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IDEMA
**The Impact of Decoupling and Modulation in the European Union: a
sectoral and farm level assessment**

Final Report

Editors: Sone Ekman and Ewa Rabinowicz
Swedish Institute for Food and Agricultural Economics (SLI)
Lund, Sweden

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Project coordinator: Ewa Rabinowicz, Swedish Institute for Food and Agricultural Economics (e-mail: Ewa.Rabinowicz@sli.lu.se, phone +46 46 2220783).
Project website: <http://www.sli.lu.se/IDEMA>

Project partners

1.	Swedish Institute for Food and Agricultural Economics (SLI)	Sweden
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Introduction

This report summarises the main results of the IDEMA project. The IDEMA project developed methods and tools to provide a socio-economic assessment of the impacts of decoupling EU agricultural support from production. Using these methods and tools, the project has analysed impacts of decoupling on the EU farm sector, markets for agricultural products and the environment.

Background

Price-related measures dominated agricultural policies in OECD countries in the 70s and 80s. In the 90s, EU gradually replaced these measures by direct payments. The reform of the Common Agricultural Policy (CAP) in June 2003 constitutes a further radical change of policies for farm subsidies in the European Union (EU). It implemented decoupling of direct payments via a Single Farm Payment (SFP) per hectare of land, which is independent of the individual farmer's production decisions. The reform intended to make European agriculture more competitive and market-oriented and at the same time provide support to farmers with less distortion on production and trade.

In the public debate preceding the 2003 CAP reform it was argued that a decoupled Single Farm Payment would lead to substantial abandonment of production in several regions and sectors and an exodus from the most disadvantaged rural areas. Some farmers' organisations argued that production would shrink and considerable job losses would ensue. It was also claimed that farmers in less favoured regions may risk to be squeezed out as land rents are often below the arable land payment. Landlords may reclaim the land from leaseholders and cash the decoupled payment themselves. Another concern, which has been voiced, is that decoupling will distort the market for previously unsupported products, such as fruits and vegetables.

Project approach and objectives

Uncertainty regarding the impacts of the reform, due its radical nature, as well as the concerns voiced in the public debate highlighted the need to provide comprehensive assessment of the impacts of decoupling on the EU farm sector. Accordingly, the European Community's Sixth Framework Programme included, under the heading of CAP reform, a call entitled: 'Decoupling – Development of various tools and methods for the impact assessment of decoupling'. The assignment was to assess the impact of integrating existing direct payments into a decoupled income support and in particular quantify impact on:

- supply, demand, stocks, trade and prices for the main commodities;
- localisation of production;
- land use, land market and prices;
- farm income, structural adjustment of holdings;
- entries and exits from the agricultural sector.

The IDEMA project has been organised to respond to the above objectives. The choice of approach for the IDEMA project was influenced by two main factors: the radical nature of the reform and the complexity and immensity of the issues to be addressed. The radical nature of the reform implies limited possibilities to generalize from past experiences. Because the reform was implemented after the project started, there were no data available to assess its impacts. Econometric analyses based on historical data therefore had only limited possibilities to contribute to answering the questions posed to the project. The project had to rely either on models or surveys of intentions, or both. As the implications of decoupling are multifaceted, no single methodological approach was considered to be able to address all aspects of the issue and a multiplicity of complementary approaches needed to be applied. Accordingly, the project was organised around three approaches. These approaches are:

- a) survey-based analysis of farmers' strategic decisions,
- b) dynamic agent-based regional modelling and
- c) sector level and general equilibrium modelling.

The different approaches complement each other as they can answer different questions on the possible impacts of decoupling agricultural support. The need to analyse the expected reaction of agriculture at the different level of aggregation (EU-wide, national and regional) made the use of different models necessary. Agent-based regional modelling is appropriate to analyse impacts on for example structural change, while sector level modelling is suited for analysing impacts on e.g. product markets. These modelling approaches can be contrasted with results using survey methodology, investigating how farmers actually intend to react to decoupling. The methodological approaches are also complements with respects to their weaknesses. Surveys of farmers' intentions are biased by farmers' expectations about policy evolution. Models are, on the other hand, limited by the behavioural assumptions they are based on. By combining and extending the three main approaches and applying them to various EU member states, the project intended to be able to synthesise policy implications relevant for the diversity of challenges facing European agriculture.

The overall topic of the project is policy related and, therefore, the main purpose has been to aid the policy-making process in the agri-food sector. The project aimed at the following specific objectives:

- Review of literature on fundamental concepts of decoupling and previous experiences with decoupled policies.
- An econometric study of the impact of a previous system with decoupled support, applied in Sweden before joining the EU.
- A survey of the functioning of land markets in participating countries in order to support the modelling of land markets in the models used.
- Development of a survey instrument using FADN to study whether the decoupled payment will affect farmers' investment behaviour and the likelihood of staying in or exiting from agriculture.
- Further development and adaptation of the agent-based, dynamic model AgriPoliS, to take into account the behaviour of different farm types as well as the spectrum of agriculture in the enlarged EU (location, production systems, semi-subsistence and/or large commercial farms, natural conditions, marginal areas).

- Development of an environmental impact module in AgriPolis, in order to analyse the environmental implications of decoupling in selected regions.
- An adjustment of AgriPoliS to the Mediterranean farming system and Mediterranean agriculture.
- Further development of the partial equilibrium model (ESIM) and country specific general equilibrium models to analyse implication of decoupled payments on production, consumption, commodity prices and trade, in the EU25.
- Analysis of problems in the new member states related to the specificity of their farm structures (individually owned, tenanted and corporate farms) and labour, land and capital markets.

The concept of decoupling

Decoupling of agricultural support from production has triggered an extensive analysis of the issue in the literature (see below) as well as some confusion as to the definition of the concept. Two types of definition of decoupling can be found in the literature. A fundamental difference between the two types of definitions is whether a policy is defined as decoupled *ex ante*, as in the legal definition in the URAA, or *ex post* as by e.g. Cahill (1997). The latter definition has been adopted by the OECD (2001). *Ex ante* definitions are criteria based, and the URAA provides a list of criteria support measures have to fulfil to be considered decoupled from production. The criteria based definitions give no guarantee that the support does not influence production *ex post*. Cahill (1997) argues that a policy, or a policy package, is decoupled if it does not affect the level of production. The *ex post* definitions are, consequently, based on the outcome of the policy. Cahill also introduced the notion of ‘the degree of decoupling’ of a policy by comparing the impact of the policy on production with a fully coupled (i.e. having the same impact as a price support) and a fully decoupled policy.

It can be noted that the 2003 CAP reform has implied yet another definition of decoupling and added to the confusion by allowing the individual Member States to retain, for some commodities and if preferred, a linkage of a part of the payment to production. Those payments are often referred to as partially decoupled.

There exists a vast body of literature on the subject of decoupling, especially assessment of the degree of decoupling, in the sense of Cahill, of past policy reforms. A review of this literature was a starting point of the IDEMA project and is reported in Andersson (2004). This literature identifies a number of potential links between different types of support to agriculture and farm output. Support that affects incentive prices give rise to what is known as the *price effect*, and the *cross-subsidation effect*. The cross-subsidation effect appears as a result of changes in prices of commodities that are substitutes in production or input use. As a consequence the allocation of land and other input use may be affected, which in turn affects output. In an attempt to decouple agricultural support, these effects can be removed by e.g. providing support through lump-sum transfers. However, *indirect effects* may remain after decoupling, as agricultural support may induce indirect effects by the pure existence of the support. These include the *income effect*, where the support potentially affects the farmers’ choice of on-farm labour supply. Further, a *risk related effect* arises as risk-averse

producers may increase output as a consequence of an income support. Finally, *dynamic effects* may affect output through farmers' investment decisions and expectations affected by the policy. A review of empirical studies on the above mentioned effects shows that the direct effects of agricultural support on output are important and well known. Studies of indirect effects are up to this date fewer and with less consensus (Andersson 2004).

Decoupling scenarios

The IDEMA project has not intended to analyse to what degree the Single Farm Payment (SFP) is decoupled from production. Instead, IDEMA analysed impacts of the SFP and other alternative decoupling schemes, compared to a reference scenario. The reference scenario represents what would happen if the coupled support schemes preceding the 2003 CAP reform had remained unchanged.

The reference scenario with coupled payments is different in the EU-15 and in the new Member States (NMS), since the support schemes preceding the 2003 reform were different. The reference scenario in EU-15 is a hypothetical continuation of Agenda 2000. The reference scenario in the NMS is a hypothetical continuation of the support schemes existing prior to the EU accession, i.e. a scenario without EU accession.

The main decoupling scenarios analysed are:

- **Actual implementation** of the 2003 CAP reform (as implemented in each Member State);
- **Full decoupling** with fully decoupled direct payments and top-ups;
- a **Bond scheme**, where the SFP is linked to the farmer and not to land;

There are some differences regarding which scenarios have been analysed with each of the three main methodological approaches. The Bond scheme was not analysed using survey methodology, for example.

Survey based analysis of farmers' intentions

The following sections are based on Deliverable 14 (Douarin et al. 2007) of the IDEMA project.

Introduction

This chapter presents the findings of a study on impacts of decoupled payments on farmers' intentions. The analysis draws on primary survey data and farm accounting records. Predicting impacts of radical policy changes when no historical data are available, as was the case when the IDEMA project started, is not an easy task. One solution is to ask those who will be affected, the farmers, what they intend to do. Accordingly, a survey instrument was considered a valuable tool to study the reform. However, surveys have both advantages and disadvantages. Surveys provide insights without a priori assumptions and give good insights into farmers' business confidence (Thomson & Tansey, 1982). Opinions whether surveys are good predictors of actual behaviour of farmers are, however, mixed. Some authors provide evidence that in the short-run farmers actually implement their intentions (Harvey, 2000; Tranter et al., 2004). According to others, a survey response constitutes a weak predictor of the actual behaviour (Vare et al, 2005). Furthermore, answers are biased by respondent's expectations about policy evolution and respondent's attempt to influence the outcome of the analysis (Thomson & Tansey, 1982).

The IDEMA project collected a unique dataset of farmers' intentions, regarding their planned activities in the post-accession / SFP system era in five EU Member States (France, Lithuania, Slovakia, Sweden and the UK). The choice of countries incorporates a mixture of EU-15 and NMS. To understand the specific effects of the switch in policy, farmers were asked to state their intentions under two main policy scenarios:

- a) Continuation of **policies under Agenda 2000 in EU-15** and continuation of **pre-accession policies in NMS**. This provides the baseline scenario of what farmers would have done under continuation of the previous policy environment, with coupled support.
- b) Intentions under **the 2003 CAP reform** as it has been implemented in each country: SFP in the EU-15 and the SAPS in the NMS.

