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Assessing impacts of CAP reform in France and Germany

Abschätzung der Auswirkungen der Agrarreform in Frankreich und Deutschland

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Abstract

The 2003 CAP Reform left EU member states much room for national implementation. The farm group model EU-FARMIS is applied to quantify the effects of the reform and the impacts of the options for national implementation. The analysis is done for France and Germany because their implementation schemes adequately reflect the broad range of options. It is found that cereal and fodder maize production is reduced both in France and Germany. In contrast, the acreage of other arable fodder crops, of set-aside and of non-food crops is expanded. While bull fattening is substantially reduced in both countries, suckler cow production is extended in France due to partial decoupling, but reduced in Germany due to full decoupling. Sectoral income effects measured in Farm Net Value Added are similar. The regional implementation of decoupling in Germany induces a significant redistribution of direct payments and therefore causes differences in income effects depending on farm type, location and size.

Key words

CAP Reform; decoupling; farm group model; FADN

Zusammenfassung

Die Reform der GAP im Jahr 2003 eröffnet den EU-Mitgliedsstaaten Spielraum für die nationale Umsetzung. Um die Wirkungen der Reform und unterschiedlicher Umsetzungsoptionen zu quantifizieren, wird das Betriebsgruppenmodell EU-FARMIS eingesetzt. Die Analyse wird für Frankreich und Deutschland durchgeführt, da diese Länder die Breite der Umsetzungsoptionen widerspiegeln. Bezüglich der Landnutzung ist eine Einschränkung der Getreide- und Futtermaisfläche sowohl in Frankreich als auch in Deutschland zu erwarten. Stattdessen wird die Fläche anderer Ackerfutterpflanzen, der Flächenstilllegung und der Energiepflanzen ausgeweitet. Während die Bullenhaltung in beiden Ländern substantiell verringert wird, nimmt die Mutterkuhhaltung in Frankreich aufgrund der Teilentkopplung zu und in Deutschland aufgrund der Vollentkopplung ab. Die sektoralen Einkommenseffekte, gemessen an der Nettowertschöpfung zu Faktorkosten, sind vergleichbar. Die Implementierung der Entkopplung in Deutschland im Rahmen des Regionalmodells führt zu einer erheblichen Umverteilung von Direktzahlungen und daher zu unterschiedlichen Einkommenseffekten je nach Betriebstyp, Standort und Größe.

Schlüsselwörter

GAP Reform; Entkopplung; Betriebsgruppenmodell; FADN

1. Introduction

The 2003 CAP Reform constitutes a rather radical shift in the agricultural policy of the EU. Key elements of the reform are the decoupling of direct payments, the introduction of cross-compliance and the expansion of Pillar II via modulation. However, the reform provides a variety of options for national implementation. This has led to the coexistence of various decoupling schemes throughout the EU which may differ in their impact on the respective countries. Against this background, the aim of this paper is to assess the impact of the CAP reform, and especially, to highlight the influence of its national implementation options. To this end, the CAP reform impacts are analysed and contrasted for the agricultural sectors of France and Germany, as the respective national implementations of the reform represent the variety of implementation options rather well. For the impact assessments EU-FARMIS, a non-linear mathematical programming model based on farm accountancy data, is used. The effects of cross compliance and of potential changes in the second pillar of the CAP due to increased funding through modulation can only partly be reflected in the model.

The paper is structured as follows: first the CAP reform, model, database and scenarios are briefly described. Then, impacts of the reform on land use, allocation of production and income are shown for both countries focussing on differing impacts between national implementations.

2. The reform of the CAP

The 2003 CAP Reform package left the EU member states a number of options for national implementation. Details of the different implementation schemes are given in GAY et al. (2005). The most important options regarding decoupling concerned

a) the determination of entitlement levels: member states could choose to determine entitlement levels on a farm individual historical base, on the basis of regional premium amounts or on a combination of both.
b) the degree of decoupling: member states could opt to either fully decouple or to choose from several options for partial decoupling.
c) the time schedule: member states could implement the reform within the period of 2005 to 2007.

This led to the coexistence of various agricultural policy schemes within the EU. France and Germany took rather divergent paths for the national implementation of the reform.

- The implementation in Germany starts in 2005 and in France in 2006.
- In France, the level of direct payments is based on an individual historical base period, while in Germany, after a transition period where farm individual top-ups are paid, payments are based on a regional base. In the final stage of the German implementation scheme, entitlement levels

are equal for the entire used agricultural area (UAA) [1] of each region.

- France opted for partial and Germany for full decoupling. In France, 100% of suckler cow and calf slaughter premiums, 40% of adult slaughter premiums, 25% of arable crop premiums and 50% of sheep and goat premiums will stay coupled.

The aim of decoupling is to reduce the distorting effect of direct payments on production in order to increase the transfer efficiency of agricultural support. France opted for partial decoupling because it wanted to prevent the abandonment of agricultural areas in mountainous and other disadvantaged regions. As suckler cow production is of special importance in these regions it was decided to leave suckler cow premium fully coupled (LAMBERT, 2005; MEYER, 2004).

