners. Therefore, the regional implementation is less effective in stabilising farm income than the historical implementation. A Bond Scheme type of regime would be optimal in this respect but a significant amount of land would become fallow.

Obligatory modulation was implemented as a tool to enhance the fairness of payment distribution by the reduction of the amount of direct payments given to large farms. However, the reduction of direct payments by 5% clearly falls short of this goal. On the other hand, a further degression of direct payments would be problematic with respect to competitiveness. As direct payments are linked to the production factor land, degression would mean a disadvantage for large farms on the land market. This would be counterproductive with respect to the development of competitive farm structures.

Cross Compliance was introduced to ensure that the common production standards are met within the entire EU. However, the level of payments seems very high in comparison to the obligations of farmers. This is especially the case, as most regulations were already part of national law before Cross Compliance was introduced. Hence, Cross Compliance is often seen as an excuse for the continuation of farm support. This might in the long run harm the acceptance of agricultural policy by the tax payer.

It is very likely that agricultural policy reform will continue in the future. Probably in 2013 a new agricultural policy scheme will replace the current one. To ensure a swift and smooth transition, farmers should know well before 2013 how the policies of the future are likely to develop. Therefore, the discussion about the future of agricultural policy has to continue and to be manifested in decisions. It was shown that the current mix of political instruments provided by the 2003 CAP Reform is not optimal to achieve the targets of European agricultural policy. Therefore, for the successor of the 2003 CAP Reform the following adjustments should be incorporated:

1. The set of fundamental agricultural policy instruments should be harmonised across Member States. This would ensure the equality of opportunities of market participants and a more efficient factor allocation. Due to the diversity of implementation schemes and options this is not the case at the moment. If the set of instruments is not sufficient to answer all challenges at local level additional tools could be implemented at the appropriate level. However, the effect of these measures on the common markets has to be minimal.

2. Full decoupling should be introduced in all Member States. Full decoupling is preferable to partial decoupling because it offers higher efficiency and increases farmers' market orientation and competitiveness. Additionally, the implementation of full decoupling, ceteris paribus, reduces the administrative burden, because only the new policy regime is applicable. In the case of partial decoupling two sets of policy instruments have to be administered. The introduction of full decoupling, therefore, would significantly reduce costs.

3. Use of a part of direct payments for a flat rate payment. One of the aims of the reform was to keep the land in good agricultural and ecological condition. It is shown that partial decoupling of arable direct payments contributes to this goal but has negative side effects. Therefore, it is recommended to rely on Cross-Compliance to achieve this goal. To ensure that Cross Compliance works, the entire agricultural land should be eligible for entitlements and the level of entitlements should be sufficient to guarantee that the production standards are met. A flat rate payment offers these attributes, and, additionally, is more transparent. However, it has the disadvantage that large parts of the direct payments are captured in the land rents which supports the landowners and not necessarily active farmers. Hence, the level of entitlements should be limited to a reasonable part of the total amount of direct payments at Member State level, e.g., 25%. In mountainous or severely disadvantaged regions where the payment might not be sufficient to ensure the maintenance of the agricultural area, pointed instruments could be applied at local level to reduce land abandonment. The flat rate-payment could be uniform at the national level. Due to the relatively low size of the flat rate; re-distribution effects among farmers and transmission effect of direct payments to the landowners would be limited. To ensure that farmers meet the Cross-Compliance criteria, sanctions should be enforced efficiently because the level of the maximum punishment is reduced in comparison with the situation today.

4. Provision of the main part of direct payments in the form of bonds. The annual payout of the bonds each farmer receives should be based on historical, farm individual references and capture the amount of payments exceeding the payments granted in the form of the flat rate payment[2]. For example each bond could provide its owner with the right to receive 100 € per year. The reference could be the same as for the 2003 CAP Reform. Like in the proposal of the Bond Scheme by SWINBANK and TANGERMANN (2001; 2004) bonds should be tradable and could even be inheritable. To prevent the development of permanent claims, the duration of the reception of payments should be limited to, e.g., 15 years. Additionally, the level of payments could decrease over time.

5. Implementation of an instrument for degression of support. In the 2003 CAP reform obligatory modulation was introduced as a degressive element to reduce payments for large farms. However, the reduction of payments by 5% is not at all sufficient to ensure a distribution of support which is comprehensive and fair in the eye of the taxpayer. However, as explained before, in the policy framework of the 2003 CAP Reform it is problematic to enforce a more pronounced distinction. In the case of bonds, degression is less problematic. As bonds are not in any way linked to factor use, the effects on production and the land market should be minimal.[3] Therefore, it is recommended to implement a more pronounced degressive element. For example, if for each bond its owner receives 100 € per year, the maximum number of bonds for each farm could be limited to 250 which corresponds to an annual payment of 25.000 € per farm. As the reference for the reception of payments lies in the past, farms have no possibility to optimise farm structure in order to maximise the amount of payments. It is important to note that the part of direct premiums given in the form of the flat rate payment is not limited in any way, because these are planned as an incentive to meet the Cross-Compliance restrictions.

6. Use of the available funds for more efficient policies. Due to the reduction of the payout of bonds over time and the upper limit of bonds per farm, substantial funds

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[2] If the amount of payments received in the form of the flat rate payment exceeds the sum derived from historical references; the difference should be taken from the national reserve. However, the number of such cases should be small and relatively easy to foresee.

[3] Income support is never fully decoupled, in the sense that it has no influence on production decisions at all. Effects mentioned in the literature are e.g. the insurance effect and the effect of wealth on the possibility and the willingness of farmers to invest (HENNESSY, 1998).

can be saved. These could be used on Member State level[4] to support, e.g., rural development, environmental measures or other projects of interest. Alternatively, level of subsidies could be reduced.

This set of measures represents a sound compromise between the continuity of current policies and new measures, which are more efficient to achieve the goals of the reform. It might be deemed difficult to implement such a policy scheme because Member States would have to change the implementation schemes they have chosen. However, it should be obvious that a more common approach has to be followed. From the point of view of the administration, proposed measures should be simple to implement because the necessary information should be available. As reference an elapsed period of time must be chosen. If the new policies are decided in time it is not necessary to implement any transition measures, because the proposal is socially balanced and concepts like decoupling and Cross Compliance are already known by farmers.

[4] Alternatively, the funds could be used to finance measures on EU level. However, it would be difficult to politically accomplish such a policy because funds would have to be redistributed among Member States.

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7 Annex

Table A.3.2.1: Overview about the National Implementation schemes in EU25

	Start	Regions	Model	Decoupling of dairy payment	What sectors remain coupled	Implementation of the second wave of the cotton, olive oil and hops) and the reform
Austria	2005	-	historic	2007	- suckler cows 100% - slaughter premium adults 40% - slaughter premium calves 100%	tobacco 100% decoupled hops payment 25% coupled
Belgium	2005 2005	Zone Nord: Flanders + Zone Sud: Wallonia	historic historic	2006 2006	- suckler cows 100% - slaughter premium - suckler cows 100% - seeds (some species) 100%	tobacco 100% decoupled tobacco 100% decoupled
Cyprus			*mandatory regional model*			
Czech Republic			*mandatory regional model*			
Denmark	2005	one region	static hybrid	2005	- special male premium 75% - ewe premium 50%	-
Estonia			*mandatory regional model*			
Finland	2006	(Three regions based on reference yield)	dynamic hybrid moving to a flat rate model	2006	- sheep and goats payments 50% - special male premium 75% - Article 69 application: = 2.1% of the ceiling = 10% of the ceiling for the bovine sector - seeds (timothy seed)	-
France	2006	-	historic	2006	- cereals 25% - suckler cows 100% - ewe premium 50% - veal slaughter premium 100% - adult - outermost regions 100% - seeds (some species)	- 10% deduction in the olive oil sector for the programmes established by producer 1782/2003 and Art. 8 of Reg. 865/2003) - hops payments 25% annex VII point H and - olive oil coefficient for decoupling: 1 - tobacco coefficient for decoupling: 0.4
Germany	2005	Bundesländer (Berlin Brandenburg, Bremen in Lower Saxony and	dynamic hybrid model	2005		- hops payments 25% - tobacco coefficient
Greece	2006	-	historic	2007	- seeds - article 69 application: = 10% of the ceiling = 10% of the ceiling for the beef sector, = 5% of the ceiling for the sheep and goat	- article 69 application: =2% of the ceiling for tobacco, = 4% of the =10% of the ceiling for sugar - 2% deduction in the olive oil sector for the 1782/2003 and Art. 8 of Reg. 865/2003). annex VII point H and I: - sectors tobacco
Hungary			*mandatory regional model*			
Ireland	2005	-	historic	2005	none	
Italy	2005	-	historic	2006	- seeds 100% - article 69 for quality = 8% of the ceiling for the arable sector, = 7% of the ceiling for the bovine sector, = 5% of the ceiling for the sheep and goat	- article 69 application: =8% of the ceiling - 5% deduction in the olive oil sector for the programmes established by producer 1782/2003 and Art. 8 of Reg. 865/2003) - coefficient for the decoupling of olive oil is - coefficient for the decoupling of tobacco - for the region Puglia the decoupling 100%
Latvia			*mandatory regional model*			
Lithuania			*mandatory regional model*			
Luxemburg	2005	one region	static hybrid	2005	none	-
Malta	2007		*mandatory regional model*			
Netherlands	2006	-	historic	2007	- slaughter premium calves 100% - slaughter premium adults 100% - seeds for fibre flax 100%	-
Poland			*mandatory regional model*			
Portugal	2005	-	historic	2007	- suckler cows 100% - slaughter premium - outermost regions 100% - article 69: 1%	article 69: 10% of the ceiling for the olive oil
Slovakia			*mandatory regional model*			
Slovenia			*mandatory regional model*			
Spain	2006	-	historic	2006	- seeds 100% -arable crops 25% - sheep and - suckler cow 100% - slaughter premium calves 100% - adult - Article 69 application: = 7% of the ceiling for the bovine sector = 10% of the ceiling for dairy payments - outermost regions 100%	tobacco decoupling coefficient: 0.4 olive oil 10% of the ceiling for the cotton sector 10% of the ceiling for sugar
Sweden	2005	5 regions (based on reference yield)	static hybrid	2005	- special male premium 74.55% - article 69 ceiling	
United Kingdom	2005	England normal	dynamic hybrid moving to flat rate payment	2005	none	
	2005	England moorland	dynamic hybrid payment		none	