In some countries a third decoupled scenario was included in the survey. Results from the third scenario are not presented here, since in this case farmers' intentions are similar to the 2003 reform scenario.

Data were collected through face to face interviews, except in Sweden where a postal survey was conducted. To avoid collecting large amounts of data on the economic performance and structural characteristics of farms, IDEMA survey data was matched to Farm Accountancy Data Network (FADN) records. The rationale was to use the wealth of information which is included in the FADN system to be able to analyse farmers' responses in conjunctions with historic records of farm performance and structure. In addition, by relying on the information which was already included in the FADN, the motive was also to avoid burdening respondents with too many questions, which would

impair the rate of response. Although FADN returns were available for all farms surveyed and provided a good description of farms prior to the change in policy, it was necessary to collect some additional information, particularly demographic, that is usually missing in FADN databases. Information about other sources of income and off-farm investments was also collected. Table 1 gives some general information about the survey and the matching FADN. Table 2 provides some sample characteristics. Data collection took place between February and November 2005 in all five countries.

Table 1. Data available from the survey and from FADN

Country	Type of survey	Sample size	Matching FADN
England	Face to face	153	1998-2002
France	Face to face	281	2002, 2003 or 2004 (one year only)
Sweden	Postal	344	1999-2002
Lithuania	Face to face	220	2000-2002
Slovakia	Face to face	154	2001-2002

The survey questionnaire was developed in order to ask farmers what they would do under different policy scenarios. It would in particular allow comparing farmers' intentions holding everything else but the policy reform constant. Objectives of the survey were, however, not merely to establish what farmers intend to do but to understand the reaction patterns and underlying motives. Do farms react differently depending on farm structure, region, farm financial performance, human capital, age etc?

Primary data were collected on intentions to exit from/stay within agriculture as well as intentions to change the amount of land farmed and the production mix. Data were also collected about farmers' objectives, values and opinions concerning policy support. The questionnaire was pre-tested and discussed with focus groups. The questionnaire was divided into three main sections:

- questions regarding farmers' intentions;
- questions regarding farmers' attitudes and expectations;
- information regarding farms' and farmers' characteristics.

Table 2. Some farm sample characteristics

Variable	England	France	Sweden	Lithuania	Slovakia
Age of the operator (years)	55	44	55	50	51
Farm managerial experience (years)	22	18	26	10	11
Experience working off-farm (years)	3	2	10	10	19
Farm area (ha)	136	98	86	94	187
Share of farms in LFA regions (%)	27	Na	49	66	60
Share of crop in total revenue (%)	17	23	26	52	76
Share of net current subsidies in revenue (%)	14	17	24	10	17

Farm survival and growth

Understanding the determinants of farm survival or exit is critical for capturing the forces of structural change in agriculture. In the present study, the determinants of exit/staying under the different policy scenarios are investigated to assess what are the main factors behind the decision to exit from farming and to understand which factors are recurrent and which factors vary with the policy environment. This is done through a Probit model with the dependent variable being the decision to stay in or exit from the farming sector within the next 5 years.

Several determinants for exit were identified in the present study. Clear impacts of lifecycle factors can be observed, consistent with expectations and previous research as well as with experiences from a Swedish policy reform in the early 90s (Andersson, 2005). Older farmers without a successor exit earlier. It is also interesting to note that farmers operating larger farms are more likely to stay in farming in all scenarios.

Growth is another important component of structural change and investigating the determinants of growth under the different policy scenarios is therefore likely to allow more insights into the consequences of the policy change. In the case of our study, the distribution of farmers' plans to grow was strongly biased towards "no change" as many respondents stated they were not planning to alter the size of their farm in the coming 5 years and towards "no downscaling" as very few respondents reported a plan to reduce the size of their farm. Under these circumstances, econometric analyses are only possible using a discretised variable based on farmers' plan to grow with two categories: intending to grow or not intending to grow. Therefore, the determinants of growth are revealed through a Probit model contrasting the farmers intending to grow to the rest of the respondents.

Results show that younger farmers are more likely to grow, but farm size seems to have no impact on growth. Better performing farms are more likely to grow under the decoupled policy. Regarding the determinants for both exit and growth there is no clear difference between EU-15 and the NMS.

Farmers' adjustment to decoupling

Farmers' intentions in EU-15

According to farmers' intentions, the introduction of decoupled payments will have little direct effect on structural change in England. Few farmers plan to modify their exit or growth decisions under SFP arrangements compared to what they would have done if they faced a continuation of the Agenda 2000 policy environment. Under both scenarios the key characteristics of farmers seeking to exit in the short-term (defined as the next five years) were the same: elderly farmers, specialised in COP production (cereals, oilseeds and protein crops) and with high value added without net current subsidies per hectare.

The more pronounced adjustment concerns production choices (even though the majority of the respondents are not planning to change their output mix, some intend to decrease their cattle production) and to a certain extent diversification to off-farm

activities. Therefore, this early empirical research suggests that in England the adjustments to the 2003 CAP reform are likely to be subtle and to concern mainly production activity choices and diversification.

A direct comparison between England and France would be illuminating due to the differences in the implementation of decoupling and different regulations concerning trade of entitlements in the two countries. Unfortunately, due to the difficulties with data collection in France, direct comparisons are difficult to make. The French sample is restricted in its geographical coverage and mountainous regions were not covered. Additionally, the regions surveyed are relatively homogenous and the farmers interviewed in general rely only partially on their on-farm income and are younger than the national average. Nevertheless, the French results are similar to the findings from England in that few farmers intend to alter their plans to exit or grow as a result of the introduction of the SFP. Intentions are little affected by the switch to SFP in France, which may be expected given the conservative manner in which France has chosen to implement the SFP. Relatively greater adjustment is likely to be witnessed, however, in the output mix of farms and the allocation of time devoted to farm/off-farm work.

In contrast to England and France, in Sweden the implementation of SFP is more likely to stimulate structural change as some farmers are planning to exit earlier than they would have done under Agenda 2000. Very little land is however likely to be abandoned as the demand for land for farm growth persists after the change in policy. The predicted changes in production mix are also relatively stronger in the Swedish case and likely to be characterised by (a) a movement away from COP and (b) the extensification of livestock production. The Swedish farmers also intend to keep some land in GAEC without producing on it. These plans are consistent with prior expectations concerning the impact of decoupling, i.e. to use less intensive farming practices and a reduced incentive to produce.

It becomes evident that farmers plan to apply a minimal adjustment strategy in response to changes in agricultural policy, at least in France and England. There is no strong evidence that farmers intend to drastically change their strategic decisions to exit agriculture. Few farmers are interested in merely keeping land in good agricultural and environmental condition (GAEC) and not producing. From this point of view, the results of our study are in line with previous studies which have sought to investigate farmers intentions in response to policy change (Harvey, 2000; Tranter et al., 2004; Chatellier and Delattre, 2005; Breen et al, 2005). However, results for Sweden are in slight contrast with this, as farmers are intending to change their exit and growth plans depending on the policy in place.

Farmers' intentions in EU-10

In the NMS (Lithuania and Slovakia), the implementation of the 2003 CAP reform has a different meaning. The implementation of the SAPS in the NMS means a significant increase in the degree of support offered to farmers, with both higher and more predictable payments. Therefore, it is not surprising that in Lithuania the main impact of the payments is evidenced in a greater willingness to operate larger farms. As the returns to agricultural activities are expected to rise, farmers are less interested in diversification and have no wish to leave land uncultivated under GAEC. This comparable pattern is repeated in Slovakia: the switch from the pre-accession policy to

the SAPS induces a significant rise in the numbers who wish to stay in agriculture. However, in Lithuania and Slovakia, the characteristics of those seeking to stay or expand do vary. Decision to stay or grow were poorly explained by the set of variable available for the analysis in Slovakia, while in Lithuania, farmers' characteristics were shown to be determinant (age, succession status and off-farm work experience). In Slovakia, likelihood of expansion is related to managerial experience and farm location (LFA regions). In Lithuania, expansion plans are linked to lifecycle variables (age and succession status).

In analysing the differences between the EU-15 countries and NMS, it should be noted that what has been studied in the NMS is not so much the effect of a switch from coupled to decoupled payments but the effect of the introduction of the CAP payments as a result of EU accession. From this point of view, the differences in responses between the EU-15 and NMS are justified as farmers respond to contrasting policy changes.

Farmers' attitudes and expectations

Farm typologies

While agricultural policy has shifted from a production orientation to more decoupled forms of payment, there is little evidence that farmers' attitudes have also adjusted. Therefore, it is important to also investigate whether typologies of farmers can be identified, with respect to their opinions on policy support and their farming objectives. The question is whether different values or opinions can be linked to diverging behavioural intentions to adjust to the 2003 CAP reform. To analyse this question, the pooled sample of farmers interviewed in the five countries studied is utilised, and it is investigated whether there are significant differences in farmers' attitudes to agriculture and policy support amongst the EU member states. An ANOVA based analysis is presented regarding farmers' attitudes towards support and off-farm work, and the relationship with intentions to exit and grow.

Analyzing the responses, five clusters were identified:

1. *Liberalisers* who are distinguished by positive attitudes to policy reform and believe that the CAP imposes too many restrictions on their future farming plans. They feel that they can fairly easily find off-farm work. The share of farmers from NMS is low in this cluster. Nearly 60 percent of the farms in the cluster are classified as specialist pigs and poultry.
2. *Pessimists* who have a low ability to stay viable without CAP support or to find off-farm work. Farmers in this cluster have low formal education. Sheep and goat farmers in LFA constitute a high proportion.
3. *Protectionists with a focus on primary agricultural production*, who are close to sample mean for most scale items. Farmers in this cluster reject policy liberalisation and believe farmers should concentrate on agriculture. The cluster consists of a mix of countries and farm types.
4. *Protectionists with a multifunctional focus* who strongly reject policy liberalisation, but embrace multifunctional agriculture with government support. Farmers in this cluster have little intention to change their farming operation in

the future. The group consists of a mixture of farm types but is weighted against England and Slovakia.

5. *Enthusiastic new entrants* who believe that farmers should concentrate on farming activities and not work off-farm. This cluster is totally dominated (86%) by farmers from NMS and 44 percent of the farms in this group expect to increase their farmed area. Farmers in the cluster support strong protection.

Policy implications

The comparative cross-country analysis generates several important insights for policy, stemming from the analysis of farmers' attitudes across the pooled sample of five states. First, most farmers still possess a protectionist mindset and do not accept the idea that they could survive or be competitive without policy support. The sampled farmers strongly disagree with statements advocating the removal of policy support and, at the same time, express preferences for the full utilisation of agricultural land for agricultural production and concentration on farming. More than one-third of the respondents strongly disagree with the notion that good farming skills are sufficient to run a profitable business whatever the design of European policies. At the same time, a half of the respondents think that the CAP system of support imposes restrictions on their future farming plans. So, it appears that farmers rely on policy support although a large proportion of them realise that this support might be conditional on some restrictions on their farming activities. The only farmers who endorse policy liberalisation are those who are largely based in sectors that traditionally receive little CAP support (pigs and poultry).