A comprehensive descriptive study on decoupling, including the analysis of the 2003 CAP Reform and its implementation options, was done by SWINBANK et al. (2004). In GAY et al. (2004), the 2003 CAP Reform is analysed with a focus on environmental issues. A comparison of the 2003 CAP Reform with the Bond Scheme is given in SWINBANK and TANGERMANN (2004). Quantitative impact assessments of either the Commission's proposals or the final agreement of the 2003 CAP Reform were realised for the EU-15 (EU COMMISSION, 2003; BRITZ and PEREZ, 2004) as well as for France (BARKAOUI and BUTAULT, 2003; BUTAULT et al., 2005; GOHIN, 2002; LHERM et al., 2003; SOURIE et al., 2003; INSTITUTE DE L´ELEVAGE, 2003) and Germany (HENNINGSEN et al., 2005; KLEINHANSS et al., 2004). These studies applied different methodological approaches ranging from general equilibrium models (GOHIN 2002) over partial equilibrium models (EU COMMISSION, 2003) to mathematical programming models based on LP (HENNINGSEN et al., 2005) or PMP (KLEINHANSS et al., 2004; BARKAOUI and BUTAULT, 2003; BUTAULT et al., 2005).

Although model specification and model assumptions deviate partially, these studies arrive at similar results with respect to the direction of the main developments. A moderate reduction of Grande Cultures, the partial substitution of silage maize by other arable fodder crops, and the extension of voluntary set-aside is anticipated with regard to land use. Furthermore, the milk quota is expected to remain binding, and beef production (in the case of full decoupling) is expected to decline. However, the degree of these adjustments differs depending on the type of model applied.

A comparative analysis of the CAP reform in Germany and France was done by MEYER (2004). However, the informational value of findings is limited, as the specification of the models in France and Germany is different.

Our study complements the findings of previous studies in several ways. First, not the standard reform scheme proposed by the European Commission is analysed but the actual implementation schemes applied in France and Germany. Furthermore, the impact assessment is done for both countries using a uniform methodological approach.

Finally, FARMIS as a sector model based on farm groups, provides not only results on an aggregated level but also insights about the impact on various farm types.

[1] Permanent crops are the only exception. They are not eligible for direct payments.

3. Model, data and scenarios

In the following section a short overview on model structure, database, target year projection and scenario assumptions is given.

3.1 Model structure and data

EU-FARMIS is an extension of the farm group model FARMIS, a comparative-static process-analytical programming model based on the German Farm Accountancy Data Network (INLB). Within two EU funded research projects of the 6th Framework Programme[2], the model has been and is still being further developed and extended to include other EU member states.

The model is based on farm groups. A standard optimisation matrix, which contains in the current version 27 crop and 15 livestock activities, forms the core of the model. In the linear part of the objective function, farm income[3] minus (opportunity) costs for land and labour, as well as the interest on borrowed capital is maximised. The matrix restrictions cover the areas of feeding (energy and nutrient requirements, calibrated feed rations), fertiliser use (organic and mineral), labour (seasonally differentiated) and political instruments (e.g. set-aside, quotas). The structure of the model is exhibited in figure 1. Key elements of the model, like the aggregation of farm groups, the generation of input-output coefficients, the model calibration and target year projection are described in the following. More detailed descriptions can be found in JACOBS (1998), OSTERBURG et al. (2001), BERTELSMEIER et al. (2003), BERTELSMEIER (2004) and OFFERMANN et al. (2005).

Selection of farm groups

FARMIS uses farm groups rather than single farms to ensure the confidentiality of individual farm data, but also to increase manageability and robustness of the model system. The groups are based on either national or EU-FADN data. Groups are formed using a stratification tool which allows for a flexible aggregation (GOCHT, 2004). To increase the homogeneity of the farms within each farm group, suitable stratification criteria have to be chosen. Standard stratification criteria are region, farm type (e.g. arable crops, milk or grazing livestock etc.) and farm size (criteria for size depend on the farm type). In general, stratification of farm groups is flexible and can be adjusted depending on the policy scenarios. The analysed current stratification used for policy impact analysis for Germany and France is based on 154 and 188 farm groups, respectively. Farms specialised in horticulture and other permanent crops were excluded from the analysis because those activities cannot yet be adequately represented by the model. This, however, leads to a significant reduction of Farm Net Value Added (FNVA) at the sector level because of the importance of

[2] EDIM (European Dairy Industry Model) and 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).

[3] Here farm income refers to net value added. Costs of fixed factors have to be covered irrespective whether they are owned by the farmer or not.

