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The economics of the common agricultural policy (CAP)

Abbreviations and symbols used

Member States

B	Belgium
DK	Denmark
D	Germany
WD	West Germany
GR	Greece
E	Spain
F	France
IRL	Ireland
I	Italy
L	Luxembourg
NL	The Netherlands
P	Portugal
UK	United Kingdom
EUR 9	European Community excluding Greece, Spain and Portugal
EUR 10	European Community excluding Spain and Portugal
EUR 12–	European Community, 12 Member States including West Germany
EUR 12+	European Community, 12 Member States including Germany

Currencies

ECU	European currency unit
BFR	Belgian franc
DKR	Danish crown (krone)
DM	German mark (Deutschmark)
DR	Greek drachma
ESC	Portuguese escudo
FF	French franc
HFL	Dutch guilder
IRL	Irish pound (punt)
LFR	Luxembourg franc
LIT	Italian lira
PTA	Spanish peseta
UKL	Pound sterling
USD	US dollar
SFR	Swiss franc
YEN	Japanese yen
CAD	Canadian dollar
ÖS	Austrian schilling
R	Russian rouble

Other abbreviations

ACP	African, Caribbean and Pacific countries having signed the Lomé Convention
AMS	Aggregate measure of support
ECSC	European Coal and Steel Community
EDF	European Development Fund
EIB	European Investment Bank
EMCF	European Monetary Cooperation Fund
EMS	European Monetary System
ERDF	European Regional Development Fund
Euratom	European Atomic Energy Community
Eurostat	Statistical Office of the European Communities (SOEC)
GDP (GNP)	Gross domestic (national) product
GFCF	Gross fixed capital formation
LDCs	Less-developed countries
Mio	Million
Mrd	1 000 million
NCI	New Community Instrument
OCTs	Overseas countries and territories
OECD	Organization for Economic Cooperation and Development
OPEC	Organization of Petroleum Exporting Countries
PPS	Purchasing power standard
SMEs	Small and medium-sized enterprises
toe	Tonne of oil equivalent
:	Not available

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Foreword

A group of independent agricultural economists was asked to undertake an economic assessment of current EU agricultural policy and to consider various ways to reform the common agricultural policy (CAP).

The main results of the work of this expert group were presented in a volume of *European Economy* entitled *EC Agricultural Policy for the 21st Century.*[1]

This volume of 10 papers reports the background studies undertaken by members of the group. The papers represent the opinion of the individual experts and do not necessarily reflect the opinion of the Commission.

In reading the papers, it should be borne in mind that several of them were finalized before it became clear how the 1992 Council decision on CAP reform would be implemented.

Heinrich Matthes
Chairman of the Editorial Board of
European Economy

[1] *European Economy Reports and Studies* No 4 (1994), Office for Official Publications of the European Communities, Luxembourg. ISBN 92-826-8837-2.

Synopsis

by Knud J. Munk and Ken Thomson.

This synopsis summarizes the papers the members of the expert group have prepared to provide background information for the preparation of the main report, *EC Agricultural Policy for the 21st Century*.[1] The experts were asked to prepare papers on different aspects of reform of the common agricultural policy (CAP). The papers fall in three groups: the first group considers the effect on the world market and the trading partners of the European Union. The second group assesses the impact on the EU Member States and the third group considers various specific issues of key importance for the assessment of the reform process.

To harmonize the assumptions for the analysis the members of the expert group agreed to consider three scenarios. The first, the base scenario, corresponds to a continuation of pre-reform EU agricultural policies, i.e. policies applied before the 1992 reform including the application of the stabilizer mechanisms. The second, the CAP reform scenario, is based on an interpretation of the 1992 reform decision to allow quantification of its impact. The third, the decoupled reform scenario, considers a modification of the 1992 reform decision in that all direct payments would be provided in a lump-sum fashion and that there would be no set-aside.

Based on quantitative results produced by the use of the MISS, RUNS and ECAM models, the experts also agreed on a common assessment of the main effects of reform for the Union.[2] The main findings were that the 1992 reform leads to a reduction of EU production of cereals and oilseeds with a significant increase in the use of cereals for feed and a corresponding decrease in the use of imported feedingstuff ingredients, and that the costs to the EU budget and the level of farmers' income increase moderately under the two reform scenarios compared with the base scenario.

The first three papers consider the relations of the Union to its trading partners and the effect of CAP reform on these relations.

The paper by **Guyomard and Mahe** considers the history of US-EU agricultural trade relations, emphasizing interactions in the GATT context.