Second, the often advocated strategy of diversification and development of multiple income sources still creates difficulties for a substantial proportion of European farmers. This is due to a mixture of beliefs that farmers should focus on the production of food and fibre, and a lack of appropriate skills and off-farm opportunities. More than 40 percent of the respondents do not think they can easily find a job off-farm or increase the number of hours devoted to off-farm work. This emphasises once again the limitations of rural development policies that are focused solely on the farming community. Farmers are unlikely to create a significant number of new jobs through the pursuit of enterprise diversification, which is an infeasible option for many, and their own future prosperity depends on the availability of work in the non-farm rural economy. Pessimism surrounding the opportunities for diversification is not confined to the relatively poorer NMS. In fact, upland grassland farmers in England are the most pessimistic about their ability to adapt.

Third, although the overwhelming majority advocate protection, farmers are more flexible in terms of the instruments through which policy support might be delivered. One of the positive messages emerging from this research is that the majority of respondents agree with the need for farmers to produce attractive landscapes and positive environmental externalities, and be paid for this. The non-pecuniary benefits of farming also feature prominently. The latter are crucial for understanding why farmers' responses to policy reforms have been rather modest or at least more modest than expected.

Finally, the strongest opposition to policy liberalisation comes from farmers in the NMS. Newcomers to farming in the NMS strongly reject policy liberalisation and

endorse notions that farmers should concentrate on agriculture which corroborates with the previously mentioned intentions to stay longer in agriculture or grow more. For them diversification seems to be associated with liberalisation tendencies. These views are likely to have important implications for the decision-making processes surrounding agricultural policy reform in the EU. The new entrants to the Union are expected to strengthen the political opposition to agricultural policy reform and undermine attempts to extend the reform measures, including the capping and further modulation of the Single Farm Payment.

Implications of the Single Area Payment for corporate farms in the NMS

A special study (Latruffe and Davidova 2007) has been conducted to analyse whether the introduction of the Single Area Payment (SAP) will induce a withdrawal of land from corporate farms by private landowners in the New Member States (NMS). The question about the potential response of the landowners to the SAP is a key to understand some of the driving forces of the structural change in NMS farming.

Overall, the main policy conclusion in this study is that the SAP will induce more landowners to review their situation within the corporate farms and to try to capture the capitalisation of the SAP through higher rents. However, it is unlikely that they will massively withdraw their land from the corporate farms. Therefore, the expected behaviour of landowners does not put the very existence of the corporate farms under question, at least within the short- to mid-term horizon. However, if this is true on average, financially constrained farms may quickly lose their capacity to compete for land in the conditions of an increased land demand which has started being observed in the NMS after the EU accession. Therefore, a substantial structural change might be expected within the corporate farm sector with a better allocation of land to the more efficient users.

Conclusions

Summarising our results, it becomes evident that farmers plan to apply a minimal adjustment strategy in response to decoupling, at least in France and England. There is no strong evidence that farmers intend to drastically change their strategic decisions to exit agriculture. Few farmers are interested in merely keeping land in good agricultural and environmental condition (GAEC) and not producing. However, results for Sweden are in slight contrast with this, as farmers are intending to change their exit and growth plans depending on the policy in place. Introduction of CAP payments in the NMS gives incentives for farmers to stay longer in farming and to grow. CAP payments also make farmers in the NMS less interested in diversification.

In general, farmers in the studied Member States reject calls for policy liberalisation and they prefer full utilisation of land for agricultural production. Those with the most liberal policy attitudes are based in sectors with lightest past support (pigs and poultry). NMS farmers are strongly against policy liberalisation (both new entrants and established farmers). Hence, the enlargement of the EU has probably resulted in strengthening of the opposition to future agricultural policy reforms.

Agent-based regional modelling

The following sections are based on Deliverable 10 (Sahrbacher et al. 2005), Deliverable 20 (Kellerman et al. 2007) and Deliverable 23 (Sahrbacher et al. 2007) of the IDEMA project.

The impact of decoupling on structural change is one of the key issues related to the 2003 reform. Will structural change speed up after the introduction of decoupled payments or will the opposite be the case? In research, analysis of structural change has long been a neglected issue. An important part of the IDEMA project has been the use of modelling to study the impact of decoupling on agricultural structural change. This has been done for selected countries of the enlarged EU. The methodological framework we used for this investigation is AgriPoliS, an agent-based spatial and dynamic simulation model of agricultural structural change (cf. Happe 2004, Happe et al. 2006). The origin of this model dates back to work by Balmann (1997), who studied path-dependencies in agricultural structural change with an agent-based approach. Whereas Balmann's model was based on a hypothetical farm structure, AgriPoliS can be calibrated to empirical data derived from farm accounting data and regional statistics. Accordingly, this makes the model applicable for policy analysis and empirically-based analysis of regional structural change.

In IDEMA we adapted AgriPoliS to 11 case study regions in the EU-25. These case study regions were chosen to cover the diversity of farming in Europe with regard to factors such as farming structure, production patterns, factor use, or farm size. Hence, a model reflecting these highly heterogeneous conditions must be flexible enough to be adapted to the respective conditions.

The model

The core of AgriPoliS is the understanding of a regional agricultural structure as a complex, evolving system. This regional agricultural system is shown schematically in Figure 1. The figure shows the interactions between the three central components of agricultural structures: farms, markets, and land.

The key entities in the model are a number of individual farms which evolve subject to their actual present state and to changes in their environment. This environment consists of other farms, factor and product markets, and space, which are again all embedded within the technological and political environment. Farms, land, and markets either directly depend on each other or they exert influence on each other. Mutual dependence between farms, land, and markets results from the fact that farms require land on which to produce. Farm management practices in return influence the state of the land. On the other hand, mutual interdependence between farms and markets takes place because farms can purchase production inputs on factor markets and sell products to product markets.

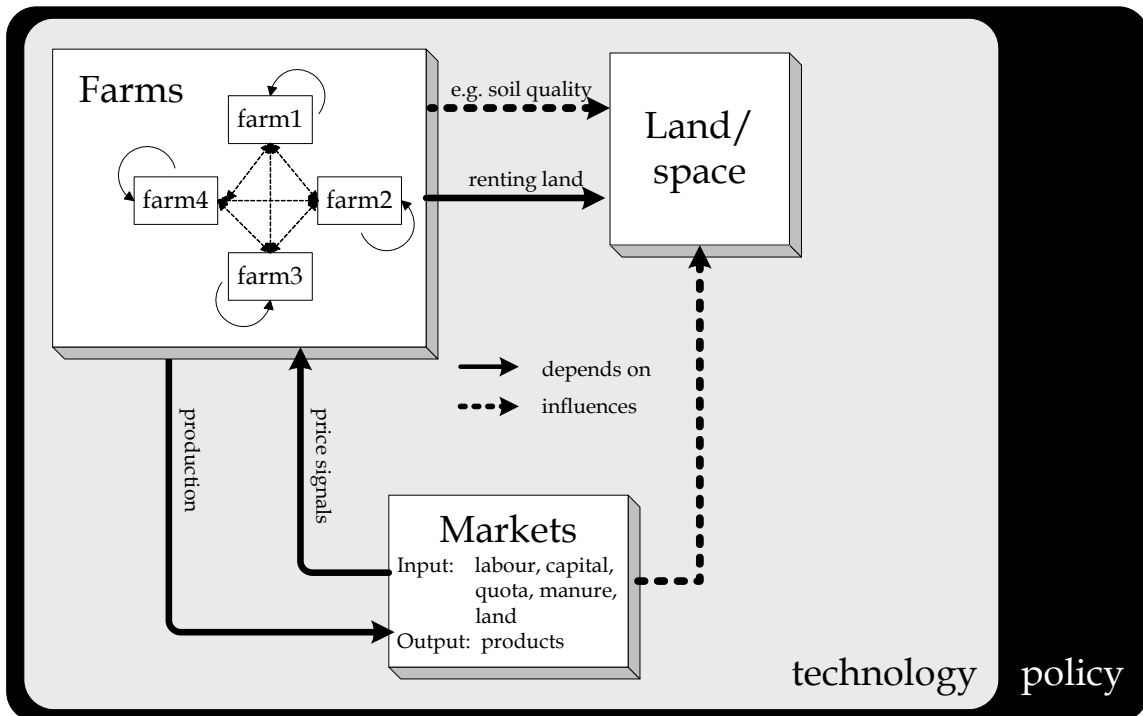


Figure 1. A conceptual model of a regional agricultural system.

Agents involved

For the purpose of AgriPoliS, an agent is defined as an entity that acts individually, senses parts of its environment and acts upon it. In the context of AgriPoliS, one farm agent corresponds to one farm or agricultural holding. In accordance with the above definition, a farm agent is an independently acting entity that decides autonomously on its organisation and production to pursue a defined goal (e.g. farm household income maximisation). Furthermore, a farm agent reacts to changes in its environment and its own state by adjusting its organisation in response to available factor endowments and observable actions of other farm agents.

Farm agent (inter-)actions and behaviour

Farm agents are assumed to act autonomously and to maximise profits from their economic activities. For this, production and investment decisions are made simultaneously based on a recursive mixed-integer linear programme. However, decision-making of a farm is bounded rational since decision-making is myopic and strategic aspects are only included in a rudimentary manner. Except for the price information on land rents and product and input prices, individual farms in AgriPoliS do not know about other farms' production decisions, factor endowments, size, etc. Farm agents are also bounded rational with respect to expectations; in the majority of cases, farm agents follow adaptive expectations. In the model, policy changes are anticipated by farmers one period in advance and included into the decision-making process.

Figure 2 displays the decision hierarchy for an individual farm agent during one period of simulation. Based on this figure, the most important actions undertaken by a farm agent are renting land (renting additional land and disposing of unprofitable land), investment, production, farm accounting, and the decision of whether to quit farming or stay in the sector.