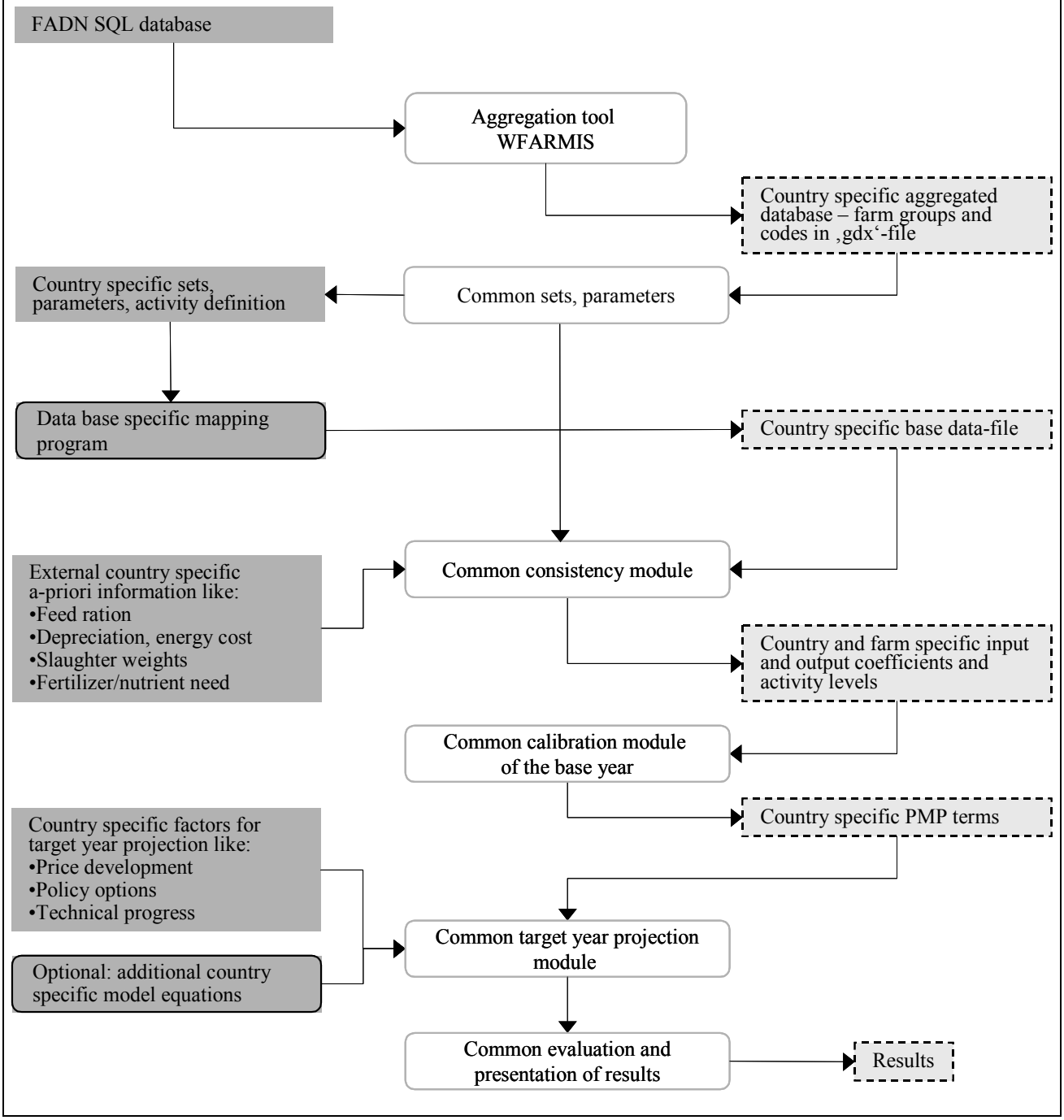
horticulture and permanent crops like vineyards, especially in France.

Usually FADN data for at least two consecutive years is used in order to enhance the stability and significance of the results. For this analysis, only data from 2002 is used, because the statistical base data required for the re-calculation of aggregation factors is not yet available for EU-FADN.

Generation of input-output coefficients

A major part of the FADN variables is available not for specific activities but for the whole farm. Therefore, activity specific input/output coefficients have to be calculated. Examples for these coefficients on the input side are costs for energy, depreciation, interest, seeding, veterinary services and plant protection as well as requirements for different nutrients for crop and livestock activities. On the output side, yields, prices and premium levels have to be determined. Part of the information is available directly from the FADN farm accounts, e.g. production levels, yields and corresponding output prices. Activity-specific input coefficients, however, generally need to be generated as the respective information in the farm accounts is aggregated. The calculation proceeds as follows: in a first step,

Figure 1. Structure of the model FARMIS



Source: own illustration

input coefficients such as fertiliser and fodder are set based on a normative approach. Based on information from farm management handbooks, the use of input factors of each process is determined in relation to yields or structural characteristics (e.g. use of machinery). In a second step, these normative input coefficients are adjusted according to corresponding information from the farm accounts of the respective farm group. This is trivial in cases of single inputs and corresponding farm accounting data, resulting in a simple correction factor. The consistency problem gets more complex when more coefficients have to be matched with a single account. It is especially complex if coefficients are in physical units, like fodder or fertiliser, and data provided in the farm account is of monetary nature. Cross-Entropy estimators (GOLAN et al., 1996) are used in these cases, which allow the inclusion of prior information about the unknown parameters (a detailed description can be found in OFFERMANN et al., 2005).

Model calibration

A positive mathematical programming procedure (see e.g. HOWITT, 1995; HECKELEI, 2002) is used to calibrate the model to the observed base year. It is assumed that the observed land allocation and livestock size in the base year represent the optimal solution which cannot be reproduced by the linear programming model because of data limitations e.g. unobservable costs or profits. Following this idea the primal linear programming model is extended with additional constraints covering the observed activity levels in the base year. The dual values of the these constraints are interpreted as unobservable costs or profits. FARMIS uses these values in combination with external elasticities to calculate non linear cost terms. Details of the approach are described in BERTELSMEIER (2004).