The reform scenarios are estimated to increase world market prices compared with the base scenario, except for grain substitutes. The effect is largest in the decoupled reform scenario. The United States of America overall is, therefore, positively affected (in terms of farm income and government budget) by CAP reform although the decrease due to reform in non-cereals feed consumption in the Union has a negative effect. The authors nevertheless consider that the reform may give rise to further trade conflicts. The reform improves EU competitiveness in white meat production which may create trade tensions with the USA in third markets. Furthermore, the different levels of protection provided to imported corn and exported wheat may create tension as the Union will have difficulty fulfilling its minimum access commitments in the GATT as regards imported corn, which is unlikely to be competitive in the Union.

Munk considers how the prospect of accession of the CEECs to the Union affects the pressure for reform of the CAP. The paper suggests that the Central and East European countries (CEECs) are not competitive in agriculture at world market prices and that they will tend to develop protectionist agricultural policies as has been the case in other countries at similar levels of development. The CEECs are likely to implement levels of protection consistent with an agricultural trade position close to self-sufficiency. A considerable convergence in price levels between the Union and the CEECs is therefore likely under the reform scenarios. Given the quantitative restriction of production under the CAP, the extension of the EU market price support system to the CEECs in the case of accession is therefore likely to result in only a modest increase in EU budget costs. The need to stimulate agricultural trade between the Union and the CEECs to promote economic and political integration during the period prior to accession will, however, add pressure for further CAP reform beyond what was decided in 1992.

Goldin, Van der Mensbrugghe and Cordella consider the effect of CAP reform on developing countries. They find that CAP reform has a limited, and in general negative, effect on developing countries. These countries are, in general, importers of cereals and are penalized by the increase in world market prices for cereals. Exceptions are the Latin American countries which benefit from higher prices for cereals and oilseeds. CAP reform may also reduce the benefit of privileged trade access from which a number of developing countries are benefiting. Furthermore, reduced prices for northern products will reduce the demand for competing products coming from the South. Finally, reduced EU stocks may possibly have an adverse effect on stockholding and hence willingness to provide food aid.

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[1] *European Economy Reports and Studies* No 4 (1994), Office for Official Publications of the European Communities, Luxembourg. ISBN 92-826-8837-2.

[2] See Annex D of the main report.

The following two papers consider the effect of CAP reform within the Union itself, on the northern Member States and the second on the southern Member States.

Folmer, Keyzer, Merbis, Stolwijk and Veenendaal provide information on the impact of CAP reform on Member States. The paper also reviews a number of arguments for and against market price support, concluding that a free-trade solution cannot necessarily be justified on welfare economic grounds in general, but that a reduction in price support, relaxation in quantitative restrictions and compensation in the form of lump-sum transfers in the case of EU agricultural policy may be given a welfare economic justification. The model results show that compared with the base scenario, value-added in UK, France and Germany is negatively affected by CAP reform, whereas Ireland, Italy and the Netherlands will gain compared with a continuation of the policies of the 1980s. All the nine Member States considered gain in terms of aggregate real income, but the effects are small. For the EC 9, the aggregate real income gains are estimated to be ECU 8 billion under the 1992 reform scenario and ECU 12 billion under the decoupled scenario compared to the base scenario. The authors emphasize that the 1992 reform involves increased constraints on the farmers, creating higher administrative costs not taken into account in the calculations.

Sarris analyzes how differences in product composition, farm size and age structure between the South and the North of the Union determine the impacts of the 1992 reform. He estimates that the reform increases the net transfer from the South to the North due to the CAP, taking into account the changes in transfers for different agricultural products and the financing of the expected increase in the EU budget. However, due to higher shares of food consumption, consumers in the South benefit relatively more from lower food prices than consumers in the North. In this region of the Union, small farmers who benefit from reduced consumer prices and big farmers who enjoy high transfers for grains are likely to gain, whereas middle-sized farmers with limited consumer gains and significant losses from lower support to sheep and tobacco are likely to lose from reform. Sarris identifies the two major aspects of the 1992 reform to be the shift from market price support to direct payments and the much neglected likely increase in administrative complexity of the CAP and hence in administrative costs. Since these costs are financed by Member States and are largely proportional to the number of farms, they impose disproportionate costs on the southern countries which furthermore have the weakest administrations. On the other hand, the early retirement scheme favours the South because it has a disproportionate number of old farmers.

The last group of four papers assesses various aspects of reform: the effect on rural development and the environment, structural change, farm labour and price stability.