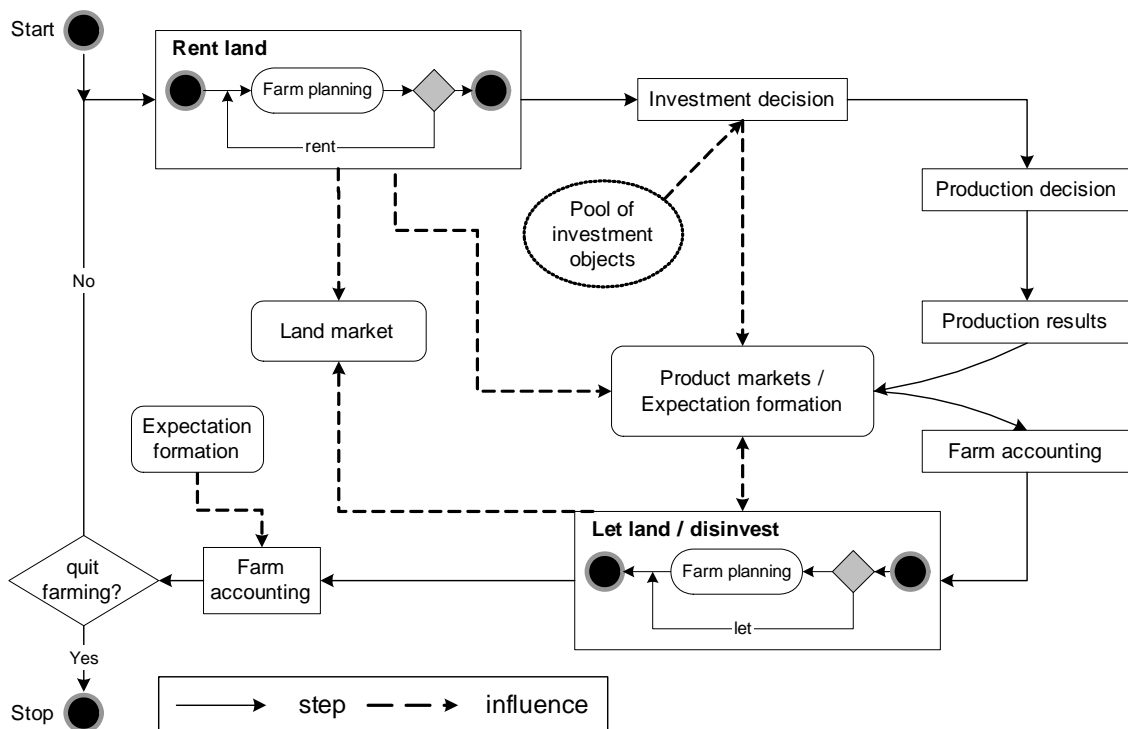


Figure 2. Course of events in one planning period for one farm agent

Farm agents can produce a selection of goods. In order to produce, farm agents utilise buildings, machinery, and facilities of varying type and capacity. With respect to this, AgriPoliS implements economies of size; with an increasing size of production, unit investments costs decrease. Moreover, labour is assumed to be more effectively used with increasing size. AgriPoliS also aims to mimic the effect of technological progress; it is assumed that with every new investment, unit costs of the product produced with this investment decrease by a certain percentage.

Farms can engage in rental activities for land, production quotas, and manure disposal rights. Labour can be hired on a fixed or per-hour basis, and vice versa, farm family labour can be offered for off-farm employment. To finance farm activities and to balance short-term liquidity shortages, farm agents can take up long-term and/or short-term credits. Liquid assets not used within the farm can be invested with a bank. Farm agents quit production and withdraw from the sector if equity capital is zero, the farm is illiquid, or if opportunity costs of farm-owned production factors are not covered.

New investments affect production capacities for the operating lifetime of said investment. This implies investment costs to be sunk. A farm agent is handed over to the next generation after a given number of periods. In case of such a generation change, opportunity costs of labour increase. Accordingly, continuation of farming can be interpreted as an investment into either agricultural or non-agricultural training. Moreover we assume that opportunity costs of labour can decrease with increasing age of the farmer. Finally, farm agents differ not only with respect to their specialisation, farm size, factor endowment and production technology, but also with respect to managerial ability.

At this development stage, agents in AgriPoliS interact indirectly by competing on factor and product markets. Interaction is organised by markets that explicitly coordinate the allocation of scarce resources such as land or the transaction of products. In this respect, the land market is the central interactional institution between agents. In reality, the land market is of particular relevance, as farms very often cannot develop independent of land. Deliverable 2 (Le Mouel 2004) and Deliverable 9 (Latruffe and Le Mouel 2006) of the IDEMA project provide background information on agricultural land markets.

The spatial, technological and political environment

In AgriPoliS a region is represented in a stylised way, where space is represented by a set of cells/plots assembled into a two-dimensional grid. In the model presented in Happe (2004) this stylised landscape was limited to two different soil types and a representation of only some spatial relationships. In the current version of the model, this approach was extended. First of all, we allow for an unlimited number of soil types, where we also explicitly consider non-agricultural land to represent some kind of natural borders around the field. Although the landscape is still based on grid cells of equal size, plots can now be aggregated to form larger areas of contiguous land. At different layers, the contiguous plot (land) area is either used to reflect the ownership structure, the physical landscape or the usage structure in the region. Furthermore, we introduced spatially-explicit mapping between farm production and the landscape. In this manner, the model can be used for environmental impact assessments.

Brief overview of the case study regions

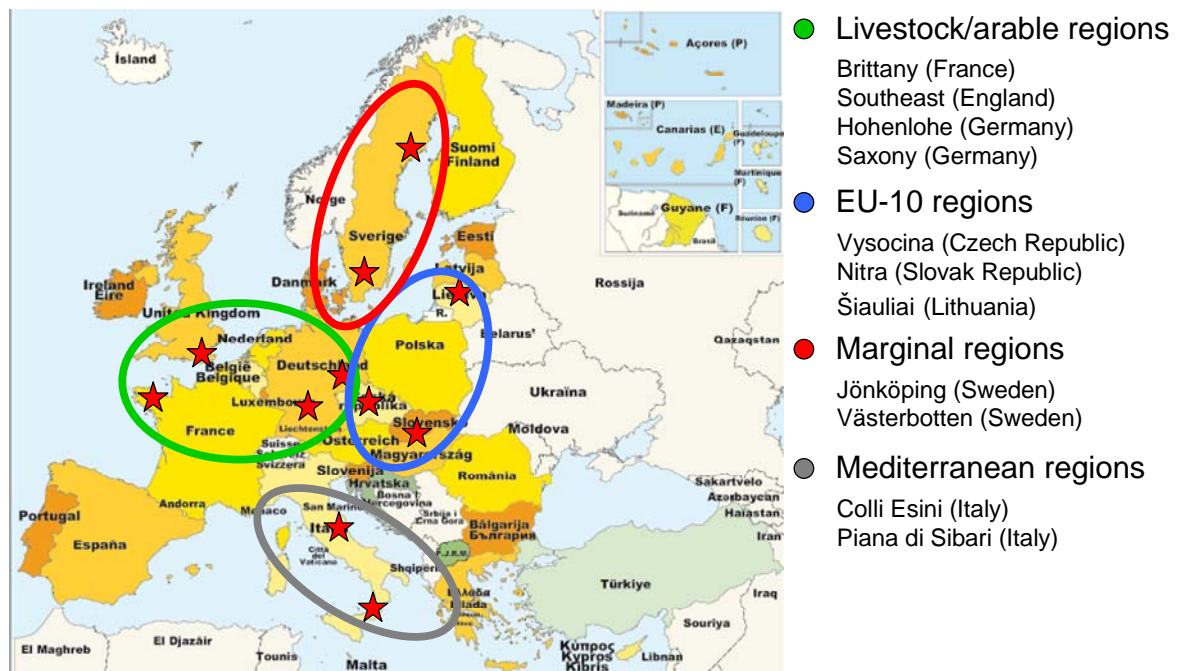


Figure 3. Location of the case study regions.

The selected regions can be grouped by different criteria: agronomic (North/South), socio-economic (high income/low income regions), mode of operation (intensive/extensive agriculture), scale of farm operation (small/large farm) and legal

form (private/corporate). Based on these considerations we have chosen the regions displayed in Figure 3.

Scenarios

The target year of the AgriPoliS simulations is 2013 (simulations are run over a 13 year period). We consider four policy scenarios in both EU-15 and EU-10. The analysis of EU-10, represented by Czech Republic, Lithuania and Slovak Republic, covers both the impact of EU accession and of decoupling.

The four scenarios for the member states of the EU-15 are:

- A continuation of Agenda 2000 beyond 2004 (reference scenario).
- Actual implementation of the 2003 CAP reform, including (partially) decoupled payments as they are actually implemented in each individual member state.
- A full decoupling scenario with fully decoupled direct payments in each member state, i.e. the option to partially couple direct payments is removed.
- A Bond scheme scenario. Here the Single Farm Payment for each farm is calculated like in the full decoupling scenario. However this Single Farm Payment is not distributed as payment entitlements per hectare, but it is coupled to the farmer. That is, the payment is granted to the farmer independent of any farming activity. Hence, the farmer can produce or leave the sector.

The four scenarios for the NMS are as follows:

- A without accession scenario, where it is assumed that the pre-accession policy is continued beyond 2004.
- An accession scenario, where the foreseen phasing-in of payments and production top-ups is explicitly considered. Top-ups are reduced after 2009 and from 2013 only a single area payment is paid.
- A full decoupling scenario, which is similar to accession except that top-ups are decoupled 2009 and only a single area payment (SAP) is paid from that year.
- A Bond scheme scenario, where payments are fully decoupled from 2009 (phasing in of payment continues till 2013). The payment is coupled to the farmer in the same way as for EU-15.

Impacts of decoupling policies in EU-15

The following sections are based on Deliverable 23 (Sahrbacher et al. 2007) of the IDEMA project.

The 2003 CAP reform

As already mentioned, the main advantage with AgriPoliS is that it models structural change. AgriPoliS results show that structural change slows down due to the decoupling of direct payments in the 2003 CAP reform. Figure 4 illustrates this result; average farm size in 2013 is smaller in the REFORM scenario than with a hypothetical continuation of Agenda 2000 policies. The rationale behind this result is that particularly farms with grassland remain in the sector, because decoupled payments provide additional income

opportunities. For these farms, maintaining grassland in good agricultural and environmental condition (GAEC) seems to be more profitable than off-farm opportunities.