Extrapolation of model parameters

The ex ante analysis of policy scenarios proceeds in two steps. In the first step, a reference scenario is established for a target year in the future, usually assuming that the present agricultural policy will continue. In the second step, alternative scenarios are specified that differ in terms of alternative policy measures. Exogenous variables not defined in the policy scenario are projected for the target year. Two types of exogenous variables can be distinguished:

- Variables which are assumed to develop independently of the policy scenario, e.g., most input prices and currently also changes in general farm structure, and which are usually projected to the future based on observed trends in the past.
- Variables whose development may depend on the policy scenario, e.g. product prices. These are forecasted by the use of other models available at the FAL (BERTELSMEIER et al., 2003). For this study, the development of the product prices in the different policy scenarios was estimated using GAPsi, a partial equilibrium model developed and maintained by the Institute of Market Analysis and Agricultural Trade Policy of the FAL (LEDEBUR and MANEGOLD, 2004). GAPsi is a non-linear and synthetic, recursive-dynamic, multi-product partial equilibrium model covering the agricultural sector. The model includes 13 agricultural products and differentiates 13 regions which together represent the whole world. The producer price changes determined by GAPsi for the EU are then used to adjust the farm gate prices in FARMIS accordingly.

The outcome of the optimisation can be compared to the result of the reference scenario and allows statements on the impacts of different policy options.

Implementation of decoupling

Decoupling is implemented in the model by the extension of the objective function and by the introduction of constraints limiting the number of entitlements for each farm group. In the case of the historical scheme, the number of entitlements is determined based on historical acreage not including sugar beets and permanent crops. However, entitlements can be activated on sugar beet acreage. In this framework the level of entitlements is calculated by dividing the sum of direct payments in the baseline plus the sum of the expected milk premiums of each farm group by the amount of eligible area of the farm. In the case of the regionally based decoupling scheme, the number of entitlements is equal to the total UAA except permanent crops. The level of entitlements in Germany is determined externally based on projections from the Federal Ministry of Consumer Protection, Food and Agriculture (BMVEL, 2005). For partial decoupling, a part of the activity-based direct payments in the base year are retained and the sum of decoupled area based payments is reduced accordingly.

While Modulation is not taken into account for Agenda 2000, it is included in the scenarios based on the 2003 CAP reform. However, the use of these additional funds is not modelled. Cross compliance is not considered in the model except that entitlements can only be activated on land which fulfils minimal requirements regarding land management[1].

Price adjustment for young animals

The farm group models do not restrict the use of intermediate products, such as heifers and calves, to the respective amount produced within the farm group because such a restriction would suggest that young animals cannot be traded between individual farms. In previous assessments no restriction on total national net trade of the respective products was implemented, implicitly assuming that young animals can be internationally traded at fixed prices and trade flows would adjust to the changes in the modelled national demand and supply. However, this in some cases led to implausible results because it could happen that the use of dairy calves increased on national level although a general reduction of the number of dairy cows takes place across all EU member states[2]. To solve the problem, an iterative algorithm was developed that adjusts the prices of young animals in order to meet the national trade balances of young animals in the base year, generating a new 'national equilibrium' price. The technical procedure is described in the following: in a first step, the national trade

[1] Land has either to be agriculturally used or managed according to minimal requirements, e.g. mulched.

[2] The number of dairy cows, and consequently the number of dairy calves, declines because the milk yield of dairy cows gradually increases, and total milk production is constrained by the milk quota regulation.

balances of each young animal used as an intermediate product are calculated for the base year and the scenario. The difference of the balances in the base year and the scenario forms the vector dq_i. Thereafter, the partial effects of the price changes of each intermediate product on the national trade balance of all intermediate products are calculated. In doing so, the matrix $M_{j,i}$ of price changes and corresponding young animal balance changes is generated. A price adjustment vector dp_j is calculated by multiplying the inverse of the matrix $M_{j,i}$ by the vector dq_i as shown in Equation 1.

$$(1) \quad M_{j,i}^{-1} \cdot dq_i = dp_j$$

where j and i represent the young animals used as intermediate products in FARMIS.

Using dp_j, the prices for young animals are adjusted and the model is solved again. Due to the complex interaction of the model restrictions the necessary price adjustments cannot be estimated exactly. Therefore, the whole procedure has to be repeated until the targeted animal balances are met. Usually two to three iterations are sufficient to meet the base year's balances with satisfying accuracy.

By fixing the national balances of young animals to observed base year values, it is now implicitly assumed that no changes of international trade flows take place. This assumption still does not perfectly reflect reality as the respective trade balances between EU member states may adjust in the future especially with the different degrees of decoupling in the national beef sectors, but it avoids the most glaring inconsistencies observed previously. Future model developments will aim at balancing young animals at the EU level or at least across several (neighbouring) countries.