Table A.4.4.1: Aggregated results for Spain

		Base year 2002	Agenda 2000		Partial decoupling		Full decoupling		Regional model	
			Value	Variation (%)	Value	Variation (%)	Value	Variation (%)	Value	Variation (%)
Crops										
Non-Irrigated chickpea	1000 ha	25.37	28.57	12.62	26.59	4.81	29.20	15.12	29.20	15.12
Irrigated rice	1000 ha	28.89	26.22	-9.22	28.35	-1.86	28.62	-0.91	28.61	-0.97
Irrigated sugar beet	1000 ha	96.02	72.81	-24.18	83.25	-13.30	84.10	-12.42	84.09	-12.42
Irrigated cotton	1000 ha	89.92	96.57	7.40	80.81	-10.14	81.19	-9.71	81.19	-9.71
Irrigated paprika pepper	1000 ha	2.32	2.34	0.59	2.34	0.58	2.34	0.59	2.34	0.70
Irrigated early potato	1000 ha	8.32	7.03	-15.44	7.35	-11.63	7.36	-11.52	7.36	-11.52
Irrigated medium season potato	1000 ha	12.29	10.67	-13.19	11.18	-9.07	11.20	-8.88	11.20	-8.88
Irrigated late season potato	1000 ha	14.54	13.06	-10.14	13.49	-7.23	13.54	-6.84	13.54	-6.84
Irrigated asparagus	1000 ha	0.54	0.55	1.57	0.55	1.42	0.55	1.47	0.55	1.80
Irrigated melon	1000 ha	1.60	1.62	0.77	1.62	1.04	1.62	1.21	1.62	0.70
Irrigated tomato	1000 ha	16.51	16.61	0.63	16.57	0.39	16.58	0.41	16.63	0.71
Irrigated pepper	1000 ha	0.20	0.20	0.41	0.20	0.36	0.20	0.34	0.20	0.37
Irrigated artichoke	1000 ha	3.61	3.64	0.79	3.63	0.49	3.63	0.48	3.63	0.53
Irrigated cauliflower	1000 ha	0.53	0.53	0.70	0.53	0.57	0.53	0.55	0.53	0.63
Irrigated garlic	1000 ha	10.95	10.97	0.24	10.99	0.37	10.99	0.39	10.97	0.22
Irrigated onion	1000 ha	2.47	2.48	0.43	2.48	0.71	2.48	0.70	2.48	0.58
Irrigated green bean	1000 ha	0.31	0.40	28.03	0.39	23.63	0.39	24.13	0.40	27.50
Irrigated pea	1000 ha	1.91	2.16	12.98	2.03	6.42	1.99	4.12	1.99	4.12
Non-Irrigated durum wheat	1000 ha	355.44	359.55	1.16	282.48	-20.53	248.07	-30.21	248.02	-30.22
Irrigated durum wheat	1000 ha	47.26	49.62	5.00	47.39	0.28	46.18	-2.29	46.17	-2.30
Non-Irrigated soft wheat	1000 ha	897.36	943.14	5.10	944.45	5.25	904.46	0.79	904.45	0.79
Irrigated soft wheat	1000 ha	120.86	141.61	17.17	149.13	23.39	148.28	22.69	148.28	22.69
Non-Irrigated rye	1000 ha	50.72	49.66	-2.08	47.67	-6.01	45.20	-10.88	45.20	-10.88
Irrigated rye	1000 ha	3.90	4.13	5.85	3.99	2.27	3.91	0.21	3.91	0.21
Non-Irrigated barley	1000 ha	2882.61	2835.20	-1.64	2861.11	-0.75	2764.17	-4.11	2764.18	-4.11
Irrigated barley	1000 ha	188.51	218.77	16.05	227.42	20.64	223.04	18.32	223.05	18.33
Non-Irrigated oats	1000 ha	157.24	142.65	-9.28	142.47	-9.39	140.39	-10.72	140.39	-10.72
Irrigated oats	1000 ha	0.55	0.56	1.10	0.58	5.84	0.57	2.93	0.57	2.93
Non-Irrigated grain maize	1000 ha	2.73	2.87	5.21	2.87	5.15	2.62	-3.87	2.62	-3.87
Irrigated grain maize	1000 ha	374.37	341.23	-8.85	331.91	-11.34	320.64	-14.35	320.58	-14.37
Non-Irrigated sunflower	1000 ha	496.41	518.69	4.49	476.18	-4.08	447.11	-9.93	447.11	-9.93
Irrigated sunflower	1000 ha	103.82	123.67	19.12	115.75	11.49	111.88	7.76	111.86	7.74
Non-Irrigated vetch	1000 ha	34.16	40.64	18.97	33.69	-1.36	35.91	5.14	35.91	5.14
Non-Irrigated alfalfa	1000 ha	158.21	137.82	-12.89	117.78	-25.56	126.04	-20.34	126.04	-20.34
Irrigated alfalfa	1000 ha	138.22	116.86	-15.46	88.26	-36.15	94.00	-32.00	93.99	-32.00
Non-Irrigated winter forage cereals	1000 ha	3.16	2.87	-9.38	3.17	0.03	3.17	0.03	3.17	0.03
Non-Irrigated forage maize	1000 ha	2.17	1.44	-33.65	1.72	-20.81	1.70	-21.69	1.70	-21.69
Irrigated forage maize	1000 ha	8.03	7.16	-10.94	7.73	-3.74	7.86	-2.16	7.86	-2.16
Non-Irrigated temporary grassland	1000 ha	247.03	236.60	-4.22	240.03	-2.83	245.16	-0.76	245.16	-0.76
Irrigated temporary grassland	1000 ha	21.89	22.17	1.30	22.35	2.11	22.34	2.06	22.34	2.06
Non-Irrigated permanent grassland	1000 ha	1817.11	1817.11	0.00	1817.11	0.00	1817.11	0.00	1817.11	0.00
Irrigated permanent grassland	1000 ha	23.32	23.32	0.00	23.32	0.00	23.32	0.00	23.32	0.00
Livestock										
Suckler cows	1000 heads	961.35	960.80	-0.06	926.36	-3.64	858.51	-10.70	858.51	-10.70
Dairy cows	1000 heads	999.59	943.30	-5.63	969.24	-3.04	961.19	-3.84	961.19	-3.84
Dairy sheep	1000 heads	5430.28	5467.69	0.69	5535.45	1.94	5430.70	0.01	5430.70	0.01
Non dairy sheep	1000 heads	8385.38	8411.54	0.31	8840.94	5.43	8431.03	0.54	8431.03	0.54
LU	1000 LU	4348.58	4289.94	-1.35	4357.07	0.20	4194.22	-3.55	4194.22	-3.55
Non utilized area										
Non irrigable non used area	1000 ha	0.00	41.25	Inf	157.33	Inf	380.33	Inf	380.38	Inf
Irrigable non used area	1000 ha	0.00	0.19	Inf	38.09	Inf	54.38	Inf	54.43	Inf
Utilized area (summary)										
Non irrigated other crops area	1000 ha	59.52	69.21	16.26	60.28	1.27	65.11	9.39	65.11	9.39
Non irrigated COP crops area	1000 ha	4842.51	4851.75	0.19	4757.23	-1.76	4552.02	-6.00	4551.96	-6.00
Non irrig. grassl. and fodder crops area	1000 ha	2227.69	2166.24	-2.76	2154.88	-3.27	2132.26	-4.28	2132.26	-4.28
Dual values of land										
Mean dual value of non irrigated land	€	254.51	143.25	-43.71	78.52	-69.15	52.84	-79.24	52.85	-79.24
Mean dual value of irrigated land	€	568.57	346.54	-39.05	189.11	-66.74	150.80	-73.48	150.82	-73.47
Economic results										
Target function	Mill €	6887.45	6224.03	-9.63	6949.30	0.90	7046.77	2.31	7046.50	2.31
Coupled aid	Mill €	1977.75	2005.15	1.39	735.03	-62.84	121.39	-93.86	121.38	-93.86
Decoupled aid	Mill €	0.00	0.00	0.00	1551.27	Inf	2162.48	Inf	2162.50	Inf
Total aid before modulation	Mill €	1977.75	2005.15	1.39	2286.30	15.60	2283.87	15.48	2283.88	15.48
Modulation reduction	Mill €	0.00	0.00	0.00	50.70	Inf	50.68	Inf	50.98	Inf
Total aid after modulation	Mill €	1977.75	2005.15	1.39	2235.59	13.04	2233.19	12.92	2232.90	12.90
Gross margin after modulation	Mill €	6359.78	5580.30	-12.26	6281.78	-1.23	6298.65	-0.96	6298.45	-0.96
Mean % of aid in margin		31.10	35.93		35.59		35.45		35.45	
Average payment entitlement per ha	€	0.00	0.00		172.23		240.09		240.09	

Table A.4.4.2: Aggregated results for Galicia

		Base year 2002	Agenda 2000		Partial decoupling		Full decoupling		Regional model	
			Value	Variation (%)	Value	Variation (%)	Value	Variation (%)	Value	Variation (%)
Crops										
Non-Irrigated grain maize	1000 ha	2.73	2.87	5.21	2.87	5.15	2.62	-3.87	2.62	-3.87
Non-Irrigated temporary grassland	1000 ha	195.53	186.08	-4.83	187.53	-4.09	191.79	-1.91	191.79	-1.91
Irrigated temporary grassland	1000 ha	19.43	19.43	0.01	19.43	0.01	19.43	0.01	19.43	0.01
Non-Irrigated permanent grassland	1000 ha	174.59	174.59	0.00	174.59	0.00	174.59	0.00	174.59	0.00
Irrigated permanent grassland	1000 ha	3.19	3.19	-0.03	3.19	-0.03	3.19	-0.03	3.19	-0.03
Livestock										
Suckler cows	1000 heads	173.33	173.32	0.00	174.52	0.69	173.28	-0.02	173.28	-0.02
Dairy cows	1000 heads	462.12	447.32	-3.20	461.26	-0.19	456.74	-1.16	456.74	-1.16
LU	1000 LU	748.67	730.91	-2.37	748.97	0.04	742.16	-0.87	742.16	-0.87
Non utilized area										
Non irrigable non used area	1000 ha	0.00	9.28	Inf	7.86	Inf	3.84	Inf	3.84	Inf
Irrigable non used area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Utilized area (summary)										
Non irrigated other crops area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non irrigated COP crops area	1000 ha	2.73	2.87	5.21	2.87	5.15	2.62	-3.87	2.62	-3.87
Non irrig. grassl. and fodder crops area	1000 ha	370.12	360.67	-2.55	362.11	-2.16	366.38	-1.01	366.38	-1.01
Irrigated other crops	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total irrigated COP crops	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Irrigated grassland and fodder crops area	1000 ha	22.62	22.62	0.00	22.62	0.00	22.62	0.00	22.62	0.00
Dual values of land										
Mean dual value of non irrigated land	€	374.79	63.04	-83.18	71.58	-80.90	45.38	-87.89	45.38	-87.89
Mean dual value of irrigated land	€	1106.07	533.37	-51.78	557.59	-49.59	507.29	-54.14	507.29	-54.14
Economic results										
Target function	Mill €	535.39	409.87	-23.45	506.13	-5.47	513.57	-4.08	509.75	-4.79
Coupled aid	Mill €	25.07	25.14	0.27	27.04	7.86	0.00	-100.00	0.00	-100.00
Decoupled aid	Mill €	0.00	0.00	0.00	71.98	Inf	98.78	Inf	94.96	Inf
Total aid before modulation	Mill €	25.07	25.14	0.27	99.02	294.99	98.78	294.02	94.96	278.79
Modulation reduction	Mill €	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total aid after modulation	Mill €	25.07	25.14	0.27	99.02	294.99	98.78	294.02	94.96	278.79
Gross margin after modulation	Mill €	643.98	505.71	-21.47	612.14	-4.94	617.26	-4.15	613.44	-4.74
Mean % of aid in margin		3.89	4.97		16.18		16.00		15.48	
Average payment entitlement per ha	€	0.00	0.00		181.99		249.74		240.09	

Table A.4.4.3: Aggregated results for Asturias

		Base year 2002	Agenda 2000		Partial decoupling		Full decoupling		Regional model	
			Value	Variation (%)	Value	Variation (%)	Value	Variation (%)	Value	Variation (%)
Crops										
Non-Irrigated temporary grassland	1000 ha	7.58	7.58	-0.01	7.58	-0.01	7.58	-0.01	7.58	-0.01
Non-Irrigated permanent grassland	1000 ha	138.30	138.30	0.00	138.30	0.00	138.30	0.00	138.30	0.00
Livestock										
Suckler cows	1000 heads	107.47	107.47	0.00	107.47	0.00	106.99	-0.44	106.99	-0.44
Dairy cows	1000 heads	141.84	141.84	0.00	141.36	-0.33	141.36	-0.33	141.36	-0.33
LU	1000 LU	290.57	290.56	0.00	290.00	-0.20	289.46	-0.38	289.46	-0.38
Non utilized area										
Non irrigable non used area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Irrigable non used area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Utilized area (summary)										
Non irrigated other crops area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non irrigated COP crops area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non irrig. grassl. and fodder crops area	1000 ha	145.87	145.87	0.00	145.87	0.00	145.87	0.00	145.87	0.00
Irrigated other crops	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total irrigated COP crops	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Irrigated grassland and fodder crops area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dual values of land										
Mean dual value of non irrigated land	€	791.05	287.64	-63.64	331.21	-58.13	263.31	-66.71	263.31	-66.71
Economic results										
Target function	Mill €	233.61	182.58	-21.84	214.16	-8.33	217.88	-6.73	213.35	-8.67
Coupled aid	Mill €	13.97	13.97	0.00	15.64	11.94	0.00	-100.00	0.00	-100.00
Decoupled aid	Mill €	0.00	0.00	0.00	23.90	Inf	39.55	Inf	35.02	Inf
Total aid before modulation	Mill €	13.97	13.97	0.00	39.54	183.03	39.55	183.08	35.02	150.68
Modulation reduction	Mill €	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total aid after modulation	Mill €	13.97	13.97	0.00	39.54	183.03	39.55	183.08	35.02	150.68
Gross margin after modulation	Mill €	270.01	218.99	-18.90	250.12	-7.37	253.74	-6.03	249.21	-7.70
Mean % of aid in margin		5.17	6.38		15.81		15.59		14.05	
Average payment entitlement per ha	€	0.00	0.00		163.86		271.12		240.09	