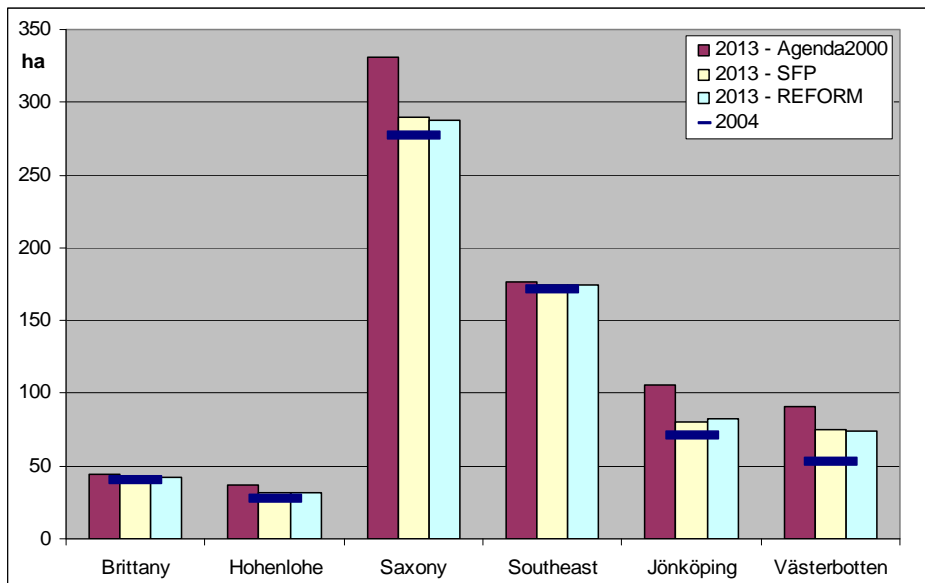


Figure 4. Average farm size in 2013 with the Agenda 2000 scenario, actual implementation of the 2003 REFORM and a full decoupling (pure SFP) scenario.

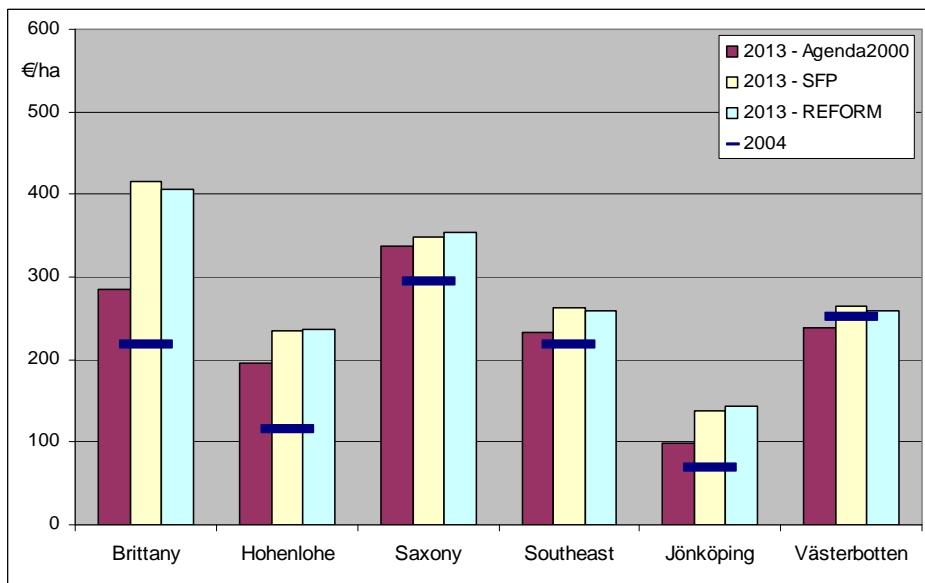


Figure 5. Average profit/ha in 2013 with the Agenda 2000 scenario, actual implementation of the 2003 REFORM and a full decoupling (pure SFP) scenario.

Analysing the impact of decoupling on farm income is particularly relevant, because both the former direct payments and the decoupled Single Farm Payment have the purpose to give farmers a stable income. AgriPoliS results show that average farm income increases due to decoupling. Income increases because decoupling gives farmers more freedom when choosing what to produce and because product prices increase (these price changes are taken from ESIM, see next chapter). Figure 5 shows average profit per hectare as an indicator of farm income. Average profit per hectare is higher in all regions when direct payments are decoupled from production. However,

decoupling does not overcome the problem of capitalisation of payments. Decoupling increases arable land rental prices in many of the analysed regions. Land rental prices increase in regions with considerable cattle payments prior to decoupling, where cattle payments are redistributed from cattle to arable land due to decoupling. Rental prices in Brittany do not increase due to a regulated land market.

Bond scheme

The hypothetical Bond scheme scenario implies that the linkage between the SFP and land is removed, such that the payment is granted to the farmer independent of any farming activity. This scenario is in fact a gradual phasing-out of direct payments to agriculture, since over time more and more payment entitlements will be in the hands of farmers who have left the sector.

AgriPoliS results demonstrate that the analysed Bond scheme speeds up structural change considerably in all regions and it also leads to abandonment of agricultural land (Table 3). Large areas of land are released by quitting farmer. However, also some farms which stay in the sector release land in the Bond scenario, but mainly in the form of grassland due to a decline in beef and milk production. Except for Jönköping, it is mainly small farms that leave agriculture in the Bond scenario.

Table 3. Farms quitting, area released and area left idle due to introduction of a Bond scheme in 2005

	Brittany	Hohenlohe	Saxony	Southeast	Jönköping	Västerbotten
Number of farms	-18 %	-28 %	-47 %	-23 %	-44 %	-34 %
Land released by quitting farms	5 %	21 %	15 %	16 %	51 %	25 %
Total area released	16 %	32 %	30 %	19 %	53 %	32 %
Land rented by other farms	15 %	13 %	19 %	9 %	22 %	12 %
Idle land	1 %	19 %	11 %	10 %	31 %	11 %

Breaking the link between the SFP and land means that the decoupled payment will no longer be capitalised in land rental prices. Consequently, AgriPoliS results for the Bond scenario show that land rental prices fall by about 50 percent in most of the regions. Lower land rental prices combined with increased efficiency due to structural change compensate for payments leaving the sector due to quitting farmers. The resulting effect is higher or almost unchanged average profit per hectare, as illustrated in Figure 6.

Table 4 provides an overview of AgriPoliS simulation results for EU-15. Results for the Mediterranean regions are presented in a separate section below, due to the substantially different production conditions.

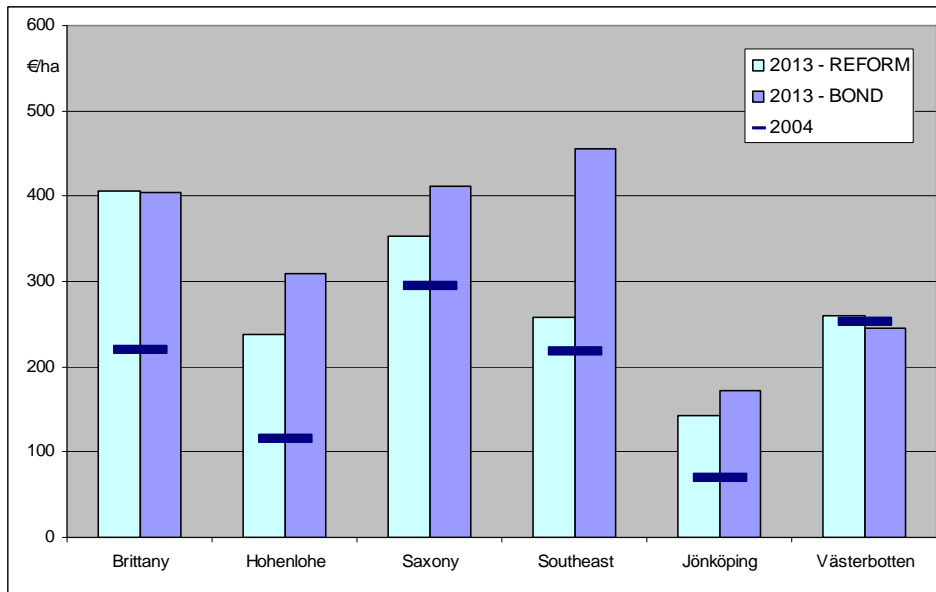


Figure 6. Average profit per hectare in 2004 and 2013 with the 2003 REFORM and the BOND scenarios.

Table 4. Summary of impacts in EU-15 regions (except Mediterranean regions)

	Impact of decoupling relative to Agenda 2000	Impact of decoupling policies in all regions	General impacts and developments
ACTUAL IMPLEMENTATION	<ul style="list-style-type: none"> - Slows down structural change - Reduces adjustment pressure because grassland management becomes an additional income source - Basic land management (GAEC¹) is more profitable than off-farm labour use 	<p><u>Livestock:</u></p> <ul style="list-style-type: none"> - decline in number of ruminants <p><u>Profits:</u></p> <ul style="list-style-type: none"> - increase of profits per hectare <p><u>Rental prices</u></p> <p><u>grassland:</u></p> <ul style="list-style-type: none"> - general increase in rental prices of grassland; successive capitalisation of area-based payments (except for Bond) 	<p><u>Structure:</u></p> <ul style="list-style-type: none"> - heterogeneous adjustment patterns in regions with an initially similar farm size structure (e.g. Hohenlohe and Brittany) - in dual farm structures, smaller family operated farms exit faster than large scale farms (Saxony) <p><u>Livestock:</u></p> <ul style="list-style-type: none"> - policy-independent decline of ruminant production, even with coupled direct payments <p><u>Rental prices:</u></p> <ul style="list-style-type: none"> - the initial level determines the development of rental prices (e.g. no change in rental prices in Hohenlohe under Agenda 2000 due to initially high level, low initial level in Southeast leads to strong increase)
FULL DECOUPLING	<ul style="list-style-type: none"> - Slows down structural change - Reduces adjustment pressure because grassland management becomes additional income source - Basic land management (GAEC) is more profitable than off-farm labour use - Decrease in livestock density 		
BOND	<ul style="list-style-type: none"> - Strong increase in farm size - Lower land rental prices - Decrease of livestock production - Many farms leave the sector if off-farm job opportunities are available - More land is left idle 		

¹ GAEC = Good Agricultural and Environmental Conditions

Impacts in the New Member States

This section is based on Deliverable 27 (Jelinek et al. 2007), Deliverable 28 (Stonkute et al. 2007) and Deliverable 29 (Blaas et al. 2007) of the IDEMA project.

The analysis for the NMS is somewhat different since these countries went from pre-accession policies directly into decoupled CAP payments. From AgriPoliS results it is evident that the impact of accession dominates the effect of decoupling. However, results vary between the three countries analysed. In Czech Republic and Slovakia, EU accession meant significantly higher payments to agriculture, while in Lithuania payments were comparably high before accession. Consequently, the introduction of CAP payments has a negligible impact on structural change in Lithuania, while structural change slows down considerably in Czech Republic and Slovakia. Figure 7 shows how the number of farms in Slovakia develops in each scenario.