Table 1. CAP Reform scenarios: adjustments in comparison to reference

	2003 CAP Reform	
	Germany	**France**
Price changes (rel values)		
Milk[1]	-3.8 %	-3.8 %
Beef/Veal	7.5 %	7.5 %
Cereals (exept rye)	4 %	4 %
Rye	-13 %	-13 %
Grain maize	1.6 %	1.6 %
Oilseeds	3.2 %	3.2 %
Pulses	1.4 %	1.4 %
Degree of decoupling		
Arable crop premiums	100 %	75 %
Suckler cow premium	100 %	0 %
Special premium for male bovines	100 %	100 %
Calf slaughter premium	100 %	0 %
Adult slaughter premium	100 %	60 %
Sheep and goat premiums	100 %	50 %
Extensification premium	100 %	100 %
Milk premium	100 %	100 %
New measures (abs values)		
Supplement for energy crops	45 Euro/ha	45 Euro/ha
Supplement for protein crops	55 Euro/ha	55 Euro/ha
Modulation rate	5 %	5 %

1) Larger reduction of base year prices (-17% instead of -12.75%)

Source: GAY et al. (2005) and GAPsi calculations

3.2 Scenario specification

For France as well as for Germany, a scenario based on the national implementation of the 2003 CAP reform in each country is compared to the continuation of Agenda 2000, taken as reference. Further specifications and assumptions of the scenarios are given in the following and summarised in table 1:

Reference: Agenda 2000

The reference scenario represents the situation in the year 2013 that would have been realised if no changes had been made to the Agenda 2000 package. Compared to the base year 2002, this implies constant agricultural policies, with the exception of the milk market reform, which is projected to lead to a decrease in the farm gate price of milk by 12.75%, implying an only partial transmission of the intervention price decrease for butter and skimmed milk powder. Direct payments continue to stay coupled to production. The projected land use and production at sector level for the reference scenario is given in table 2.

Scenario: National implementation of the reform of the CAP

The stronger reduction of intervention prices in the milk market regime leads to a further decrease of the farm gate price for milk, which is projected to decline by 17% compared to the base year. Following the EU-wide reduction of beef production due to the (partial) decoupling of direct payments, the price for beef is forecasted to increase by 7.5% compared to the reference. As rye is not explicitly distinguished in the market model GAPsi, the development of the rye price following the abolishment of rye intervention was taken from UHLMANN and KLEINHANSS (2002), who project a price decrease of 13% compared to the base year.

- **Partial decoupling in France**: Suckler cow premiums and calf slaughter premiums stay coupled. The slaughter premium for adult cattle (40%), arable crop premiums (25%) and sheep and goat premiums (50%) are partially decoupled. The remaining direct payments are fully decoupled. The level of entitlements is based on individual historical references.
- **Full decoupling in Germany**: As the target year is 2013, the transitional stages of the combi-model are not considered in the analysis. Therefore, all premiums, except the newly introduced premium for energy crops and the supplement for protein crops, are treated as fully decoupled. The level of entitlements is based on regional references.

4. Results

Price policy measures, decoupling and its implementation induce manifold effects on land use, production and income. Aggregated results are described in the following section.

4.1 Impacts on land use and production

The analysis revealed that both the implementation schemes in France and Germany have significant impacts on land use and production. In table 2, model results regarding land use and production are given at sectoral level for both countries. Changes at regional level are shown in table 3.

Concerning **land use** in France, as well as in Germany, the acreage of major crops like cereals, oilseeds, protein crops and fodder maize is reduced. The reduction is generally caused by decoupling, i.e. the loss of relative economic attractiveness compared to crops that formerly did not receive direct payments.

The most significant findings for **Germany** are the following:

Table 2. Impacts on land use and production at the sector level in Germany and France (CAP 2003 compared to Agenda 2000)

		Germany		France	
		Reference	CAP 2003	Reference	CAP 2003
		abs	Change % of reference	abs	Change % of reference
Farm groups	Number	154		188	
Farms represented	Number	203,415		311,011	
Land use					
Cereals	1000 ha	6,500	*-5.0*	9,208	*-9.1*
Rye	1000 ha	675	*-15.0*	23	*-33.5*
Grain maize	1000 ha	262	*-0.3*	1,852	*-4.5*
Food oilseeds	1000 ha	725	*-0.6*	1,397	*-6.6*
Protein crops	1000 ha	235	*-6.0*	504	*-7.1*
Potatoes	1000 ha	231	*4.5*	171	*3.0*
Sugarbeet	1000 ha	387	*0.0*	346	*0.0*
Arable fodder crops	1000 ha	1,606	*3.8*	5,299	*7.4*
Silage maize	1000 ha	1,068	*-4.2*	1,357	*-7.1*
Other fodder crops	1000 ha	537	*19.7*	3,942	*12.4*
Set-aside	1000 ha	1,142	*0.1*	1,497	*1.0*
Without non-food	1000 ha	830	*25.1*	1,119	*31.6*
Non-food oilseeds	1000 ha	312	*20.5*	378	*16.3*
On set-aside	1000 ha	312	*-66.4*	378	*-89.7*
On other arable land (abs value)	1000 ha	(0)	*(270.9)*	(0)	*(401)*
Arable land	1000 ha	10,993	*0.0*	18,991	*-0.8*
Grassland	1000 ha	4,044	*0.1*	6,467	*-0.1*
Fallow land (abs value)	1000 ha	(23.1)	*(20.0)*	(28.9)	*(184.3)*
Livestock production					
Dairy cows	1000 head	3,656	*0.0*	3,428	*0.0*
Suckler cows	1000 head	424	*-4.1*	4,093	*3.0*
Fattening bulls [1)]	1000 head	1,297	*-8.6*	1,095	*-13.6*
Fattening pigs [1)]	1000 head	52,488	*0.0*	28,421	*0.0*
Sheep	1000 head	1,209	*0.8*	10,319	*-2.5*
Production					
Cereals	1000 tons	44,458	*-4.4*	80,480	*-8.0*
Food oilseeds	1000 tons	2,550	*-0.4*	3,013	*-7.3*
Non-food oilseeds	1000 tons	1,119	*19.8*	1,546	*15.9*
Milk	1000 tons	30,053	*0.0*	26,418	*0.0*
Beef meat	1000 tons	1,095	*-3.7*	1,483	*-1.0*
Pork meat	1000 tons	5,229	*0.0*	6,675	*0.1*

1) Annual production.