Table A.4.4.4: Aggregated results for Cantabria

		Base year 2002	Agenda 2000		Partial decoupling		Full decoupling		Regional model	
			Value	Variation (%)	Value	Variation (%)	Value	Variation (%)	Value	Variation (%)
Crops										
Non-Irrigated forage maize	1000 ha	1.25	0.72	-42.37	0.89	-28.85	0.85	-31.56	0.85	-31.56
Non-Irrigated temporary grassland	1000 ha	0.41	0.60	47.66	0.77	88.13	0.74	80.38	0.74	80.38
Non-Irrigated permanent grassland	1000 ha	107.71	107.71	0.00	107.71	0.00	107.71	0.00	107.71	0.00
Livestock										
Suckler cows	1000 heads	53.01	53.01	0.00	52.68	-0.63	52.68	-0.63	52.68	-0.63
Dairy cows	1000 heads	105.80	100.31	-5.18	99.66	-5.80	99.47	-5.98	99.47	-5.98
LU	1000 LU	186.33	179.75	-3.53	178.59	-4.15	178.36	-4.28	178.36	-4.28
Non utilized area										
Non irrigable non used area	1000 ha	0.00	1.05	Inf	0.00	Inf	0.07	Inf	0.07	Inf
Irrigable non used area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Utilized area (summary)										
Non irrigated other crops area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non irrigated COP crops area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non irrig. grassl. and fodder crops area	1000 ha	109.37	108.31	-0.96	109.37	0.00	109.30	-0.06	109.30	-0.06
Irrigated other crops	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total irrigated COP crops	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Irrigated grassland and fodder crops area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dual values of land										
Mean dual value of non irrigated land	€	450.33	83.29	-81.51	82.81	-81.61	32.01	-92.89	32.01	-92.89
Economic results										
Target function	Mill €	146.45	111.02	-24.19	136.46	-6.82	138.65	-5.33	130.87	-10.64
Coupled aid	Mill €	11.68	11.68	0.00	10.74	-8.06	0.00	-100.00	0.00	-100.00
Decoupled aid	Mill €	0.00	0.00	0.00	23.26	Inf	34.19	Inf	26.26	Inf
Total aid before modulation	Mill €	11.68	11.68	0.00	34.00	191.00	34.19	192.57	26.26	124.72
Modulation reduction	Mill €	0.00	0.00	0.00	0.19	Inf	0.20	Inf	0.05	Inf
Total aid after modulation	Mill €	11.68	11.68	0.00	33.81	189.35	33.98	190.84	26.21	124.28
Gross margin after modulation	Mill €	193.32	151.86	-21.44	176.57	-8.67	178.55	-7.64	170.77	-11.66
Mean % of aid in margin		6.04	7.69		19.15		19.03		15.35	
Average payment entitlement per ha	€	0.00	0.00		212.68		312.59		240.09	

Table A.4.4.5: Aggregated results for Basque Country

		Base year 2002	Agenda 2000		Partial decoupling		Full decoupling		Regional model	
			Value	Variation (%)	Value	Variation (%)	Value	Variation (%)	Value	Variation (%)
Crops										
Irrigated sugar beet	1000 ha	2.49	2.47	-0.96	2.50	0.15	2.50	0.14	2.50	0.14
Irrigated late season potato	1000 ha	2.00	1.99	-0.70	1.97	-1.64	1.97	-1.61	1.97	-1.61
Irrigated green bean	1000 ha	0.08	0.12	46.22	0.11	35.42	0.11	35.15	0.11	35.15
Non-Irrigated soft wheat	1000 ha	21.25	21.99	3.47	21.95	3.29	21.94	3.24	21.94	3.24
Non-Irrigated rye	1000 ha	0.33	0.32	-3.39	0.30	-8.87	0.30	-9.33	0.30	-9.33
Non-Irrigated barley	1000 ha	7.21	6.82	-5.50	6.91	-4.17	6.91	-4.14	6.91	-4.14
Non-Irrigated oats	1000 ha	3.24	2.91	-10.15	2.89	-10.66	2.90	-10.43	2.90	-10.43
Non-Irrigated sunflower	1000 ha	0.56	0.56	-0.36	0.54	-4.32	0.53	-4.62	0.53	-4.62
Non-Irrigated alfalfa	1000 ha	0.25	0.25	0.06	0.25	0.06	0.25	0.06	0.25	0.06
Non-Irrigated permanent grassland	1000 ha	90.94	90.94	0.00	90.94	0.00	90.94	0.00	90.94	0.00
Livestock										
Suckler cows	1000 heads	35.64	35.64	0.00	35.33	-0.87	35.33	-0.87	35.33	-0.87
Dairy cows	1000 heads	37.38	37.38	0.00	37.24	-0.38	37.24	-0.38	37.24	-0.38
Dairy sheep	1000 heads	144.22	144.22	0.00	144.22	0.00	144.22	0.00	144.22	0.00
LU	1000 LU	106.41	106.41	0.00	105.89	-0.48	105.89	-0.48	105.89	-0.48
Non utilized area										
Non irrigable non used area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	Inf	0.00	Inf
Irrigable non used area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Utilized area (summary)										
Non irrigated other crops area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non irrigated COP crops area	1000 ha	32.60	32.60	0.00	32.60	0.00	32.59	-0.01	32.59	-0.01
Non irrig. grassl. and fodder crops area	1000 ha	91.19	91.19	0.00	91.19	0.00	91.19	0.00	91.19	0.00
Irrigated other crops	1000 ha	4.57	4.57	0.00	4.57	0.00	4.57	0.00	4.57	0.00
Total irrigated COP crops	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Irrigated grassland and fodder crops area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dual values of land										
Mean dual value of non irrigated land	€	450.87	299.59	-33.55	180.19	-60.03	119.25	-73.55	119.25	-73.55
Mean dual value of irrigated land	€	306.93	245.74	-19.94	113.16	-63.13	114.07	-62.84	114.07	-62.84
Economic results										
Target function	Mill €	134.49	111.55	-17.06	126.95	-5.61	128.93	-4.14	126.34	-6.06
Coupled aid	Mill €	22.17	22.17	0.00	11.27	-49.14	0.00	-100.00	0.00	-100.00
Decoupled aid	Mill €	0.00	0.00	0.00	22.58	Inf	33.92	Inf	31.19	Inf
Total aid before modulation	Mill €	22.17	22.17	0.00	33.85	52.71	33.92	52.99	31.19	40.69
Modulation reduction	Mill €	0.00	0.00	0.00	0.49	Inf	0.49	Inf	0.35	Inf
Total aid after modulation	Mill €	22.17	22.17	0.00	33.36	50.48	33.42	50.76	30.83	39.09
Gross margin after modulation	Mill €	146.87	124.08	-15.52	139.24	-5.19	141.21	-3.85	138.63	-5.62
Mean % of aid in margin		15.09	17.87		23.96		23.67		22.24	
Average payment entitlement per ha	€	0.00	0.00		173.83		261.09		240.09	

Table A.4.4.6: Aggregated results for Navarre

		Base year 2002	Agenda 2000		Partial decoupling		Full decoupling		Regional model	
			Value	Variation (%)	Value	Variation (%)	Value	Variation (%)	Value	Variation (%)
Crops										
Irrigated asparagus	1000 ha	0.54	0.55	1.57	0.55	1.42	0.55	1.47	0.55	1.80
Irrigated pepper	1000 ha	0.20	0.20	0.41	0.20	0.36	0.20	0.34	0.20	0.37
Irrigated artichoke	1000 ha	0.74	0.74	0.56	0.74	0.48	0.74	0.46	0.74	0.54
Irrigated cauliflower	1000 ha	0.53	0.53	0.70	0.53	0.57	0.53	0.55	0.53	0.63
Irrigated green bean	1000 ha	0.23	0.28	21.59	0.28	19.45	0.28	20.22	0.29	24.80
Irrigated pea	1000 ha	0.46	0.64	38.54	0.54	17.40	0.50	7.39	0.50	7.39
Irrigated durum wheat	1000 ha	0.31	0.35	13.31	0.35	12.34	0.33	5.78	0.33	5.78
Non-Irrigated soft wheat	1000 ha	37.95	39.60	4.36	39.71	4.64	39.64	4.44	39.64	4.44
Irrigated soft wheat	1000 ha	6.33	7.53	18.97	8.20	29.56	8.19	29.47	8.19	29.47
Non-Irrigated barley	1000 ha	109.82	107.67	-1.96	108.25	-1.43	107.92	-1.73	107.92	-1.73
Irrigated barley	1000 ha	1.28	1.46	13.95	1.58	22.92	1.57	22.37	1.57	22.37
Non-Irrigated oats	1000 ha	0.75	0.64	-14.95	0.66	-12.73	0.66	-12.21	0.66	-12.21
Irrigated grain maize	1000 ha	11.67	10.75	-7.90	10.41	-10.75	10.07	-13.69	10.06	-13.79
Non-Irrigated sunflower	1000 ha	7.15	7.23	1.11	7.00	-2.08	6.96	-2.69	6.96	-2.69
Non-Irrigated vetch	1000 ha	3.19	3.75	17.75	3.41	7.03	3.73	16.92	3.73	16.92
Non-Irrigated alfalfa	1000 ha	1.33	1.35	1.90	1.17	-11.60	1.29	-2.59	1.29	-2.59
Irrigated alfalfa	1000 ha	5.35	4.52	-15.58	3.84	-28.29	4.14	-22.59	4.14	-22.62
Non-Irrigated temporary grassland	1000 ha	0.06	0.05	-26.74	0.05	-22.51	0.05	-13.14	0.05	-13.14
Non-Irrigated permanent grassland	1000 ha	51.93	51.93	0.00	51.93	0.00	51.93	0.00	51.93	0.00
Livestock										
Suckler cows	1000 heads	31.37	31.10	-0.84	31.43	0.18	31.76	1.24	31.76	1.24
Dairy cows	1000 heads	27.67	25.87	-6.50	25.57	-7.59	25.32	-8.49	25.32	-8.49
Dairy sheep	1000 heads	238.83	255.71	7.07	239.49	0.28	239.25	0.18	239.25	0.18
Non dairy sheep	1000 heads	455.51	456.44	0.21	457.87	0.52	455.64	0.03	455.64	0.03
LU	1000 LU	172.49	172.70	0.13	170.48	-1.16	170.19	-1.33	170.19	-1.33
Non utilized area										
Non irrigable non used area	1000 ha	0.00	2.19	Inf	0.12	Inf	0.22	Inf	0.22	Inf
Irrigable non used area	1000 ha	0.00	0.00	0.00	0.43	Inf	0.54	Inf	0.54	Inf
Utilized area (summary)										
Non irrigated other crops area	1000 ha	3.19	3.75	17.75	3.41	7.03	3.73	16.92	3.73	16.92
Non irrigated COP crops area	1000 ha	155.68	155.15	-0.34	155.62	-0.04	155.18	-0.32	155.18	-0.32
Non irrig. grassl. and fodder crops area	1000 ha	53.32	51.14	-4.08	53.03	-0.54	53.06	-0.49	53.06	-0.49
Irrigated other crops	1000 ha	2.24	2.31	3.00	2.30	2.68	2.30	2.76	2.32	3.36
Total irrigated COP crops	1000 ha	20.05	20.73	3.37	21.08	5.13	20.66	3.02	20.64	2.96
Irrig. forage and grassl. area for feeding	1000 ha	5.35	4.52	-15.58	3.84	-28.29	4.14	-22.59	4.14	-22.62
Dual values of land										
Mean dual value of non irrigated land	€	400.53	282.51	-29.47	201.33	-49.73	169.11	-57.78	169.11	-57.78
Mean dual value of irrigated land	€	569.40	390.59	-31.40	163.55	-71.28	138.26	-75.72	139.10	-75.57
Economic results										
Target function	Mill €	258.88	238.80	-7.75	262.37	1.35	266.54	2.96	259.02	0.05
Coupled aid	Mill €	62.60	63.15	0.88	21.82	-65.15	0.04	-99.94	0.04	-99.94
Decoupled aid	Mill €	0.00	0.00	0.00	47.73	Inf	69.53	Inf	61.66	Inf
Total aid before modulation	Mill €	62.60	63.15	0.88	69.55	11.11	69.57	11.15	61.70	-1.43
Modulation reduction	Mill €	0.00	0.00	0.00	1.54	Inf	1.54	Inf	1.19	Inf
Total aid after modulation	Mill €	62.60	63.15	0.88	68.01	8.65	68.04	8.69	60.51	-3.33
Gross margin after modulation	Mill €	227.09	205.39	-9.56	227.23	0.06	230.78	1.62	223.27	-1.68
Mean % of aid in margin		27.57	30.75		29.93		29.48		27.10	
Average payment entitlement per ha	€	0.00	0.00		185.85		270.72		240.09	