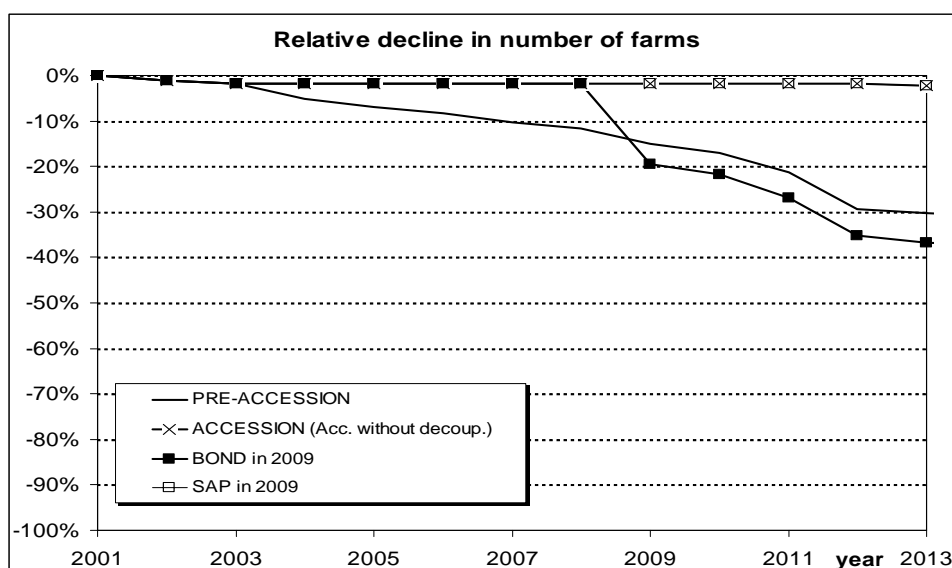


Figure 7. Decline in number of farms in Slovakia in each scenario.

From Figure 7 it is also clear that the Bond scheme speeds up structural change. However, whether structural change is slower or faster with the Bond scheme than with a continuation of pre-accession policies depends on the pre-accession policy in each country.

As in EU-15, decoupled CAP payments linked to land capitalise in land rental prices, while land rental prices in the Bond scenario are closer to rental prices with a continuation of pre-accession policies. Figure 8 illustrates these results for Slovakia.

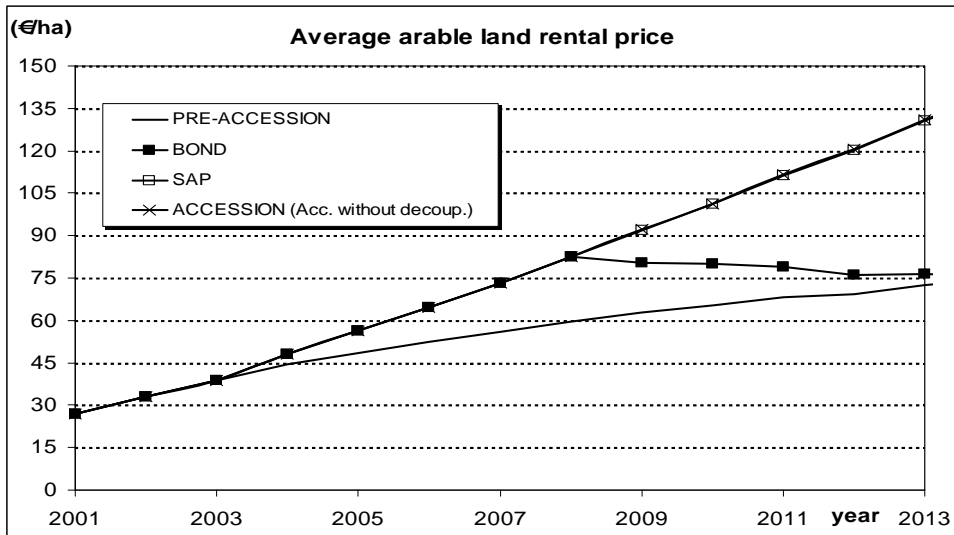


Figure 8. Average arable land rental prices in Slovakia in each scenario.

The impact of the different policy scenarios on farm profitability follows the same pattern in the three analysed NMS. Average profit per hectare is lowest in the pre-accession scenario and highest with the Bond scheme. Figure 9 illustrates this result for Lithuania. The general conclusion is that farm profits increase with the degree of decoupling.

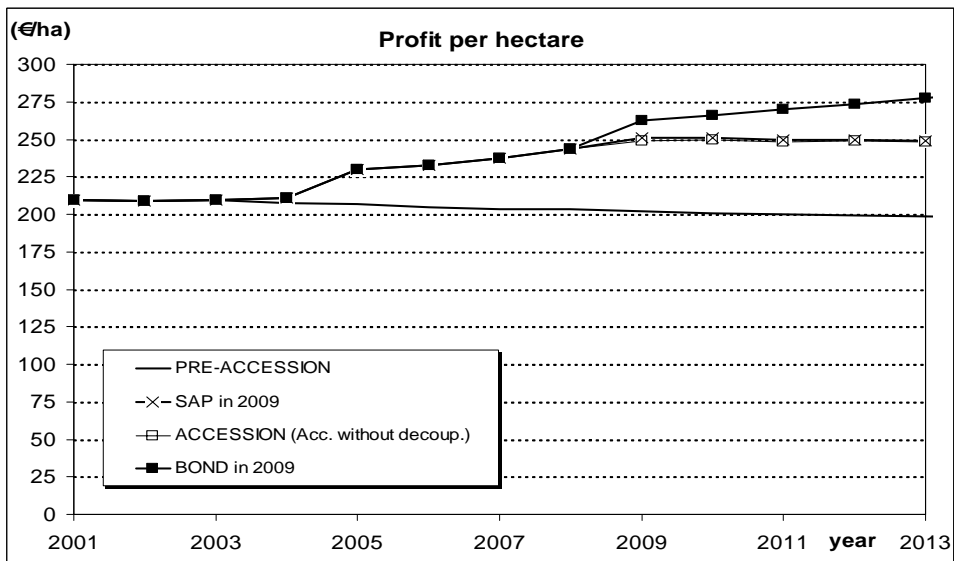


Figure 9. Average profit per hectare in Lithuania in each scenario.

Table 5 summarises AgriPoliS simulation results for EU-10 regions (Vysocina, Nitra, Siauliai).

Table 5. Summary of policy impacts in EU-10 regions

	Vysocina (Czech Republic)	Nitra (Slovak Republic)	Šiauliai (Lithuania)
WITHOUT ACCESSION	<ul style="list-style-type: none"> - Strong structural change due to low payments - Low level of coupled payments for livestock and arable production 	<ul style="list-style-type: none"> - Strong structural change - Low level of coupled payments for livestock and arable production 	<ul style="list-style-type: none"> - Little structural change - Comparatively high level of coupled payments for livestock and arable production
ACCESSION	<ul style="list-style-type: none"> - Increasing total payment level reduces structural change compared to Without Accession - Change in production structure (increase cattle production) due to coupled top-up payments 	<ul style="list-style-type: none"> - Increasing total payment level reduces structural change compared to Without Accession (incentives to remain in the sector) - Decline in livestock density (esp. in Full Decoupling since no coupled livestock premium is paid) - Increase of rental prices of arable land and grassland 	<ul style="list-style-type: none"> - No immediate impact on production structure due to high level of coupled payments before accession - With phasing-in of top-ups possible additional production incentives - Moderate increase of grassland rental prices (due to higher SAPS payments)
FULL DECOUPLING	<ul style="list-style-type: none"> - Decoupling of top-ups causes hardly any change in farm and production structure 		
BOND	<ul style="list-style-type: none"> - Increases speed of structural change - No direct impact on production structure - Stabilisation of profits due to successive decrease in rental prices in the long-run 	<ul style="list-style-type: none"> - Induces strong structural change - No direct impact on production - Profits increase further in opposite to Accession and Full Decoupling, because of decreasing rental prices 	<ul style="list-style-type: none"> - Induces strong structural change - Change in production structure (decrease of livestock, in particular beef cattle) - Strong decrease in rental prices (reflected in higher profits)
General effects in region	<ul style="list-style-type: none"> - Redistribution of land towards individual farms is stronger in the Accession and Full Decoupling scenarios than Without Accession 	<ul style="list-style-type: none"> - Redistribution of land towards individual farms is stronger in the Accession and Full Decoupling scenarios than Without Accession - Labour-input reduction independent of policy 	<ul style="list-style-type: none"> - Low initial importance of livestock production with an overall decreasing trend - Labour-input reduction independent of policy
General effect for all policies and regions	<ul style="list-style-type: none"> - Impact of accession dominates effect of decoupling; Bond is the only decoupling policy that creates a visible change in the farm structure after accession. - In the short-run, profits increase with phasing-in of payments - In the long-run, payments are capitalised in higher rental prices leading to a stagnation or decrease of profits (except for Bond) 		

Policy impacts in Mediterranean regions

This section is based on Deliverable 25 (Lobianco & Esposti 2006) of the IDEMA project.

Mediterranean agriculture is more oriented towards perennial crops and vegetables than agriculture in Northern Europe. IDEMA has analysed two Italian regions, characteristic for Mediterranean agriculture. An AgriPoliSmed version of AgriPolis has been developed, which models cultivation of perennial crops like olives, grapes and citrus fruits.

Simulation results suggest that the effects of decoupling policies on Mediterranean agriculture are often dominated by effects of structural trends. For example, labour input in agriculture clearly shows a structural declining trend in both Italian regions, independent of policy scenario (Figure 10). Only a Bond type of decoupling policy would substantially change the regional farm structure, providing an incentive for farmers to leave the sector.

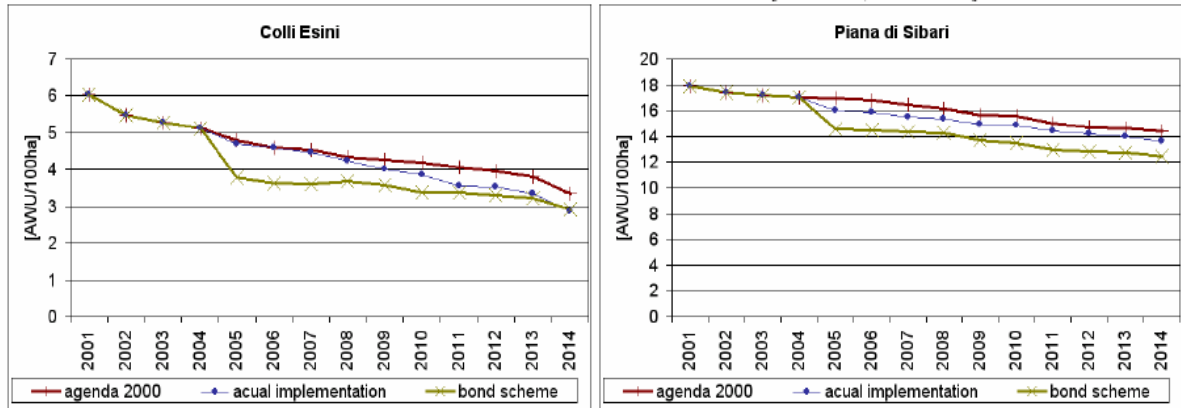


Figure 10. Total agricultural labour (AWU/100 ha) in the two Mediterranean regions

It can be noted that the 2003 CAP reform (actual implementation scenario) has very little impact on farm profits per hectare, while the Bond scenario to some extent reduces the income of active farmers. The results also point out that permanent crop farms can remain profitable also with a very small farm size, while arable crop farms need a much larger size to be competitive.