Source: FARMIS-EU, 2005, INLB-EU-DG-AGRI/G.3.

Table 3. Impacts on land use and livestock production

	Germany					France				
	North	South	Centre	East	Total	North	South	Centre	West	Total
	change % of reference					change % of reference				
Land use										
Cereals	-1.1	-3.5	-3.7	-9.2	-5.0	-6.1	-12.1	-12.4	-8.5	-9.1
Wheat	-0.2	-2.8	-2.7	-7.0	-3.7	-5.8	-9.4	-11.2	-9.8	-8.3
Barley	-0.1	-3.6	-3.1	-9.1	-4.2	-7.6	-19.2	-13.4	-11.3	-10.9
Rye	-11.5	-12.9	-15.3	-16.6	-15.0	-18.0	-38.1	-35.6	-23.6	-33.5
Grain maize	2.0	-0.4	-0.1	-4.0	-0.3	-2.9	-2.9	-7.2	-4.8	-4.5
Oats	-1.0	-5.0	-5.3	-9.2	-5.1	-9.6	-19.8	-20.3	-12.9	-15.8
Food oilseeds	3.5	1.9	2.0	-3.3	-0.6	-5.6	-0.3	-10.9	-6.3	-6.6
Protein crops	1.5	-1.7	-2.4	-7.9	-6.0	-6.3	-2.9	-10.1	-10.1	-7.1
Potatoes	4.5	4.4	3.4	5.2	4.5	3.1	4.6	3.8	1.8	3.0
Fodder crops	1.4	2.5	8.9	7.1	3.8	4.4	8.9	10.0	6.4	7.4
Forage maize	-2.7	-7.9	-4.4	-3.3	-4.2	-5.1	-8.5	-7.4	-8.3	-7.1
Other arable fodder	15.4	19.1	23.0	22.8	19.7	20.2	10.8	12.2	12.0	12.4
Non-food	5.8	17.7	12.8	26.7	20.5	15.2	15.0	19.2	14.1	16.3
Set-aside	-0.6	0.1	0.2	0.6	0.1	-0.2	2.2	1.5	1.4	1.0
Grassland	0.1	0.1	0.0	0.0	0.1	-0.3	0.0	0.0	0.0	-0.1
Livestock production										
Suckler cows	1.2	1.8	-3.1	-9.3	-4.1	5.0	3.1	-0.4	7.1	3.0
Bulls	-9.5	-4.4	-13.5	-11.8	-8.6	-14.4	-10.8	-13.7	-13.2	-13.7
Sheep	-0.6	1.6	-4.5	1.5	0.8	-7.2	-2.8	-4.5	0.1	-2.5
Beef meat	-5.2	-0.6	-4.1	-5.9	-3.7	-5.5	2.2	-1.7	1.4	-1.0

Source: FARMIS-EU, 2005, INLB-EU-DG-AGRI/G.3.

- The cereal area will be reduced by 5% on average. With 15%, the reduction of rye acreage is more pronounced than the reduction of other cereals. This effect is caused by the abolishment of rye intervention which induces significant price reductions. Adjustment in the east is more pronounced than in western regions. In the north only minor area reductions will occur for wheat and barley, while grain maize area will slightly increase.
- Food oilseed acreage is predicted to decrease only slightly on the sectoral level. However, the impact differs between regions: while there will be a small increase in the west, area will be reduced in the east.
- Protein crops, which are of minor importance in Germany, will be reduced by 6% on average. The impact varies between +1.5% in the north and –7.9% in the east. Without the coupled protein crop premium (56 Euro/ha) the cropping area would be further reduced.
- Part of the fodder maize acreage is substituted by other arable fodder crops, which is a consequence of decoupling. In the Agenda 2000 scenario, silage maize was the only fodder crop to benefit from direct payments, while in the future all land with fodder crops is eligible to receive the regional premium. This effect is more pronounced in Bavaria and Baden-Wuerttemberg because in both regions fodder maize premiums used to be higher. It is noticeable that the absolute increase of the area used for other fodder crops like grass on arable land is larger than the reduction of the area cropped with fodder maize even though the total number of livestock is reduced, which is to be explained by the fact that dry matter yields of fodder maize are significantly higher than the respective grass yields.
- Total set-aside is slightly expanded, however, it is important to distinguish between set-aside with and set-aside without non-food production. The coupled premium for energy crops (45 Euro/ha) introduced in the 2003 CAP Reform is not paid for non-food on obligatory set-aside land. This causes non-food production to shift from set-aside to other arable land. While total non-food production will increase by 20.5%, it will be reduced by two thirds on set-aside. 'Pure' set-aside (i.e. not covered by crops) will increase by 25.1%. Prices in non-food production where assumed to be unaffected because the level of non-food production still is comparatively low and the processing industry needs to use is plants to capacity.
- As grassland is eligible for regional entitlements, some formerly idle grassland will re-enter production. The amount of fallow land is reduced accordingly. However, the size of these adjustments is limited.