Table A.4.4.7: Aggregated results for Rioja

		Base year 2002	Agenda 2000		Partial decoupling		Full decoupling		Regional model	
			Value	Variation (%)	Value	Variation (%)	Value	Variation (%)	Value	Variation (%)
Crops										
Irrigated sugar beet	1000 ha	1.91	1.89	-0.93	1.91	-0.01	1.91	0.36	1.91	0.36
Irrigated late season potato	1000 ha	2.13	2.07	-2.67	2.10	-1.30	2.10	-1.07	2.10	-1.07
Non-Irrigated soft wheat	1000 ha	4.25	4.35	2.53	4.37	2.91	4.37	2.95	4.37	2.95
Non-Irrigated barley	1000 ha	4.57	4.46	-2.35	4.45	-2.70	4.45	-2.74	4.45	-2.74
Irrigated grain maize	1000 ha	0.16	0.23	41.01	0.19	17.08	0.18	9.71	0.18	9.71
Irrigated permanent grassland	1000 ha	0.08	0.08	0.00	0.08	0.00	0.08	0.00	0.08	0.00
Livestock										
Non dairy sheep	1000 heads	89.69	89.69	0.00	98.88	10.24	89.69	0.00	89.69	0.00
LU	1000 LU	13.45	13.45	0.00	14.83	10.24	13.45	0.00	13.45	0.00
Non utilized area										
Non irrigable non used area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Irrigable non used area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Utilized area (summary)										
Non irrigated other crops area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non irrigated COP crops area	1000 ha	8.82	8.82	0.00	8.82	0.00	8.82	0.00	8.82	0.00
Non irrig. grassl. and fodder crops area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Irrigated other crops	1000 ha	4.03	3.96	-1.85	4.01	-0.69	4.02	-0.39	4.02	-0.39
Total irrigated COP crops	1000 ha	0.16	0.23	41.01	0.19	17.08	0.18	9.71	0.18	9.71
Irrigated grassland and fodder crops area	1000 ha	0.08	0.08	0.00	0.08	0.00	0.08	0.00	0.08	0.00
Dual values of land										
Mean dual value of non irrigated land	€	295.87	249.33	-15.73	136.97	-53.71	93.89	-68.27	93.89	-68.27
Mean dual value of irrigated land	€	1121.81	380.38	-66.09	374.20	-66.64	369.44	-67.07	369.44	-67.07
Economic results										
Target function	Mill €	21.62	18.90	-12.59	23.35	8.04	23.65	9.41	20.27	-6.25
Coupled aid	Mill €	4.78	4.82	0.71	1.88	-60.73	0.00	-100.00	0.00	-100.00
Decoupled aid	Mill €	0.00	0.00	0.00	4.61	Inf	6.35	Inf	2.87	Inf
Total aid before modulation	Mill €	4.78	4.82	0.71	6.48	35.56	6.35	32.83	2.87	-39.92
Modulation reduction	Mill €	0.00	0.00	0.00	0.10	Inf	0.10	Inf	0.00	Inf
Total aid after modulation	Mill €	4.78	4.82	0.71	6.38	33.38	6.25	30.79	2.87	-39.96
Gross margin after modulation	Mill €	14.44	11.74	-18.69	16.52	14.41	16.51	14.36	13.13	-9.08
Mean % of aid in margin		33.13	41.03		38.62		37.88		21.87	
Average payment entitlement per ha	€	0.00	0.00		384.81		530.83		240.09	

Table A.4.4.8: Aggregated results for Aragon

		Base year 2002	Agenda 2000		Partial decoupling		Full decoupling		Regional model	
			Value	Variation (%)	Value	Variation (%)	Value	Variation (%)	Value	Variation (%)
Crops										
Irrigated rice	1000 ha	1.06	0.75	-29.62	1.07	1.27	1.07	1.27	1.05	-0.62
Irrigated durum wheat	1000 ha	6.13	7.01	14.31	6.53	6.51	6.12	-0.16	6.12	-0.21
Non-Irrigated soft wheat	1000 ha	56.57	60.39	6.76	60.38	6.74	60.23	6.48	60.23	6.48
Irrigated soft wheat	1000 ha	26.97	32.19	19.36	34.55	28.08	34.41	27.56	34.41	27.56
Non-Irrigated rye	1000 ha	6.45	6.74	4.47	6.30	-2.33	6.27	-2.83	6.27	-2.83
Non-Irrigated barley	1000 ha	397.28	393.27	-1.01	396.21	-0.27	395.75	-0.39	395.75	-0.39
Irrigated barley	1000 ha	50.43	58.13	15.28	63.28	25.49	62.60	24.15	62.60	24.15
Non-Irrigated oats	1000 ha	19.52	18.14	-7.03	18.04	-7.59	18.12	-7.16	18.12	-7.16
Irrigated grain maize	1000 ha	65.17	58.70	-9.93	57.27	-12.12	55.29	-15.17	55.29	-15.17
Non-Irrigated sunflower	1000 ha	9.66	11.19	15.79	10.37	7.27	10.26	6.15	10.26	6.15
Irrigated sunflower	1000 ha	12.32	16.26	32.04	15.13	22.81	14.08	14.31	14.08	14.31
Non-Irrigated vetch	1000 ha	3.18	3.84	20.70	2.92	-8.16	3.25	2.28	3.25	2.28
Non-Irrigated alfalfa	1000 ha	3.65	2.87	-21.26	2.25	-38.20	2.52	-30.94	2.52	-30.94
Irrigated alfalfa	1000 ha	68.01	55.79	-17.98	41.67	-38.73	44.55	-34.50	44.55	-34.50
Non-Irrigated temporary grassland	1000 ha	5.07	4.86	-4.14	4.91	-3.27	4.98	-1.87	4.98	-1.87
Non-Irrigated permanent grassland	1000 ha	7.12	7.12	0.00	7.12	0.00	7.12	0.00	7.12	0.00
Livestock										
Dairy cows	1000 heads	1.38	1.07	-22.04	1.14	-17.07	1.17	-15.32	1.17	-15.32
Non dairy sheep	1000 heads	2391.71	2399.41	0.32	2653.19	10.93	2392.94	0.05	2392.94	0.05
LU	1000 LU	360.41	361.20	0.22	399.35	10.80	360.34	-0.02	360.34	-0.02
Non utilized area										
Non irrigable non used area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.41	Inf	0.41	Inf
Irrigable non used area	1000 ha	0.00	0.00	0.00	10.59	Inf	11.98	Inf	12.00	Inf
Utilized area (summary)										
Non irrigated other crops area	1000 ha	3.18	3.84	20.70	2.92	-8.16	3.25	2.28	3.25	2.28
Non irrigated COP crops area	1000 ha	489.48	489.74	0.05	491.30	0.37	490.63	0.24	490.63	0.24
Non irrig. grassl. and fodder crops area	1000 ha	15.84	14.85	-6.23	14.28	-9.85	14.20	-10.31	14.20	-10.31
Irrigated other crops	1000 ha	1.06	0.75	-29.62	1.07	1.27	1.07	1.27	1.05	-0.62
Total irrigated COP crops	1000 ha	161.02	172.31	7.01	176.76	9.77	172.50	7.12	172.49	7.12
Irrigated grassland and fodder crops area	1000 ha	68.01	55.79	-17.98	41.67	-38.73	44.55	-34.50	44.55	-34.50
Dual values of land										
Mean dual value of non irrigated land	€	201.80	146.70	-27.30	67.56	-66.52	41.42	-79.48	41.42	-79.48
Mean dual value of irrigated land	€	519.80	335.03	-35.55	112.18	-78.42	71.40	-86.26	71.40	-86.26
Economic results										
Target function	Mill €	491.22	457.11	-6.94	502.58	2.31	512.49	4.33	511.60	4.15
Coupled aid	Mill €	195.11	197.85	1.41	66.67	-65.83	0.73	-99.63	0.72	-99.63
Decoupled aid	Mill €	0.00	0.00	0.00	133.98	Inf	195.59	Inf	194.58	Inf
Total aid before modulation	Mill €	195.11	197.85	1.41	200.66	2.85	196.32	0.62	195.29	0.10
Modulation reduction	Mill €	0.00	0.00	0.00	3.78	Inf	3.57	Inf	3.45	Inf
Total aid after modulation	Mill €	195.11	197.85	1.41	196.88	0.91	192.75	-1.21	191.85	-1.67
Gross margin after modulation	Mill €	440.14	396.65	-9.88	446.01	1.33	445.90	1.31	444.99	1.10
Mean % of aid in margin		44.33	49.88		44.14		43.23		43.11	
Average payment entitlement per ha	€	0.00	0.00		165.33		241.34		240.09	