Environmental impacts

This section is based on Deliverable 24 (Brady et al. 2007) of the IDEMA project.

Agriculture is a major user of land and water resources and has a pervasive influence on the environment. Its environmental impacts can have both negative (damages) and positive (services) implications on the welfare of human beings. The damages include both point source and non-point-source pollution. Benefits include landscape values such as maintenance of biodiversity, preservation of cultural heritage, recreation possibilities, knowledge pool and other amenities. Since environmental impacts of agriculture are intertwined with the production decisions of farmers, decoupling might alter the flow of environmental services provided by agriculture and the level of the environmental damage caused by agriculture.

The environmental analysis in IDEMA has mainly focused on the implications of decoupling for provision of landscape values. One important reason is that the principal environmental risk associated with decoupling is the loss of landscape values that are produced jointly or in conjunction with agricultural commodities. That is because decoupling reduces the level of returns to commodity production. Land abandonment, in particular, may cause landscape values to disappear. Conversely, pollution issues are of less importance because lower level of production is expected to result in lower level of input use and consequently lower pollution. In case of soil erosion, this impact can be

characterized by a loss of land management service rather than a pollution problem. In addition to these reasons, there is a lack of empirical research on provisioning of landscape values, whereas pollution problems have been covered elsewhere. Moreover, the regional level is a suitable spatial scale for the analysis.

Five representative regions were chosen to capture the diversity of the EU-25. The work included development of an environmental module within the AgriPolis model. The principal environmental indicators evaluated were landscape mosaic (structure and composition of landscape, measured by Shannon’s index) and biodiversity value (measured by the number of endangered species), which were complemented with indicators of changes in pollution risk.

The impacts of decoupling vary between regions. Impacts are least in relatively productive regions because most land continues to be used in commodity production. Impacts are greatest in regions with relatively high production costs and a low share of agricultural land, because decoupling leads to homogenization of land use. Homogenisation of land use occurs because other types of land use become even more dominating when agricultural production and area of agricultural land decline due to decoupling.

The homogenisation of land use influences both landscape mosaic and biodiversity negatively. Other forms of support such as environmental payments and national support tend however to buffer the negative impacts. Figures 11 and 12 illustrate the impacts on landscape mosaic and biodiversity value, compared with 2004. When it comes to mosaic, the following general conclusions can be drawn. The impact on mosaic is closely related to the extent to which land is converted to land managed according to GAEC (without production). Decoupling causes significant homogenization of the landscape in relatively high-cost regions and the impact increases with the degree of decoupling. Decoupling has little negative impact on mosaic in low-cost regions and even produce positive impacts when crop diversity (heterogeneity) increases.

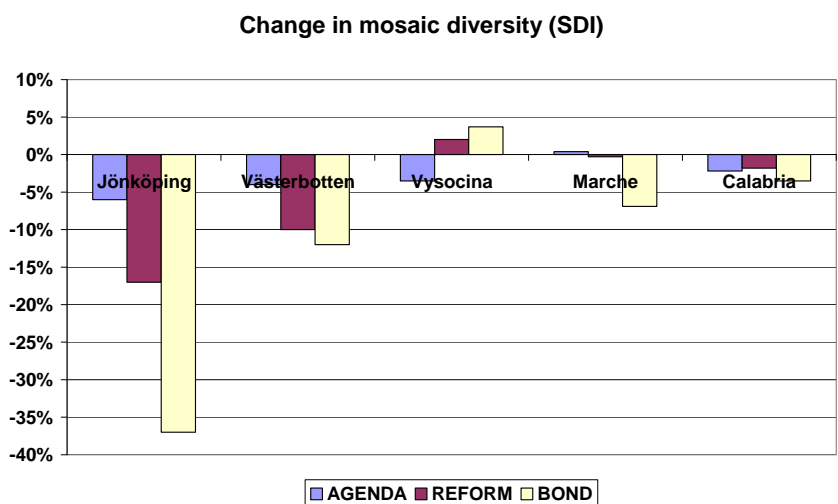


Figure 11. Change in mosaic diversity (Shannon's Index)

With respect to biodiversity, the GAEC is found under certain circumstances to be important for maintaining biodiversity in high-cost regions. However, the results

indicate that the negative impact of decoupling can be reduced by other support schemes (such as environmental support.) It can also be noted that large reductions in managed agricultural area do not necessarily translate into equivalent reductions in biodiversity value, because species productivity of habitat decreases with area. There are no general negative impacts on biodiversity value in low-cost regions.

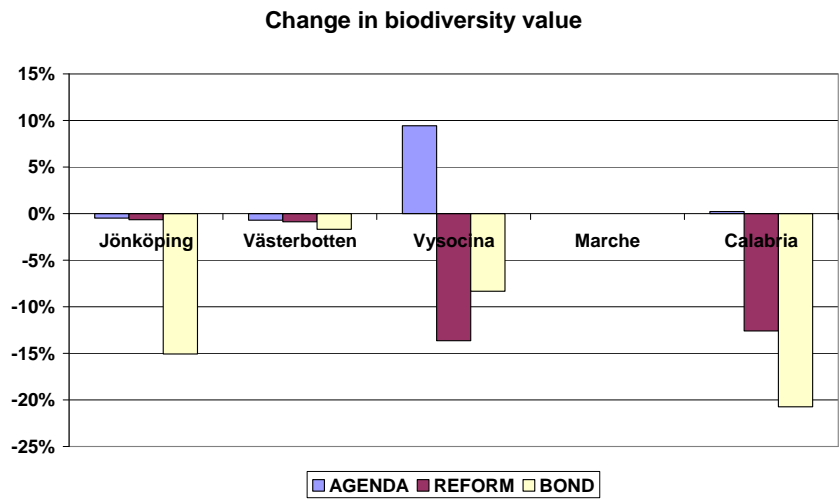


Figure 12. Change in biodiversity value

Sector level modelling and analysis

The following sections are based on Deliverable 18 (Balkhausen & Banse 2006a) and Deliverable 12 (Balkhausen & Banse 2005) of the IDEMA project.

Description of the ESIM model

The European Simulation Model (ESIM) is a recursive dynamic partial equilibrium model of the agricultural sector. It covers 36 products and 29 countries/regions. It has lagged price responses at the supply side. World market prices are endogenous and trade is modelled as net trade. The models' focus is on the EU with a detailed formulation of agricultural policies in individual EU-15 member states as well as in the New Member States (NMS) and the EU accession candidates. ESIM was first used by Tangermann & Josling (1994) and has undergone continuous development since then.

In order to model country-specific options of implementing the decoupling regulations, the aggregated model region of the EU-15 was split up into individual member states as one part of the IDEMA project. Another development within IDEMA has been the extension of ESIM to include pasture and fallow land.

Supply of crops and fodder in ESIM is determined by a yield function, dependent on the own price and price indices for intermediate inputs and labour, and an area allocation function. The area allocation function is dependent on own and cross incentive prices (including direct payments – see below) as well as intermediate input, capital, and labour cost indices. In order to ensure that all crop area is used for agricultural production, ESIM uses a scaling process by which the area allocated is scaled evenly up or down according to total crop area available. Supply of animal products is a function of own and cross incentive prices as well as a feed cost index and price indices for other intermediate inputs, capital and labour.

Direct payments enter the area allocation functions in the same way as prices; that is, market price and direct payment per product unit make up an "incentive price," which is the explaining variable. The calculation of the level of direct payments depends on the country in question and the policy applied:

- Coupled payments per ton in member states of the EU-15 are calculated by $\text{Payment per ton} * \text{Yield in base period} / \text{Actual yield}$.
That is, the payment per ton is adjusted by the actual yield for each crop and simulation period. Thus, an increase in yield leads to a decrease in the premium per ton and vice versa.
- Coupled payments per ton in the NMS are calculated by $\text{Phasing-in factor} * \text{Payment per ton in EU-15} * \text{Yield in base period} / \text{Actual yield}$.
That is, the calculation corresponds almost to the one applied for EU-15 members. However, the phasing-in factor takes care that payments in the NMS reach the level existing in the EU-15 only stepwise.

- Decoupled payments per ton in both member states of the EU-15 and NMS are calculated by
Uniform payment per ha / Actual yield.

Thereby, the payment per ha in each member state is calculated by dividing the available budget for decoupled payments by the total eligible area. That is, decoupled payments in ESIM are generally modelled as a uniform regionalised payment per hectare irrespective of which type of SFP a member state has opted. The SFP based on a farm's historical production in the reference period 2000 to 2002 can not be explicitly modelled in ESIM.

Under Agenda 2000 the maximum voluntary set-aside was restricted to 30 percent of total arable land per farm. For this study this upper bound is modelled as a "quota" assuming a shadow price of 65 percent of the set-aside premium.

Feed demand is modelled for 15 feed components plus silage maize, grass, and other fodder. Product-specific feed demand per unit of animal output includes the possibility to substitute roughages for other feed components. Total product-specific feed demand in a country is the product of feed demand per unit of animal output. An exogenous additive intercept which represents feed demand of animals not covered in ESIM is also included to guarantee market clearing for feed demand and supply.

Based on this approach the endogenous animal product-specific feed cost index reflects relative changes in feed prices. Thus, an increasing price for any feed component results in reduced demand for this component due to two effects. First, the substitution effect, in which other components is substituted for the more expensive one. Second, the output effect, where an increasing feed cost index results in lower animal production and therefore lower feed demand.

It should be mentioned that ESIM results with respect to the effects of decoupling depend heavily on assumptions about the impact of direct payments on production, both under Agenda 2000 and the decoupling scenarios. Rather rough assumptions are used, since the empirical evidence of these effects is still limited.

Scenarios

In the assessment of decoupled payments with ESIM, results for individual member countries in each scenario are compared for the projection years 2010 and 2013. The countries considered are the members of the "old" EU-15 on the one hand and the NMS without Malta and Cyprus but including Bulgaria and Romania on the other hand.

The scenarios are almost identical to the scenarios analysed with AgriPoliS. Scenarios for EU-15 include:

- A scenario with coupled direct payments, representing Agenda 2000.
- Actual implementation of the 2003 CAP reform.
- A full decoupling scenario where the option to partially couple direct payments is removed.
- A Bond scheme scenario. In ESIM it is assumed that the payments granted under the Bond scheme have no effect on production at all.

The four scenarios for the NMS are as follows:

- A without accession scenario, with continuation of pre-accession policies.
- An actual implementation scenario. From 2009 it is assumed that the NMS apply the regionalised version of the SFP.
- A full decoupling scenario with fully decoupled direct payments and national top-ups in each member state.
- A Bond scheme scenario, with the same assumptions as for EU-15.