In the following, the corresponding impacts for **France** are summarised. Concerning land use, the same tendencies are predicted as for Germany.

- Cereal production is reduced by 9.1% on average. Oilseeds and protein crops will decrease by 6.6 and 7.1%, respectively. It is striking that these changes are more pronounced than in Germany. Instead the area is either

used to produce other fodder crops and non-food crops, or it falls idle.

- Part of the silage maize acreage is substituted for other fodder crops. The relative increase of other fodder crops is smaller than in Germany. In absolute terms, however, adjustments of both fodder maize and other arable fodder are more pronounced. This can be explained by the developments in the livestock sector. In contrast to Germany, the number of suckler cows in France increases. Additionally, the number of bulls is further reduced. Therefore, the demand for hay and grass silage rises, the demand for silage maize is reduced and adjustments of the areas of the corresponding fodder crops are more pronounced.
- The total amount of set-aside will slightly increase. Non-food production on set-aside land is sharply reduced (90%) and set-aside without non-food production increases (32%). Total non-food area increases by 16%. The results are in line with the results in Germany.
- The impacts on grassland use and fallow land deviate from Germany as the amount of total agricultural area is larger than the number of entitlements. Thus the chances of land falling idle are higher.

At first glance, it may be somewhat surprising that the reductions of cereals, oilseeds and protein crops are more pronounced in France than in Germany, even though the respective direct payments are only partially decoupled in France. The factors which collectively can explain these findings have already been mentioned: first of all, the implementation of the Single Farm Payment leads to a higher share of fallow land compared to the regional model. And secondly, the partial decoupling of premiums in the livestock sector leads to a greater expansion of other arable fodder area.

The livestock sector, especially the cattle sector, is affected by the 2003 CAP Reform as well. In **Germany,** the number of bulls and suckler cows is reduced by 8.6% and 4.1%, respectively. Milk and pork production do not change. Regions are heterogeneously affected. Reductions of bull fattening are below average in the south but significantly above in the east and centre. Suckler cow production is mainly reduced in the east, while it remains almost unaffected in the north and south. The impact on bulls, suckler cows and sheep is caused by full decoupling of former headage premiums. The activities lose economic attractiveness and are therefore reduced. However, the total number of calves born is only slightly reduced compared to the Agenda 2000, as the number of suckler cows decreases while the number of dairy cows remains stable. Hence, the reduction of bull fattening implies that young male animals are slaughtered at a younger age. As the milk premium is converted into area-based payments as well, and the price for milk is assumed to decline, milk production is affected by decoupling, too. However, milk quota is still fulfilled. Pork production does not change because it is not directly affected by the reform.

The impact in **France** deviates from Germany. While the number of bulls and sheep is reduced by 13.6% and 2,5% respectively, the number of suckler cows is increased by 3%. Regional variation is lower than in Germany. Reductions of beef fattening range from 10.8 to 14.4% while suckler cow increases range from -0.4 to 7.1%. The number of bulls decreases in France as well as in Germany because the special premium for adult male cattle is fully decoupled in both countries. In France, the reduction is more pronounced because other animal premiums are partially decoupled or not decoupled at all. Therefore, the relative economic attractiveness of bull fattening is reduced to a larger extent than in Germany. In contrast, the premium for suckler cows remains coupled and the number of suckler cows increases accordingly.

4.2 Income effects

In table 4, several key indicators for income calculation are given and table 5 shows the income effects of the CAP Reform measured in Farm Net Value Added at the sector level and for chosen farm types and size classes. Looking at the sectoral values it is striking that income in both France and Germany is decreasing. However, the decrease is more pronounced in Germany. The general reduction is partly

Table 4. Income indicators

		Germany		France	
		Reference	CAP 2003	Reference	CAP 2003
		abs	Change % of reference	abs	Change % of reference
Production value	Mill. Euro	26,427	*-1.7*	40,183	*-1.2*
Variable input	Mill. Euro	-16,464	*-1.1*	-18,929	*-0.7*
Other costs	Mill. Euro	-3,446		-5,355	*0.0*
Depreciation	Mill. Euro	-4,947	*-1.0*	-6,905	*-1.7*
Subsidies total	Mill. Euro	6,447	*0.2*	9,540	*-0.2*
Direct payments	Mill. Euro	4,728	*0.4*	7,897	*-0.3*
FNVA	Mill. Euro	10,915	*-2.0*	19,820	*-1.3*
FNVA / Working unit	Euro	36,380	*-1.0*	46,520	*-0.2*
Labor input	1000 AWU	300	*-1.0*	426	*-1.1*