Table A.4.4.9.: Aggregated results for Catalonia

		Base year 2002	Agenda 2000		Partial decoupling		Full decoupling		Regional model	
			Value	Variation (%)	Value	Variation (%)	Value	Variation (%)	Value	Variation (%)
Crops										
Irrigated rice	1000 ha	0.51	0.27	-47.53	0.33	-34.59	0.33	-34.59	0.33	-34.59
Irrigated onion	1000 ha	0.22	0.22	1.85	0.22	1.90	0.22	1.80	0.22	1.15
Non-Irrigated soft wheat	1000 ha	25.73	27.46	6.72	26.18	1.75	25.47	-1.02	25.47	-1.02
Irrigated soft wheat	1000 ha	13.72	16.88	23.05	15.02	9.46	13.95	1.67	13.95	1.67
Non-Irrigated barley	1000 ha	132.88	132.27	-0.46	124.84	-6.05	119.71	-9.91	119.71	-9.91
Irrigated barley	1000 ha	15.75	18.81	19.41	17.58	11.63	15.94	1.18	15.94	1.18
Non-Irrigated oats	1000 ha	8.31	8.39	0.89	7.41	-10.81	7.11	-14.51	7.11	-14.51
Irrigated grain maize	1000 ha	39.47	36.78	-6.81	31.08	-21.27	28.23	-28.47	28.23	-28.47
Non-Irrigated sunflower	1000 ha	0.60	0.58	-2.09	0.54	-9.35	0.52	-13.61	0.52	-13.61
Irrigated sunflower	1000 ha	4.12	5.91	43.46	2.94	-28.57	1.79	-56.53	1.79	-56.53
Non-Irrigated alfalfa	1000 ha	6.36	5.47	-13.94	4.06	-36.07	4.24	-33.37	4.24	-33.37
Irrigated alfalfa	1000 ha	36.47	31.34	-14.07	22.49	-38.34	23.46	-35.68	23.46	-35.68
Non-Irrigated winter forage cereals	1000 ha	2.72	2.42	-10.94	2.72	0.03	2.72	0.03	2.72	0.03
Non-Irrigated forage maize	1000 ha	0.92	0.72	-21.77	0.83	-9.87	0.84	-8.24	0.84	-8.24
Irrigated forage maize	1000 ha	5.99	5.45	-9.08	6.10	1.75	6.16	2.74	6.16	2.74
Non-Irrigated temporary grassland	1000 ha	0.25	0.29	15.54	0.37	44.61	0.37	46.71	0.37	46.71
Non-Irrigated permanent grassland	1000 ha	5.70	5.70	0.00	5.70	0.00	5.70	0.00	5.70	0.00
Irrigated permanent grassland	1000 ha	1.83	1.83	0.04	1.83	0.04	1.83	0.04	1.83	0.04
Livestock										
Dairy cows	1000 heads	64.78	53.36	-17.62	57.41	-11.37	56.53	-12.73	56.53	-12.73
Non dairy sheep	1000 heads	95.39	95.39	0.00	95.39	0.00	92.56	-2.97	92.56	-2.97
LU	1000 LU	92.04	78.34	-14.88	83.20	-9.60	81.72	-11.21	81.72	-11.21
Non utilized area										
Non irrigable non used area	1000 ha	0.00	0.13	Inf	13.52	Inf	19.51	Inf	19.51	Inf
Irrigable non used area	1000 ha	0.00	0.00	0.00	20.49	Inf	26.17	Inf	26.17	Inf
Utilized area (summary)										
Non irrigated other crops area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non irrigated COP crops area	1000 ha	167.52	168.70	0.71	158.98	-5.10	152.80	-8.78	152.80	-8.78
Non irrig. grassl. and fodder crops area	1000 ha	15.94	14.47	-9.22	10.95	-31.28	11.15	-30.08	11.15	-30.08
Irrigated other crops	1000 ha	0.73	0.49	-32.64	0.56	-23.59	0.56	-23.62	0.56	-23.81
Total irrigated COP crops	1000 ha	73.06	78.38	7.28	66.62	-8.82	59.91	-18.00	59.91	-18.00
Irrigated grassland and fodder crops area	1000 ha	44.29	38.61	-12.81	30.41	-31.33	31.44	-29.01	31.44	-29.01
Dual values of land										
Mean dual value of non irrigated land	€	339.57	264.67	-22.06	161.05	-52.57	125.33	-63.09	125.33	-63.09
Mean dual value of irrigated land	€	328.96	121.26	-63.14	3.94	-98.80	4.56	-98.62	4.56	-98.62
Economic results										
Target function	Mill €	243.29	196.40	-19.27	209.43	-13.92	213.05	-12.43	210.68	-13.40
Coupled aid	Mill €	68.35	69.75	2.06	16.11	-76.43	0.15	-99.78	0.15	-99.78
Decoupled aid	Mill €	0.00	0.00	0.00	64.07	Inf	81.46	Inf	78.75	Inf
Total aid before modulation	Mill €	68.35	69.75	2.06	80.18	17.31	81.61	19.41	78.90	15.44
Modulation reduction	Mill €	0.00	0.00	0.00	0.90	Inf	0.98	Inf	0.63	Inf
Total aid after modulation	Mill €	68.35	69.75	2.06	79.28	16.00	80.63	17.98	78.27	14.52
Gross margin after modulation	Mill €	270.49	208.46	-22.93	212.99	-21.26	211.76	-21.71	209.40	-22.59
Mean % of aid in margin		25.27	33.46		37.22		38.08		37.38	
Average payment entitlement per ha	€	0.00	0.00		195.34		248.34		240.09	

Table A.4.4.10: Aggregated results for Balearic Isles

		Base year 2002	Agenda 2000		Partial decoupling		Full decoupling		Regional model	
			Value	Variation (%)	Value	Variation (%)	Value	Variation (%)	Value	Variation (%)
Crops										
Irrigated early potato	1000 ha	0.48	0.41	-14.15	0.43	-11.80	0.43	-11.68	0.43	-11.68
Irrigated medium season potato	1000 ha	0.39	0.34	-13.48	0.35	-11.14	0.35	-11.02	0.35	-11.02
Irrigated artichoke	1000 ha	0.02	0.02	1.15	0.02	1.15	0.02	1.15	0.02	1.15
Irrigated onion	1000 ha	0.06	0.06	0.35	0.06	0.35	0.06	0.35	0.06	0.35
Irrigated soft wheat	1000 ha	0.08	0.16	91.37	0.13	57.23	0.12	46.93	0.12	46.93
Irrigated oats	1000 ha	0.05	0.06	22.90	0.07	34.28	0.06	22.01	0.06	22.01
Non-Irrigated alfalfa	1000 ha	4.54	3.34	-26.39	1.76	-61.34	1.88	-58.64	1.88	-58.64
Irrigated alfalfa	1000 ha	0.40	0.34	-14.83	0.28	-30.25	0.28	-28.88	0.28	-28.88
Non-Irrigated winter forage cereals	1000 ha	0.45	0.45	0.03	0.45	0.03	0.45	0.03	0.45	0.03
Irrigated forage maize	1000 ha	0.05	0.04	-15.12	0.04	-22.25	0.04	-20.39	0.04	-20.39
Non-Irrigated temporary grassland	1000 ha	3.77	3.19	-15.50	2.44	-35.35	2.52	-33.11	2.52	-33.11
Irrigated temporary grassland	1000 ha	0.14	0.20	37.65	0.26	80.09	0.26	79.93	0.26	79.93
Non-Irrigated permanent grassland	1000 ha	0.14	0.14	-0.02	0.14	-0.02	0.14	-0.02	0.14	-0.02
Livestock										
Dairy cows	1000 heads	15.42	13.20	-14.38	15.42	0.00	15.42	-0.03	15.42	-0.03
LU	1000 LU	18.51	15.84	-14.38	18.51	0.00	18.50	-0.03	18.50	-0.03
Non utilized area										
Non irrigable non used area	1000 ha	0.00	2.23	Inf	4.57	Inf	4.36	Inf	4.36	Inf
Irrigable non used area	1000 ha	0.00	0.04	Inf	0.05	Inf	0.06	Inf	0.06	Inf
Utilized area (summary)										
Non irrigated other crops area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non irrigated COP crops area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non irrig. grassl. and fodder crops area	1000 ha	8.90	6.67	-25.07	4.34	-51.31	4.54	-48.99	4.54	-48.99
Irrigated other crops	1000 ha	0.95	0.82	-12.74	0.85	-10.57	0.85	-10.46	0.85	-10.46
Total irrigated COP crops	1000 ha	0.13	0.22	65.60	0.20	48.59	0.18	37.55	0.18	37.55
Irrigated grassland and fodder crops area	1000 ha	0.59	0.58	-2.16	0.57	-2.91	0.58	-1.87	0.58	-1.87
Dual values of land										
Mean dual value of non irrigated land	€	21.55	34.60	60.55	0.00	-100.00	0.00	-100.00	0.00	-100.00
Mean dual value of irrigated land	€	504.98	189.27	-62.52	29.14	-94.23	40.03	-92.07	40.03	-92.07
Economic results										
Target function	Mill €	20.63	16.70	-19.02	20.94	1.54	20.94	1.50	20.74	0.57
Coupled aid	Mill €	0.03	0.06	65.59	0.26	674.36	0.00	-100.00	0.00	-100.00
Decoupled aid	Mill €	0.00	0.00	0.00	2.26	Inf	2.52	Inf	2.32	Inf
Total aid before modulation	Mill €	0.03	0.06	65.59	2.52	7429.11	2.52	7418.84	2.32	6817.10
Modulation reduction	Mill €	0.00	0.00	0.00	0.05	Inf	0.05	Inf	0.04	Inf
Total aid after modulation	Mill €	0.03	0.06	65.59	2.47	7292.95	2.47	7282.80	2.28	6711.34
Gross margin after modulation	Mill €	15.56	9.95	-36.01	15.27	-1.85	15.26	-1.91	15.07	-3.14
Mean % of aid in margin		0.22	0.56		16.21		16.19		15.13	
Average payment entitlement per ha	€	0.00	0.00		234.45		260.98		240.09	

Table A.4.4.11: Aggregated results for Castile-Leon

		Base year 2002	Agenda 2000		Partial decoupling		Full decoupling		Regional model	
			Value	Variation (%)	Value	Variation (%)	Value	Variation (%)	Value	Variation (%)
Crops										
Irrigated sugar beet	1000 ha	66.61	48.50	-27.19	54.11	-18.77	54.90	-17.58	54.90	-17.58
Irrigated medium season potato	1000 ha	11.81	10.26	-13.16	10.75	-8.97	10.78	-8.78	10.78	-8.78
Irrigated late season potato	1000 ha	10.41	9.01	-13.48	9.42	-9.51	9.47	-9.03	9.47	-9.03
Non-Irrigated soft wheat	1000 ha	523.76	546.77	4.39	550.95	5.19	515.96	-1.49	515.96	-1.49
Irrigated soft wheat	1000 ha	43.88	52.19	18.93	54.71	24.67	54.85	24.98	54.85	24.98
Non-Irrigated rye	1000 ha	29.83	29.19	-2.15	27.88	-6.53	25.77	-13.61	25.77	-13.61
Irrigated rye	1000 ha	0.77	1.06	37.24	0.93	20.37	0.82	6.88	0.82	6.88
Non-Irrigated barley	1000 ha	1194.28	1176.73	-1.47	1190.61	-0.31	1104.74	-7.50	1104.74	-7.50
Irrigated barley	1000 ha	74.30	90.35	21.61	91.17	22.71	88.96	19.74	88.96	19.74
Non-Irrigated oats	1000 ha	10.43	9.79	-6.09	9.77	-6.34	8.66	-16.95	8.66	-16.95
Irrigated grain maize	1000 ha	83.30	75.41	-9.48	70.13	-15.81	67.42	-19.06	67.42	-19.06
Non-Irrigated sunflower	1000 ha	117.67	125.14	6.35	120.29	2.23	103.98	-11.63	103.98	-11.63
Irrigated sunflower	1000 ha	13.65	18.04	32.12	17.28	26.58	16.72	22.44	16.72	22.44
Non-Irrigated vetch	1000 ha	22.47	26.86	19.57	22.36	-0.47	23.39	4.10	23.39	4.10
Non-Irrigated alfalfa	1000 ha	142.08	124.53	-12.35	108.28	-23.79	115.86	-18.46	115.86	-18.46
Irrigated alfalfa	1000 ha	22.79	20.08	-11.88	15.84	-30.49	17.12	-24.87	17.12	-24.87
Irrigated forage maize	1000 ha	0.62	0.53	-14.65	0.50	-19.39	0.50	-18.60	0.50	-18.60
Non-Irrigated temporary grassland	1000 ha	20.16	20.16	0.03	20.16	0.03	20.16	0.03	20.16	0.03
Irrigated temporary grassland	1000 ha	2.31	2.54	9.90	2.66	14.97	2.65	14.56	2.65	14.56
Non-Irrigated permanent grassland	1000 ha	342.09	342.09	0.00	342.09	0.00	342.09	0.00	342.09	0.00
Irrigated permanent grassland	1000 ha	13.76	13.76	0.00	13.76	0.00	13.76	0.00	13.76	0.00
Livestock										
Suckler cows	1000 heads	212.25	212.21	-0.02	206.04	-2.93	192.47	-9.32	192.47	-9.32
Dairy cows	1000 heads	89.61	78.50	-12.40	81.06	-9.55	79.67	-11.09	79.67	-11.09
Dairy sheep	1000 heads	3114.76	3135.29	0.66	3176.67	1.99	3114.76	0.00	3114.76	0.00
Non dairy sheep	1000 heads	775.63	792.93	2.23	827.96	6.75	775.63	0.00	775.63	0.00
LU	1000 LU	928.82	921.12	-0.83	928.73	-0.01	894.74	-3.67	894.74	-3.67
Non utilized area										
Non irrigable non used area	1000 ha	0.00	20.21	Inf	30.53	Inf	174.77	Inf	174.77	Inf
Irrigable non used area	1000 ha	0.00	0.15	Inf	2.96	Inf	8.28	Inf	8.28	Inf
Utilized area (summary)										
Non irrigated other crops area	1000 ha	22.47	26.86	19.57	22.36	-0.47	23.39	4.10	23.39	4.10
Non irrigated COP crops area	1000 ha	1875.97	1887.62	0.62	1899.50	1.25	1759.11	-6.23	1759.11	-6.23
Non irrig. grassl. and fodder crops area	1000 ha	504.33	466.62	-7.48	450.37	-10.70	445.49	-11.67	445.49	-11.67
Irrigated other crops	1000 ha	88.83	67.76	-23.71	74.28	-16.38	75.14	-15.41	75.14	-15.41
Total irrigated COP crops	1000 ha	215.90	237.05	9.79	234.21	8.48	228.77	5.96	228.77	5.96
Irrigated grassland and fodder crops area	1000 ha	39.48	36.91	-6.51	32.76	-17.02	32.02	-18.89	32.02	-18.89
Dual values of land										
Mean dual value of non irrigated land	€	171.28	113.61	-33.67	19.28	-88.75	6.37	-96.28	6.37	-96.28
Mean dual value of irrigated land	€	446.44	248.37	-44.37	111.87	-74.94	62.91	-85.91	62.91	-85.91
Economic results										
Target function	Mill €	1531.99	1378.62	-10.01	1552.88	1.36	1573.82	2.73	1658.27	8.24
Coupled aid	Mill €	544.42	552.18	1.42	172.51	-68.31	0.00	-100.00	0.00	-100.00
Decoupled aid	Mill €	0.00	0.00	0.00	449.94	Inf	620.92	Inf	709.87	Inf
Total aid before modulation	Mill €	544.42	552.18	1.42	622.45	14.33	620.92	14.05	709.87	30.39
Modulation reduction	Mill €	0.00	0.00	0.00	14.75	Inf	14.67	Inf	19.17	Inf
Total aid after modulation	Mill €	544.42	552.18	1.42	607.70	11.62	606.24	11.36	690.70	26.87
Gross margin after modulation	Mill €	1689.87	1488.95	-11.89	1679.08	-0.64	1670.15	-1.17	1754.60	3.83
Mean % of aid in margin		32.22	37.09		36.19		36.30		39.36	
Average payment entitlement per ha	€	0.00	0.00		152.18		210.01		240.09	