Merlo traces the evolution of rural development policy in the Union from its inception when rural and agricultural development were almost synonymous through to the current emphasis on non-farming activities in rural areas and on the environment. He draws attention to the differences between regions where the ratio of farm income relative to non-farm income is low compared to the EU average, and those regions where the opposite is the case. In the high-income farming regions, agriculture tends to be well integrated with other economic activities in the same region and to be flexible with respect to change in product composition, while in the low-income farming regions this is typically not the case. The effect of decreases in support prices due to CAP reform may be different in the two types of region. The reform may reduce the advantages of economies of scale and stimulate alternative labour-intensive productions such as on farm processing of quality products benefiting from lower raw material prices. In the regions with relative strong agro-food structures this may, on balance, lead to a stimulation of rural development, whereas, in the weaker less adaptable and marginal regions, the lower prices may lead to further decline. Environmental effects will vary according to the type of region, leading to a reduction in negative externalities in intensively farmed areas, but also to some reduction in positive externalities, particularly in marginal areas already experiencing abandonment. Merlo also considers the effect of compensation payments and accompanying measures: the programmes for agri-environmental improvement, forestation and early retirement. He advocates that compensation payments be redesigned to specifically target rural development, environmental and food quality objectives rather than to land use. This would avoid the adverse impact on farm consolidation of capitalization of subsidies into land values. The impact of the accompanying measures is considered uncertain because they depend on Member State initiatives. The environmental measures may be important in marginal areas, but will have little impact in areas with high land values. Afforestation is unlikely to contribute significantly to rural development. The early retirement scheme is also unlikely to have much effect on rural development. Merlo suggests that more attention should instead be given to removing legal and institutional obstacles which, particularly in the South, prevent improvement of agricultural productivity.

The paper by **Larsen and Hansen** considers the effects of reform on the structural adjustment in agriculture which involves partly the transfer of primary factors of production to other sectors, and partly the transfer of resources between

farm types with respect to size and production orientation. They review agricultural structures in Europe and their adjustment over the last 20 years. Production and area per holding have increased whereas labour input has fallen. Also the total number of farms has fallen. Part-time farming seems to have increased in importance and farms have become more specialized. Lower farm prices will decrease land prices and lead to an increased outflow of labour from agriculture. Since land rent constitutes a greater share of the costs of bigger farms than of smaller farms, the structural adjustment pressure is likely to be bigger on smaller farms than on bigger farms. Lower farm prices will force marginal land to go out of use for agricultural production. However, these effects would be counteracted by the compensations linked to the use of land. The liberalization of farm prices will tend to favour more diversified production, but Larsen and Hansen do not consider that this effect will be significant. All in all, they consider that the 1992 reform will have little effect on structural adjustment in agriculture.

Frohberg first provides empirical evidence on the use of labour in European agriculture and considers various modelling approaches to represent the supply and demand of agricultural labour. He emphasizes the many specific features of the agricultural labour market which make a household approach more appropriate than in other sectors. Frohberg considers that the effects on the use of labour in EC agriculture due to the 1992 reform will be minimal in the short term, although extensification due to lower prices and the set-aside requirements will have a negative impact on the use of labour. The early retirement scheme could be attractive for farmers on marginal lands, but these often exist in regions where alternative job opportunities are limited. In the longer term, a switch from crop to pasture may increase out-migration although increases in poultry and pork production may have the opposite effect. Without compensation payments linked to land use, the effect on agricultural labour could, however, be significant in the long run. Simulation results obtained from the ECAM model suggest that over a 10-year period the 1992 reform without area-linked compensations would lead to an additional 3% decrease in the agricultural labour force, but this does not take into account the effect on area fallowed. Frohberg emphasizes that the effect on employment could be very negative in certain regions. In such regions discontinuation of the compensation payments linked to land use would require the adoption of policy measures to create alternative job opportunities such as for example direct payments to achieve environmental objectives. Frohberg also provides calculations of the impact of discontinuing the compensation payments at the retirement of existing farmers. He finds that over a 10-year-period this would reduce the compensation payments by around 40% with little variation from one Member State to another. A decoupled compensation scheme would therefore be significantly cheaper in the longer run than the system introduced by the 1992 reform.