Impacts of decoupling policies

According to ESIM results, the choice of policy has a considerable impact on prices, area allocation and production in EU member states. This influence differs among products and countries. However, there is no general difference between decoupling effects in the NMS and in the old member states. This is no surprise, since model results refer to the years 2010 and 2013, when level of direct payments in the NMS have reached the EU-15 level.

The implementation of the 2003 CAP reform varies among EU-15 countries. Only France and Spain use the possibility of keeping direct payments (partially) coupled to production for all product categories. In contrast, only Germany, Ireland, Greece, Italy and the United Kingdom decided to decouple all payments (almost) completely. In Austria, Belgium/Luxembourg, Denmark, Finland, the Netherlands, Portugal, and Sweden some of the payments for beef and/or lamb production are kept (partly) coupled to production.

Within the group of NMS most countries opted for highly coupled top-ups for COP production (cereals, oilseeds and protein crops) and ruminants. Only Poland goes without subsidies for the ruminant sector. In Slovakia beef payments are coupled to a comparatively low degree. In the ESIM analysis, beef payments in Bulgaria and Romania are assumed to be coupled to degree which corresponds to the average coupling degree in EU-10.

Simulation results show that decoupling in EU-15 countries as well as the introduction of (decoupled) CAP payments in the NMS lead to an area shift from COP production towards grass and arable fodder. The latter crops were not eligible for direct payments under Agenda 2000 or pre-accession policies. The decrease of COP production does not differ much between partial and full decoupling. In other words, cereal and oilseed producers do not benefit heavily if COP payments are kept partly coupled to production. However, in the special case of silage maize, area decreases are stronger when COP payments are fully decoupled than under the partial decoupling approach (which is applied in France and Spain).

Voluntary set-aside area is measured for the old member states only. With decoupling it increases in almost all countries of the EU-15. The reasons are i) the abolished limit for voluntary set-aside area, ii) decreasing incentive prices for alternative land uses, and iii), in case of some member states, even increasing incentive prices for voluntary set-aside. Set-aside area is higher under the Full Decoupling scenario than in the Actual Implementation scenario. The latter result occurs because remaining (partially) coupled

direct payments in the Actual Implementation scenario are distributed over the total eligible area with Full Decoupling, so that direct payments for set-aside are higher with full decoupling.

While cereal and oilseed producers are not heavily affected by the decision whether COP payments are partially coupled or fully decoupled, beef supply crucially depends on the decoupling option chosen under the 2003 CAP reform. The policy option of keeping beef and/or sheep payments (partially) coupled to production can even lead to an increase in beef and/or lamb production. Thus, beef producers in Finland, France, the Netherlands, and Spain, as well as sheep producers in Denmark, Finland, and France seem to even extend their production given the (partial) coupling options chosen by their governments. In these cases, the supply decreasing effect of lower direct payments is offset by the production stimulating effect of lower fodder costs and higher meat prices.

The economic situation for beef and sheep producers in the NMS is also strongly influenced by the decision whether nationally co-financed top-ups and direct payments will be granted. Beef production is up to 13 percent higher in case of partially coupled subsidies than under fully decoupled payments. In other words, farmers benefit significantly from partially coupled subsidies in their sector. However, the beef and sheep sector in the NMS benefits much more from EU accession than from the introduction of direct payments and top-ups. Hence, the EU accession was beneficial for beef and sheep producers regardless of whether coupled payments are granted or not.

Bond scheme

The Bond scenario results show a sharp decrease in incentive prices for crop and fodder productions. As a result, between 4 and 15 percent of agricultural land in EU member states is expected will fall idle if current CAP payments are fully transferred into a Bond scheme.

While the direction of change in land use resulting from the Bond scheme is homogeneous among all members, the direction of change varies among member states in case of beef and lamb production. Model results show that the impact on beef and lamb production depends on the decoupling option chosen under the 2003 CAP reform. Beef and lamb production in France and the Netherlands decreases sharply when current direct payments are transferred into a Bond scheme. In these countries a high level of coupled payments is currently paid to beef (both countries) and sheep (only France) producers. Similar effects can be expected for Spain, Portugal, Belgium, Finland, Sweden, Denmark and Austria, which also opted for partially coupled payments in the beef and/or sheep sectors. In member states like Germany, the United Kingdom or Italy, which decided to decouple payments for beef and sheep (almost) completely, beef and sheep producers do not suffer from a shift to a Bond scheme. Due to the increase in producer prices on the EU-level, which takes place as a result of the decrease in production in some countries, German, British or Italian beef and sheep producers even benefit from a removal of the remaining partially coupled payments.

Also NMS simulation results for beef and sheep differ between countries. Projected results for the implementation of a Bond scheme largely depend on the decoupling option chosen under the 2003 CAP reform. In Poland, which opted for no top-ups and

direct payments for beef, supply under the Bond scheme scenario is higher than under the Actual Implementation scenario. Ruminant production in all other NMS would suffer from an implementation of a Bond scheme, since they have opted for highly coupled top-ups and direct payments (except Slovakia). In general, supply of arable fodder and grass decreases and prices for feed components are higher when payments are transferred into a Bond scheme. As a consequence, the supply increasing effect of higher producer prices for beef is reduced due to higher feed costs.

Trade effects

Due to decreases in production in the course of decoupling, the net trade position of the EU changes from a clear net export position towards a more neutral or even towards a net import situation. While the EU is expected to remain a net exporter of wheat, barley, and rye, it will become a net importer of corn, durum, and rapeseed when direct payments are fully decoupled. With respect to beef and lamb production the net trade position of the EU does not change significantly due to decoupling.

Budgetary effects of reorganising CAP payments

This section is based on Deliverable 21 (Balkhausen & Banse 2006b) of the IDEMA project.

Budgetary effects for EU member states of changing the design of the CAP payment system have been analysed in a separate study within IDEMA. One option is a significantly stronger modulation of financial means from the first to the second pillar of the CAP. Thereby, it is also inevitable to discuss whether the NMS should be included into the dynamic modulation mechanism.

According to the impact on budgetary outlays of individual member states, it can be expected that governments of the EU-15 members will stand up for a further exemption of the NMS from modulation and for maintaining the minimum bound on how much of the modulated money is retained in each member state. Most of the NMS should claim exactly the opposite. However, neither the Czech Republic nor Hungary and Slovakia benefit from an inclusion into modulation and from the elimination of a minimum receipt of modulation savings.

From a financial point of view there are almost as many supporters of a higher modulation rate (e.g. Poland, Romania and Spain) as opponents (e.g. Germany, France and the UK). A system of national co-funding of direct payments under the first pillar is favourable for first of all Germany and the UK.

Conclusions

The IDEMA project has analysed impacts of decoupling EU agricultural support. Both the 2003 CAP reform and a more extreme Bond scheme, without a link between payments entitlements and land, have been analysed.

Impacts of the 2003 CAP reform

Survey and modelling results reveal that the impacts of the 2003 CAP reform are moderate, compared with a continuation of Agenda 2000. There is no strong evidence that farmers intend to drastically change their strategic decision to exit agriculture. In fact, model results indicate that structural change slows down when direct payments are decoupled. One reason is that grassland management becomes an additional income source for farmers. Another finding is that the decoupled payments may reduce farmers' off-farm labour supply. In the New Member States (NMS), the impact of accession dominates the effects of decoupling; the introduction of CAP payments results in a greater willingness to stay in farming and more competition for land. Increased payments are capitalised in higher land (rental) prices.

A general result is that decoupling in the 2003 CAP reform leads to a small shift from cereals to forage and grass, which were not eligible for direct payments under Agenda 2000 or pre-accession. Some increase of voluntary set-aside area in less productive, high cost regions is also expected. The greatest impacts of decoupling occur in the beef and sheep sectors. Here the individual Member States' decision to (partially) couple direct payments or use top-ups has a marked influence on beef and lamb supply. Beef and sheep production is sensitive to decoupling in regions with high production costs. Reduced supply of cereals, oilseeds, beef and lamb at the EU level leads to somewhat higher market prices of these products, which mitigates the impact of decoupling on production.

Bond scheme

Model results show that a Bond type of decoupled payment leads to a strong increase in average farm size, compared with the 2003 CAP reform. Many farmers leave the sector if off-farm jobs are available, as the decoupled payment is granted to a farmer independent of land or any farming activity (it is only based on historical production). However, in most cases profits per hectare are unchanged or even higher under the Bond scheme, due to significantly lower land (rental) prices and structural change.

The Bond scheme leads to increased abandonment of agricultural land. The impact on livestock production depends to a large extent on the (partial) coupling choices the individual Member States made under the 2003 CAP reform. Livestock production decreases mainly in countries which chose to use coupled beef and sheep payments under the 2003 reform. However, lower supply also means higher product prices.

Lower supply of agricultural products due to decoupling changes the net trade position of the EU from a clear net export position to a more neutral situation or even a net import situation.

Environmental effects

The environmental analysis reveals that decoupling impacts are least in the relatively productive regions, because most land continues to be used in commodity production. In marginal regions with relatively high production costs, decoupling has a negative impact on both landscape mosaic and biodiversity, because decoupling leads to homogenisation of land use.

Farmers' attitudes

Survey results reveal that most farmers do not accept the idea that they could survive or be competitive without policy support. The strongest opposition to policy liberalisation comes from farmers in the NMS. There is also pessimism surrounding the opportunities for diversification. More than 40 percent of respondents do not think that they can easily find a job off-farm or increase the number of hours devoted to off-farm work. However, the majority of respondents agree with the need for farmers to produce attractive landscapes and positive environmental externalities.

Summing up

It can be concluded that the existence of a link between payment entitlements and land is crucial for the impact of a decoupling policy. The decoupling of CAP support in the 2003 CAP reform has a moderate impact on production and may slow down structural change. On the other hand, changing to a Bond type of decoupled payment, which is not linked to land, means much faster structural change and idling of land. However, a Bond scheme tends to increase farm profitability rather than reducing it.

Finally it can be asked whether the results of the IDEMA project indicate that the 2003 CAP reform has achieved its objectives. The question is interesting because the same decoupling principles have been extended to other commodities and, moreover, further decoupling is expected in the "Health Check". The major objectives of the reform were to create a better market orientation, to enhance competitiveness of European agriculture and improve farmers' incomes. As the reform has been implemented, the market orientation has undoubtedly increased and farm incomes improved. A move to a full and uniform decoupling in all regions would improve the situation further but not in any dramatic way. At the same time it can be argued that the objective of improving competitiveness has hardly been archived due to slower structural change, smaller farm size and higher land prices, which all follow from the reform. An implementation of a Bond scheme would constitute a better option from a competitiveness perspective, but this may be difficult to achieve for political reasons.

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