Table A.4.4.12: Aggregated results for Madrid

		Base year 2002	Agenda 2000		Partial decoupling		Full decoupling		Regional model	
			Value	Variation (%)	Value	Variation (%)	Value	Variation (%)	Value	Variation (%)
Crops										
Irrigated medium season potato	1000 ha	0.09	0.08	-16.83	0.08	-13.68	0.08	-13.30	0.08	-13.30
Non-Irrigated durum wheat	1000 ha	3.06	3.14	2.47	2.62	-14.47	2.42	-21.03	2.41	-21.30
Non-Irrigated soft wheat	1000 ha	16.87	17.80	5.48	17.78	5.36	17.80	5.52	17.81	5.53
Irrigated soft wheat	1000 ha	0.33	0.44	33.38	0.49	47.09	0.48	45.67	0.48	45.67
Non-Irrigated barley	1000 ha	32.76	31.72	-3.18	32.16	-1.84	32.29	-1.44	32.30	-1.42
Irrigated grain maize	1000 ha	11.55	11.39	-1.44	11.09	-4.03	10.40	-9.96	10.40	-9.96
Irrigated sunflower	1000 ha	0.19	0.26	38.18	0.23	22.52	0.22	16.70	0.22	16.70
Irrigated alfalfa	1000 ha	0.06	0.06	-3.79	0.05	-15.58	0.06	-7.32	0.06	-7.32
Non-Irrigated temporary grassland	1000 ha	0.91	0.91	0.03	1.01	11.06	1.05	14.90	1.05	14.90
Non-Irrigated permanent grassland	1000 ha	11.16	11.16	0.00	11.16	0.00	11.16	0.00	11.16	0.00
Livestock										
Suckler cows	1000 heads	32.64	32.64	0.00	28.14	-13.80	21.95	-32.77	21.95	-32.77
Dairy sheep	1000 heads	96.90	96.90	0.00	96.90	0.00	96.90	0.00	96.90	0.00
Non dairy sheep	1000 heads	10.83	10.91	0.72	10.96	1.16	10.98	1.36	10.98	1.36
LU	1000 LU	52.72	52.73	0.02	47.69	-9.54	40.76	-22.69	40.76	-22.69
Non utilized area										
Non irrigable non used area	1000 ha	0.00	0.96	Inf	0.04	Inf	0.05	Inf	0.05	Inf
Irrigable non used area	1000 ha	0.00	0.00	0.00	0.29	Inf	0.99	Inf	0.99	Inf
Utilized area (summary)										
Non irrigated other crops area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non irrigated COP crops area	1000 ha	52.70	52.66	-0.08	52.56	-0.27	52.52	-0.35	52.52	-0.35
Non irrig. grassl. and fodder crops area	1000 ha	12.07	11.16	-7.54	12.17	0.83	12.21	1.12	12.21	1.12
Irrigated other crops	1000 ha	0.09	0.08	-16.83	0.08	-13.68	0.08	-13.30	0.08	-13.30
Total irrigated COP crops	1000 ha	12.07	12.09	0.13	11.80	-2.22	11.10	-8.02	11.10	-8.02
Irrigated grassland and fodder crops area	1000 ha	0.06	0.06	-3.79	0.05	-15.58	0.06	-7.32	0.06	-7.32
Dual values of land										
Mean dual value of non irrigated land	€	329.63	266.45	-19.17	223.36	-32.24	198.74	-39.71	198.64	-39.74
Mean dual value of irrigated land	€	478.62	253.43	-47.05	56.66	-88.16	28.88	-93.97	28.88	-93.97
Economic results										
Target function	Mill €	75.16	68.83	-8.43	71.60	-4.74	66.41	-11.64	69.77	-7.18
Coupled aid	Mill €	27.30	27.29	-0.02	11.25	-58.79	0.10	-99.65	0.10	-99.65
Decoupled aid	Mill €	0.00	0.00	0.00	12.21	Inf	16.67	Inf	20.19	Inf
Total aid before modulation	Mill €	27.30	27.29	-0.02	23.46	-14.05	16.76	-38.59	20.29	-25.68
Modulation reduction	Mill €	0.00	0.00	0.00	0.55	Inf	0.32	Inf	0.49	Inf
Total aid after modulation	Mill €	27.30	27.29	-0.02	22.91	-16.07	16.44	-39.77	19.80	-27.47
Gross margin after modulation	Mill €	75.38	68.90	-8.60	70.16	-6.93	63.32	-16.01	66.68	-11.55
Mean % of aid in margin		36.21	39.61		32.66		25.97		29.69	
Average payment entitlement per ha	€	0.00	0.00		145.19		198.16		240.09	

Table A.4.4.13: Aggregated results for Castile-La Mancha

		Base year 2002	Agenda 2000		Partial decoupling		Full decoupling		Regional model	
			Value	Variation (%)	Value	Variation (%)	Value	Variation (%)	Value	Variation (%)
Crops										
Non-Irrigated chickpea	1000 ha	2.80	3.31	17.89	2.34	-16.70	2.65	-5.38	2.65	-5.38
Irrigated sugar beet	1000 ha	0.49	0.36	-27.29	0.42	-14.55	0.42	-14.44	0.42	-14.44
Irrigated melon	1000 ha	1.47	1.48	0.73	1.49	1.09	1.49	1.27	1.48	0.64
Irrigated garlic	1000 ha	10.95	10.97	0.24	10.99	0.37	10.99	0.39	10.97	0.22
Irrigated onion	1000 ha	0.87	0.87	0.36	0.88	0.53	0.88	0.51	0.87	0.34
Non-Irrigated durum wheat	1000 ha	14.78	14.89	0.80	12.12	-18.02	11.00	-25.53	11.00	-25.53
Non-Irrigated soft wheat	1000 ha	98.58	106.21	7.74	105.55	7.07	105.50	7.02	105.50	7.02
Irrigated soft wheat	1000 ha	14.10	15.49	9.87	15.99	13.45	16.14	14.51	16.14	14.51
Non-Irrigated rye	1000 ha	6.25	5.82	-6.93	5.64	-9.77	5.63	-9.99	5.63	-9.99
Irrigated rye	1000 ha	3.13	3.07	-1.87	3.06	-2.18	3.08	-1.44	3.08	-1.44
Non-Irrigated barley	1000 ha	837.14	819.81	-2.07	832.28	-0.58	832.85	-0.51	832.85	-0.51
Irrigated barley	1000 ha	36.98	39.32	6.32	40.58	9.74	40.86	10.49	40.88	10.55
Non-Irrigated oats	1000 ha	56.68	51.34	-9.43	51.94	-8.36	52.25	-7.81	52.25	-7.81
Irrigated grain maize	1000 ha	62.79	54.56	-13.11	55.53	-11.57	55.39	-11.79	55.39	-11.79
Non-Irrigated sunflower	1000 ha	154.19	168.33	9.17	160.89	4.34	160.32	3.97	160.32	3.97
Irrigated sunflower	1000 ha	38.32	43.27	12.92	40.57	5.87	40.07	4.57	40.07	4.57
Non-Irrigated vetch	1000 ha	5.32	6.18	16.17	5.00	-6.08	5.54	4.15	5.54	4.15
Irrigated alfalfa	1000 ha	1.74	1.41	-19.28	1.11	-36.40	1.16	-33.70	1.16	-33.70
Livestock										
Dairy sheep	1000 heads	1828.06	1828.06	0.00	1870.59	2.33	1828.06	0.00	1828.06	0.00
Non dairy sheep	1000 heads	149.26	149.33	0.04	162.11	8.61	149.26	0.00	149.26	0.00
LU	1000 LU	296.60	296.61	0.00	304.90	2.80	296.60	0.00	296.60	0.00
Non utilized area										
Non irrigable non used area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Irrigable non used area	1000 ha	0.00	0.00	0.00	0.23	Inf	0.37	Inf	0.37	Inf
Utilized area (summary)										
Non irrigated other crops area	1000 ha	8.13	9.49	16.76	7.34	-9.74	8.20	0.86	8.20	0.86
Non irrigated COP crops area	1000 ha	1167.63	1166.40	-0.10	1168.42	0.07	1167.56	-0.01	1167.56	-0.01
Non irrig. grassl. and fodder crops area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Irrigated other crops	1000 ha	13.78	13.69	-0.69	13.77	-0.09	13.78	-0.04	13.74	-0.27
Total irrigated COP crops	1000 ha	155.31	155.70	0.25	155.73	0.27	155.54	0.15	155.56	0.16
Irrigated grassland and fodder crops area		1.74	1.41	-19.28	1.11	-36.40	1.16	-33.70	1.16	-33.70
Dual values of land										
Mean dual value of non irrigated land	€	248.87	185.60	-25.42	111.72	-55.11	81.56	-67.23	81.56	-67.23
Mean dual value of irrigated land	€	587.28	449.06	-23.54	276.62	-52.90	213.11	-63.71	212.65	-63.79
Economic results										
Target function	Mill €	1112.68	1077.43	-3.17	1142.22	2.65	1149.64	3.32	1222.52	9.87
Coupled aid	Mill €	279.34	279.21	-0.05	76.09	-72.76	0.44	-99.84	0.44	-99.84
Decoupled aid	Mill €	0.00	0.00	0.00	204.09	Inf	279.18	Inf	355.40	Inf
Total aid before modulation	Mill €	279.34	279.21	-0.05	280.18	0.30	279.62	0.10	355.84	27.38
Modulation reduction	Mill €	0.00	0.00	0.00	5.29	Inf	5.26	Inf	8.60	Inf
Total aid after modulation	Mill €	279.34	279.21	-0.05	274.89	-1.59	274.36	-1.78	347.24	24.30
Gross margin after modulation	Mill €	799.48	758.93	-5.07	829.57	3.76	831.11	3.96	903.91	13.06
Mean % of aid in margin		34.94	36.79		33.14		33.01		38.42	
Average payment entitlement per ha	€	0.00	0.00		137.88		188.61		240.09	