Source: FARMIS-EU, 2005, INLB-EU-DG-AGRI/G.3

Table 5. Income effects by farm type and size

	Germany change %	France change %
Total	-2.0	-1.3
Farm types		
Beef & dairy	-4.1	-1.3
Arable crops	0.7	-1.9
Mixed	-5.3	-1.1
Pig & poultry	0.2	-0.1
Size class		
No. of cows 0	14.1	-0.5
0-25	1.6	-0.2
25-50	-4.1	-2.3
50-100	-8.0	-2.0
> 100	-9.8	-1.8

Source: FARMIS-EU, 2005, INLB-EU-DG-AGRI/G.3

due to the milk market reform and the abolition of the rye intervention, and partly due to the modulation of direct payments. However, it needs to be taken into account that the potential use of modulation funds is not modelled. The more pronounced income reductions in Germany partly have a technical explanation: in contrast to the entitlement levels in France the entitlement levels in Germany were externally calculated by the Federal Ministry of Consumer Protection, Food and Agriculture. The use of these values in combination with EU-FADN data leads to a slight decrease of the premium sum in comparison with the historical base. Total sectoral income in Germany is therefore slightly underestimated for the CAP reform scenario, as 'sector' here refers only to that part of agriculture represented by the FADN farms, which account for a higher share of total direct payments than of total agricultural land in the base year. On the other hand, this income effect is also a consequence of the implementation of decoupled payments via the regional model, as it requires all land to be kept in good agricultural condition to be eligible for payments, which can reduce transfer efficiency.

Differences in the impact on income between France and Germany become visible by a differentiation between farm types. While in Germany grazing livestock farms and mixed farms are negatively, and crop, and pig and poultry farms are positively, affected, in France the impact differs much less between farm types.

The income reductions of grazing livestock and mixed farms in Germany can be explained by looking at the redistribution effects of the German implementation scheme. As in Germany all direct payments will be transformed into regionally unified entitlements, redistribution of direct payments takes place. Farms will benefit or suffer depending on the amount of headage and milk premium they lose and the amount of additional area-based payments they gain (e.g. for grassland, sugar beets and feed potatoes). However, in the case of intensive dairy and bull fattening farms the increase of direct payments for grassland cannot compensate the losses of milk and headage premiums. Pig and poultry and arable crop farms will benefit from the regional implementation. Looking at different dairy cow size classes[1], it becomes apparent that income losses tend to be higher the larger the number of dairy cows per farm is. Therefore, farms which often are thought to be the most competitive suffer the most severe income reductions. The income increase of farms without dairy cows can be explained by their comparatively high share of grassland and the increase of beef prices. In France, such a redistribution is absent.

5. Summary and conclusions

In this paper, the impact of the 2003 CAP Reform on the French and German agricultural sector is analysed. The analysis is done using EU-FARMIS, a comparative static process analytical programming model based on EU-FADN data. For both countries the respective national implementation of the 2003 CAP Reform is compared to the continuation of Agenda 2000. The analysis provides insights on the differing impacts of partial- and full decoupling and the effect of historical and regionally-based entitlements.

Cereal and fodder maize acreages both in France and Germany are reduced and partially replaced by other fodder plants, set-aside and non-food crops. The results show that both implementation schemes cause the same trends concerning land use but that these trends are more pronounced in France. In contrast to Germany, only a small part of the agricultural area in France falls idle. Impact differences were also found in the livestock sector. The number of bulls is reduced in both countries, but the decrease is larger in France. While the number of suckler cows increases in France, their number is reduced in Germany. These divergences are caused by partial decoupling in France and full decoupling in Germany. The increase of suckler cows in France indicates that the abandonment of agricultural production in disadvantaged regions will be prevented due to partial decoupling.

The two implementation schemes have different impacts on income measured as Farm Net Value Added. While farm types in France are similarly affected, in Germany intensive dairy and bull fattening farms are negatively affected, whereas extensive dairy farms and farms with sugar beets benefit. Differing income effects between farm types and locations in Germany are largely induced by redistribution of direct payments due to the regional implementation of decoupling.

A comparison to previous results for Germany based on the German version of FARMIS (KLEINHANSS et al., 2004) reveals some differences in the level (but not in the direction) of impacts on production, which is due to a smaller database (the EU-FADN includes fewer farm accounts, farm groups are aggregated at a higher level, and model coefficients are based on one accounting year only) and differences in the model detail (in the EU-FARMIS, extensive activities have not yet been specified), but also the endogenous adjustment of prices for young animals. Despite being somewhat less detailed, the great advantage of the EU-model is the opportunity of comparing farm level impacts for different countries using a single methodological approach.

[1] Only mixed and grazing livestock farms were included in this aggregation.

The analysis and results also provide an indication of areas for further model development. The results show that differences in the national implementation of the 2003 CAP Reform scheme lead to diverging trends for some livestock activities which could affect the trade of young animals. Therefore, future model developments should aim at balancing young animals at EU level or at least across several (neighbouring) countries. With these extensions, the impacts on trade flows of young animals could be measured. Additionally, results indicate that extensive activities need to be formulated in the model as the reduced number of cattle in combination with the requirement to keep the land in good agricultural condition may lead to very extensive uses of land. These extensions would contribute to improve model results on the extent of fallow land, even though it has to be acknowledged that in marginal areas the development of the share of part-time farmers and their behaviour will possibly play a crucial role and make the analysis of this question a challenge for optimisation models.

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