Table A.4.4.14: Aggregated results for Valencia

		Base year 2002	Agenda 2000		Partial decoupling		Full decoupling		Regional model	
			Value	Variation (%)	Value	Variation (%)	Value	Variation (%)	Value	Variation (%)
Crops										
Irrigated rice	1000 ha	8.01	8.04	0.49	8.04	0.46	8.04	0.45	8.04	0.45
Irrigated early potato	1000 ha	0.37	0.33	-10.57	0.33	-9.91	0.34	-9.74	0.34	-9.74
Irrigated artichoke	1000 ha	0.14	0.14	0.00	0.14	0.00	0.14	0.00	0.14	0.00
Non-Irrigated barley	1000 ha	0.33	0.32	-3.74	0.26	-20.87	0.25	-25.58	0.25	-25.58
Non-Irrigated temporary grassland	1000 ha	0.19	0.19	0.00	0.19	0.00	0.19	0.00	0.19	0.00
Livestock										
Non dairy sheep	1000 heads	1.89	1.89	0.00	1.94	2.53	1.89	0.00	1.89	0.00
LU	1000 LU	0.28	0.28	0.00	0.29	2.53	0.28	0.00	0.28	0.00
Non utilized area										
Non irrigable non used area	1000 ha	0.00	0.20	Inf	0.26	Inf	0.27	Inf	0.27	Inf
Irrigable non used area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Utilized area (summary)										
Non irrigated other crops area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non irrigated COP crops area	1000 ha	0.33	0.32	-3.74	0.26	-20.87	0.25	-25.58	0.25	-25.58
Non irrig. grassl. and fodder crops area	1000 ha	0.19	0.00	-100.00	0.00	-100.00	0.00	-100.00	0.00	-100.00
Irrigated other crops	1000 ha	8.52	8.52	0.00	8.52	0.00	8.52	0.00	8.52	0.00
Total irrigated COP crops	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Irrigated grassland and fodder crops area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dual values of land										
Mean dual value of non irrigated land	€	6.89	15.75	128.49	0.00	-100.00	0.00	-100.00	0.00	-100.00
Mean dual value of irrigated land	€	1524.28	771.60	-49.38	949.64	-37.70	949.87	-37.68	949.87	-37.68
Economic results										
Target function	Mill €	23.49	15.68	-33.25	22.38	-4.71	22.40	-4.64	19.56	-16.73
Coupled aid	Mill €	1.90	1.91	0.37	3.66	92.43	3.62	90.53	3.62	90.53
Decoupled aid	Mill €	0.00	0.00	0.00	4.97	Inf	5.00	Inf	2.06	Inf
Total aid before modulation	Mill €	1.90	1.91	0.37	8.62	353.86	8.62	353.93	5.68	198.73
Modulation reduction	Mill €	0.00	0.00	0.00	0.18	Inf	0.18	Inf	0.07	Inf
Total aid after modulation	Mill €	1.90	1.91	0.37	8.44	344.37	8.44	344.45	5.61	195.08
Gross margin after modulation	Mill €	14.89	7.01	-52.97	13.69	-8.06	13.71	-7.98	10.87	-27.04
Mean % of aid in margin		12.76	27.22		61.65		61.61		51.59	
Average payment entitlement per ha	€	0.00	0.00		580.12		584.49		240.09	

Table A.4.4.15: Aggregated results for Murcia

		Base year 2002	Agenda 2000		Partial decoupling		Full decoupling		Regional model	
			Value	Variation (%)	Value	Variation (%)	Value	Variation (%)	Value	Variation (%)
Crops										
Irrigated rice	1000 ha	0.27	0.24	-10.31	0.25	-5.99	0.25	-5.91	0.25	-6.33
Irrigated tomato	1000 ha	0.07	0.07	4.56	0.07	2.64	0.07	2.64	0.07	2.80
Irrigated artichoke	1000 ha	2.72	2.74	0.89	2.73	0.52	2.73	0.51	2.73	0.55
Non-Irrigated barley	1000 ha	0.38	0.38	0.00	0.38	0.00	0.38	0.00	0.38	0.00
Irrigated barley	1000 ha	1.11	1.29	16.00	1.36	22.45	1.31	17.56	1.31	17.56
Non-Irrigated oats	1000 ha	0.38	0.38	0.00	0.38	0.00	0.38	0.00	0.38	0.00
Irrigated oats	1000 ha	0.50	0.50	-1.08	0.52	3.00	0.51	1.03	0.51	1.03
Irrigated forage maize	1000 ha	1.08	0.89	-17.73	0.82	-24.47	0.88	-18.52	0.88	-18.52
Non-Irrigated temporary grassland	1000 ha	1.29	1.29	0.00	1.29	0.00	1.29	0.00	1.29	0.00
Livestock										
Dairy sheep	1000 heads	7.50	7.50	0.00	7.58	1.05	7.50	0.00	7.50	0.00
Non dairy sheep	1000 heads	327.19	327.19	0.00	360.85	10.29	327.19	0.00	327.19	0.00
LU	1000 LU	50.20	50.20	0.00	55.26	10.08	50.20	0.00	50.20	0.00
Non utilized area										
Non irrigable non used area	1000 ha	0.00	1.29	Inf	1.29	Inf	1.29	Inf	1.29	Inf
Irrigable non used area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Utilized area (summary)										
Non irrigated other crops area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non irrigated COP crops area	1000 ha	0.76	0.76	0.00	0.76	0.00	0.76	0.00	0.76	0.00
Non irrig. grassl. and fodder crops area	1000 ha	1.29	0.00	-100.00	0.00	-100.00	0.00	-100.00	0.00	-100.00
Irrigated other crops	1000 ha	3.05	3.05	0.00	3.05	0.00	3.05	0.00	3.05	0.00
Total irrigated COP crops	1000 ha	1.62	1.79	10.70	1.88	16.41	1.82	12.42	1.82	12.42
Irrigated grassland and fodder crops area	1000 ha	1.08	0.89	-17.73	0.82	-24.47	0.88	-18.52	0.88	-18.52
Dual values of land										
Mean dual value of non irrigated land	€	248.77	166.27	-33.16	140.00	-43.72	125.83	-49.42	125.83	-49.42
Mean dual value of irrigated land	€	660.86	311.83	-52.81	237.74	-64.03	206.27	-68.79	208.76	-68.41
Economic results										
Target function	Mill €	164.67	168.53	2.34	177.03	7.51	178.06	8.13	169.21	2.75
Coupled aid	Mill €	10.21	10.25	0.36	5.37	-47.39	0.11	-98.90	0.11	-98.90
Decoupled aid	Mill €	0.00	0.00	0.00	5.54	Inf	10.32	Inf	1.26	Inf
Total aid before modulation	Mill €	10.21	10.25	0.36	10.91	6.88	10.43	2.16	1.38	-86.53
Modulation reduction	Mill €	0.00	0.00	0.00	0.23	Inf	0.20	Inf	0.00	0.00
Total aid after modulation	Mill €	10.21	10.25	0.36	10.68	4.67	10.23	0.18	1.38	-86.53
Gross margin after modulation	Mill €	42.19	46.23	9.58	55.81	32.28	55.68	31.96	46.84	11.01
Mean % of aid in margin		24.20	22.16		19.15		18.37		2.94	
Average payment entitlement per ha	€	0.00	0.00		1052.64		1960.11		240.09	

Table A.4.4.16: Aggregated results for Extremadura

		Base year 2002	Agenda 2000		Partial decoupling		Full decoupling		Regional model	
			Value	Variation (%)	Value	Variation (%)	Value	Variation (%)	Value	Variation (%)
Crops										
Irrigated rice	1000 ha	5.82	3.70	-36.46	5.42	-6.78	5.69	-2.10	5.70	-2.02
Irrigated paprika pepper	1000 ha	2.32	2.34	0.59	2.34	0.58	2.34	0.59	2.34	0.70
Irrigated melon	1000 ha	0.14	0.14	1.27	0.14	0.54	0.14	0.54	0.14	1.36
Irrigated tomato	1000 ha	16.44	16.54	0.62	16.50	0.38	16.50	0.40	16.55	0.70
Non-Irrigated durum wheat	1000 ha	59.50	61.72	3.74	46.32	-22.15	39.90	-32.94	39.86	-33.00
Non-Irrigated soft wheat	1000 ha	84.86	89.95	6.00	90.35	6.48	87.12	2.67	87.11	2.66
Irrigated soft wheat	1000 ha	1.70	2.18	28.30	2.27	33.96	1.92	13.25	1.92	13.25
Non-Irrigated rye	1000 ha	4.71	4.54	-3.57	4.50	-4.35	4.36	-7.31	4.36	-7.31
Non-Irrigated barley	1000 ha	134.31	131.00	-2.46	133.07	-0.92	127.91	-4.77	127.91	-4.77
Irrigated barley	1000 ha	1.21	1.53	26.13	1.66	36.58	1.67	37.83	1.67	37.45
Non-Irrigated oats	1000 ha	42.88	37.35	-12.88	35.21	-17.89	33.98	-20.76	33.98	-20.76
Irrigated grain maize	1000 ha	55.26	53.42	-3.34	53.05	-4.01	52.20	-5.54	52.15	-5.63
Non-Irrigated sunflower	1000 ha	6.15	7.84	27.42	5.40	-12.17	4.57	-25.76	4.57	-25.76
Irrigated sunflower	1000 ha	5.26	8.21	56.22	6.99	33.00	6.66	26.61	6.64	26.27
Irrigated alfalfa	1000 ha	2.79	2.67	-4.17	2.37	-15.14	2.61	-6.31	2.61	-6.57
Non-Irrigated permanent grassland	1000 ha	483.32	483.32	0.00	483.32	0.00	483.32	0.00	483.32	0.00
Irrigated permanent grassland	1000 ha	4.19	4.19	0.02	4.19	0.02	4.19	0.02	4.19	0.02
Livestock										
Suckler cows	1000 heads	293.51	293.26	-0.08	269.85	-8.06	225.59	-23.14	225.59	-23.14
Non dairy sheep	1000 heads	2502.23	2502.32	0.00	2525.81	0.94	2534.78	1.30	2534.78	1.30
LU	1000 LU	704.06	703.80	-0.04	681.10	-3.26	632.88	-10.11	632.88	-10.11
Non utilized area										
Non irrigable non used area	1000 ha	0.00	0.00	0.00	17.54	Inf	57.59	Inf	57.64	Inf
Irrigable non used area	1000 ha	0.00	0.00	0.00	0.20	Inf	1.20	Inf	1.21	Inf
Utilized area (summary)										
Non irrigated other crops area	1000 ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non irrigated COP crops area	1000 ha	332.39	332.40	0.00	314.85	-5.28	297.84	-10.40	297.79	-10.41
Non irrig. grassl. and fodder crops area	1000 ha	483.32	483.32	0.00	483.32	0.00	460.29	-4.76	460.29	-4.76
Irrigated other crops	1000 ha	24.71	22.71	-8.11	24.40	-1.28	24.67	-0.17	24.73	0.07
Total irrigated COP crops	1000 ha	63.43	65.34	3.01	63.97	0.85	62.45	-1.55	62.38	-1.65
Irrigated grassland and fodder crops area	1000 ha	6.98	6.86	-1.66	6.56	-6.04	6.81	-2.51	6.80	-2.61
Dual values of land										
Mean dual value of non irrigated land	€	155.90	98.13	-37.06	40.29	-74.16	18.53	-88.12	18.56	-88.09
Mean dual value of irrigated land	€	448.32	290.61	-35.18	72.19	-83.90	39.11	-91.28	39.60	-91.17
Economic results										
Target function	Mill €	941.24	909.76	-3.34	985.41	4.69	1010.45	7.35	998.59	6.09
Coupled aid	Mill €	234.63	235.42	0.33	110.38	-52.96	4.16	-98.23	4.16	-98.23
Decoupled aid	Mill €	0.00	0.00	0.00	125.61	Inf	237.16	Inf	224.67	Inf
Total aid before modulation	Mill €	234.63	235.42	0.33	235.99	0.58	241.32	2.85	228.83	-2.47
Modulation reduction	Mill €	0.00	0.00	0.00	5.96	Inf	6.20	Inf	5.60	Inf
Total aid after modulation	Mill €	234.63	235.42	0.33	230.03	-1.96	235.12	0.21	223.23	-4.86
Gross margin after modulation	Mill €	580.25	546.45	-5.82	612.81	5.61	627.33	8.11	615.61	6.09
Mean % of aid in margin		40.44	43.08		37.54		37.48		36.26	
Average payment entitlement per ha	€	0.00	0.00		134.22		253.42		240.09	

Table A.4.4.17: Aggregated results for Andalucia

		Base year 2002	Agenda 2000		Partial decoupling		Full decoupling		Regional model	
			Value	Variation (%)	Value	Variation (%)	Value	Variation (%)	Value	Variation (%)
Crops										
Non-Irrigated chickpea	1000 ha	22.56	25.26	11.96	24.25	7.48	26.55	17.67	26.55	17.67
Irrigated rice	1000 ha	13.23	13.23	0.00	13.23	0.00	13.23	0.00	13.23	0.00
Irrigated sugar beet	1000 ha	24.52	19.59	-20.11	24.32	-0.83	24.37	-0.63	24.37	-0.65
Irrigated cotton	1000 ha	89.92	96.57	7.40	80.81	-10.14	81.19	-9.71	81.19	-9.71
Irrigated early potato	1000 ha	7.46	6.29	-15.77	6.59	-11.71	6.60	-11.59	6.60	-11.59
Irrigated onion	1000 ha	1.32	1.32	0.24	1.33	0.65	1.33	0.65	1.33	0.65
Irrigated pea	1000 ha	1.45	1.52	4.83	1.49	2.91	1.49	3.08	1.49	3.08
Non-Irrigated durum wheat	1000 ha	278.10	279.79	0.61	221.43	-20.38	194.74	-29.97	194.74	-29.98
Irrigated durum wheat	1000 ha	40.82	42.26	3.54	40.51	-0.74	39.72	-2.68	39.72	-2.68
Non-Irrigated soft wheat	1000 ha	27.54	28.60	3.83	27.23	-1.16	26.42	-4.09	26.42	-4.09
Irrigated soft wheat	1000 ha	13.75	14.56	5.85	17.77	29.26	18.22	32.54	18.22	32.54
Non-Irrigated rye	1000 ha	3.14	3.05	-2.86	3.04	-3.24	2.86	-8.82	2.86	-8.82
Non-Irrigated barley	1000 ha	31.65	30.76	-2.81	31.68	0.08	31.01	-2.02	31.01	-2.02
Irrigated barley	1000 ha	7.44	7.87	5.77	10.21	37.11	10.13	36.02	10.13	36.02
Non-Irrigated oats	1000 ha	15.06	13.70	-9.00	16.18	7.46	16.33	8.47	16.33	8.47
Irrigated grain maize	1000 ha	44.99	40.00	-11.10	43.17	-4.05	41.46	-7.85	41.46	-7.85
Non-Irrigated sunflower	1000 ha	200.42	197.82	-1.30	171.15	-14.61	159.98	-20.18	159.98	-20.18
Irrigated sunflower	1000 ha	29.97	31.72	5.84	32.61	8.80	32.35	7.92	32.35	7.92
Irrigated alfalfa	1000 ha	0.61	0.65	7.44	0.62	1.52	0.62	1.98	0.62	1.98
Irrigated forage maize	1000 ha	0.29	0.25	-15.51	0.28	-3.17	0.28	-4.13	0.28	-4.13
Non-Irrigated temporary grassland	1000 ha	11.81	11.40	-3.45	13.75	16.40	14.44	22.24	14.44	22.24
Non-Irrigated permanent grassland	1000 ha	404.13	404.13	0.00	404.13	0.00	404.13	0.00	404.13	0.00
Irrigated permanent grassland	1000 ha	0.27	0.27	0.00	0.27	0.00	0.27	0.00	0.27	0.00
Livestock										
Suckler cows	1000 heads	22.14	22.14	0.00	20.93	-5.48	18.46	-16.63	18.46	-16.63
Dairy cows	1000 heads	53.60	44.44	-17.10	49.11	-8.39	48.28	-9.94	48.28	-9.94
Non dairy sheep	1000 heads	1586.05	1586.05	0.00	1645.99	3.78	1600.47	0.91	1600.47	0.91
LU	1000 LU	327.02	316.03	-3.36	329.26	0.68	318.67	-2.55	318.67	-2.55
Non utilized area										
Non irrigable non used area	1000 ha	0.00	3.71	Inf	81.59	Inf	117.95	Inf	117.96	Inf
Irrigable non used area	1000 ha	0.00	0.00	Inf	2.85	Inf	4.80	Inf	4.80	Inf
Utilized area (summary)										
Non irrigated other crops area	1000 ha	22.56	25.26	11.96	24.25	7.48	26.55	17.67	26.55	17.67
Non irrigated COP crops area	1000 ha	555.91	553.72	-0.39	470.69	-15.33	431.34	-22.41	431.34	-22.41
Non irrig. grassl. and fodder crops area	1000 ha	415.94	411.96	-0.96	417.88	0.47	418.57	0.63	418.57	0.63
Irrigated other crops	1000 ha	136.46	137.01	0.40	126.27	-7.46	126.71	-7.14	126.71	-7.14
Total irrigated COP crops	1000 ha	138.42	137.92	-0.36	145.76	5.30	143.37	3.58	143.37	3.58
Irrigated grassland and fodder crops area	1000 ha	1.17	1.16	-0.39	1.17	-0.11	1.17	-0.30	1.17	-0.30
Dual values of land										
Mean dual value of non irrigated land	€	134.83	114.17	-15.33	25.56	-81.04	5.24	-96.12	5.24	-96.12
Mean dual value of irrigated land	€	673.38	490.70	-27.13	134.65	-80.00	101.44	-84.94	101.47	-84.93
Economic results										
Target function	Mill €	952.63	862.22	-9.49	995.40	4.49	1010.30	6.05	905.96	-4.90
Coupled aid	Mill €	476.18	490.31	2.97	184.34	-61.29	112.04	-76.47	112.04	-76.47
Decoupled aid	Mill €	0.00	0.00	0.00	354.52	Inf	431.35	Inf	321.44	Inf
Total aid before modulation	Mill €	476.18	490.31	2.97	538.86	13.16	543.39	14.11	433.48	-8.97
Modulation reduction	Mill €	0.00	0.00	0.00	16.70	Inf	16.91	Inf	11.34	Inf
Total aid after modulation	Mill €	476.18	490.31	2.97	522.16	9.66	526.47	10.56	422.14	-11.35
Gross margin after modulation	Mill €	935.80	831.00	-11.20	924.57	-1.20	926.40	-1.00	822.06	-12.15
Mean % of aid in margin		50.88	59.00		56.48		56.83		51.35	
Average payment entitlement per ha	€	0.00	0.00		264.80		322.18		240.09	

Table A.4.5.1: Change in gross margin and net agricultural support (subsidy minus the tax related to the sugar regime) in the decoupling scenarios when AROPAj is coupled with the PEATSim model

	LX15 - AG15	
	Gross margin Mil. €	Direct payments Mil. €
EU-15	1,663	288
Belgium	14	0
Denmark	25	3
Germany	961	743
Greece	-24	-55
Spain	34	-78
France	148	-243
United Kingdom	212	-2
Ireland	15	-32
Italy	140	-15
Luxembourg	4	0
Netherlands	27	0
Austria	27	-3
Portugal	34	-12
Finland	7	-8
Sweden	40	-9

Table A.4.5.2: Net social benefit (gross margin minus budget) using PEATSim prices

	Reference	Decoupling	
	Ag15 - AG00 €/ha	LX15 - AG15 €/ha	FD15 - AG15 €/ha
EU-15	64	47	69
Belgium	183	5	19
Denmark	93	8	27
Germany	37	7	25
Greece	95	372	440
Spain	52	66	85
France	50	36	61
United Kingdom	51	77	98
Ireland	46	68	76
Italy	192	107	136
Luxembourg	47	6	25
Netherlands	156	-146	-82
Austria	42	22	35
Portugal	37	41	70
Finland	12	0	8
Sweden	26	20	34

Table A.4.5.3: Change in land use between the scenarios AG15 and LX15 using PEATSim prices

	Cereals 1,000 ha	Oilseed & proteins 1,000 ha	Sugarbeet & potatoes 1,000 ha	Fodder crops 1,000 ha	Meadows 1,000 ha	Set-aside 1,000 ha	Fallow 1,000 ha
EU-15	-2,909	-644	192	-1,490	4,154	-169	866
Belgium	-53	-2	21	-32	76	1	-11
Denmark	-67	-5	2	-23	71	2	20
Germany	-722	-136	49	-84	794	-63	163
Greece	-50	1	9	-39	29	0	49
Spain	-153	-105	125	-60	215	-3	-20
France	-670	-329	2	-471	1,301	-4	171
United Kingdom	-261	-23	-6	-284	501	1	72
Ireland	-44	0	-7	-130	215	-1	-31
Italy	-272	-3	0	-306	343	-2	240
Luxembourg	-23	-4	-1	1	28	0	0
Netherlands	-12	0	-3	-44	71	0	-12
Austria	-97	-4	-13	-24	174	-2	-34
Portugal	-167	-4	1	-13	255	-98	25
Finland	-51	0	14	-9	6	0	40
Sweden	-266	-32	0	29	77	0	193

Table A.4.5.4: Change in production between the scenarios AG15 and LX15 using PEATSim prices

	Marketed cereals 1,000 t	On-farm cereals 1,000 t	Cereal production 1,000 t	Concentr. feed 1,000 t	Raw feed 1,000 t	Animal product 1,000 €	Livestock 1,000 LSU	Marketed feed 1,000 €	Milk 1,000 t
EU-15	-4,811	-7,436	-12,247	-2,656	0	577	-245	-578	70
Belgium	-260	-88	-348	-47	-77	21	3	-20	0
Denmark	-85	-182	-267	4	53	0	13	7	0
Germany	-1,658	-1,156	-2,814	-798	166	175	-77	-158	35
Greece	-53	-96	-149	-22	-283	1	-60	-37	-1
Spain	-48	-433	-481	-403	11	25	-140	-80	0
France	-912	-2,350	-3,261	-626	510	128	200	-82	0
United Kingdom	-513	-995	-1,508	-491	-132	64	-218	-117	10
Ireland	-4	-230	-234	-315	179	48	12	-43	1
Italy	-612	-897	-1,509	205	-643	50	12	-35	-11
Luxembourg	-29	-66	-96	-17	0	4	-1	-4	0
Netherlands	-29	-20	-49	12	130	19	-29	17	0
Austria	-55	-266	-321	-69	2	20	12	-15	0
Portugal	-103	-105	-209	37	-107	4	-9	-5	0
Finland	26	-210	-184	-59	-66	17	-11	-20	2
Sweden	-476	-343	-818	-66	257	1	46	15	34