Anderson considers the impact of reform on agricultural market fluctuations. He first considers various measures to reduce the adverse effects of risks in agriculture by buffering consumption from income fluctuations and by reducing the variation in income itself. He points out that the improvements in credit markets and the development of risk contract markets have significantly reduced the need for direct government price stabilization compared with the time when the CAP was created. To assess the effect of policy reform, Anderson uses a model which represents (a) uncertainty about the annual harvest, (b) the ability to trade the product internationally, and (c) the ability to store the product from one season to another. In the model, the CAP is represented as a floor price policy. The results suggest that reform by lowering the floor price results in a reduction in average EU market price by less than the reduction in the floor price. Compensation in the form of direct payments based on the full reduction in the floor price, therefore, leads to overcompensation of the farmers. Second, even if the floor price is fixed at the underlying world average, the average EU price will be higher than the world market price, and thirdly price volatility within the EU increases significantly whereas world market price volatility falls. World inventories, therefore, fall significantly whereas the incentives for private stockholding in the Union and the development of markets for risk contracts due to the price floor only increase slightly. An important result of the analysis is that the CAP, after reform as before it, may provide very limited incentive for private agents in the Union to store or to take other measures to reduce price volatility.

Molander provides the basis for drawing lessons from the Swedish reform process. The paper starts by describing and evaluating Swedish agriculture policy prior to the reform on the basis of its stated objectives. The overall conclusion is that agricultural policies were not sufficiently targeted given the large number of objectives. The paper then goes on to describe the current agricultural reform process reviewing the analysis on which the 1989 reform proposal of a parliamentary working party was based and the modification of that proposal through the legislative process. The proposal was based on the principle that agriculture should be subject to the same conditions as other economic activities if no good reasons to the contrary, and the observation that all the features exhibited by agriculture can be found in other sectors in the Swedish economy which function well without a detailed regulatory framework. The working party, therefore, concluded that the market price support solutions adopted in the 1930s had been made much less appropriate by the increase in educational standards and labour mobility and the

reduction in the agricultural labour force, and should be abolished with the provision of temporary compensation to affected farmers. Most points of the reform proposal by the working party were adopted by the Swedish Parliament. The reform decisions taken in 1990 with the support of nearly all parties in the Swedish Parliament involved significant price decreases with export subsidies being abolished. Farmers were provided with transitional compensation payments linked to the ownership of farm land whereas in the original proposal the compensation was linked to persons. The reform programme also included an early retirement scheme for dairy farmers and reorientation schemes to encourage alternative land uses including payments for environmental services. Direct price support to farm production in northern regions was maintained, as in the original proposal. The implementation of the reform decisions was modified after the Swedish decision to apply for EU membership, which in the medium term will impose greater adjustment pressures on Swedish agriculture than the Swedish reform in itself. The paper finally assesses the impact of the reform on agricultural markets, farm structures, food security, the environment and its regional effects. Although it will take time for the full effects of reform to be achieved, it was already in 1993 clear that there would be a fast adaptation of animal production due to a rapid uptake of the voluntary retirement scheme for milk producers and that there would be a significant reduction in the use of fertilizers and pesticides.

EC-US trade relations in the context of the GATT negotiations and of the reform of the common agricultural policy

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1. Introduction

The Uruguay Round has been ongoing for over six years, lasting longer than any previous round. This is also the first time that agricultural issues have played such an important role, with several crises triggered by the determination of the United States of America (USA) and developing countries to condition any general agreement on a successful solution of pending agricultural disputes. The common agricultural policy has been kept under constant pressure during the negotiations by exporters of temperate zone products, and particularly by the USA.

Hence, the USA and the European Community (EC) have been the major actors in the Uruguay Round and agricultural issues have been in the limelight for most of the time, a position which is out of proportion with respect to the relative share of agriculture in world trade and the importance of emerging issues, such as trade in services or intellectual property, which have received less coverage from the media.

Although on several occasions it was feared that the round would collapse, it never did, and failures to conclude agreements at important stages (Montreal in 1988, Brussels in 1990, or Geneva in 1991) were soon followed by initiatives to restart the process. In fact, several policy changes have occurred since the negotiations started and the wide discrepancies between the early negotiating positions of the major players have narrowed. The prospects for a final agreement are now within reach after the bilateral meeting of Washington where the European Commission and the USA have found a tentative solution to their disputes in the form of the Blair House pre-accord.

The major reform of the common agricultural policy (CAP) proposed by the Commission in July 1991 (European Commission, 1991) sets the stage for this bilateral compromise. This reform drastically changed the negotiating position of the EC, even though the process of adoption by the Council of Ministers (European Commission, 1992) has led to numerous changes which have edulcorated the reform project initially proposed. Nevertheless, a significant reform has been initiated and, although it does not cover all sectors, it introduces a new instrumentation for providing economic support that lessens incentives to disrupt markets. It is noticeable that the reform has focused on cereals, the commodity at the core of European agriculture, and on closely related products which are highly traded and not controlled by production quotas.

Effective policy reforms have been implemented in various countries, often aside from the Uruguay Round itself, but influenced by the general context of the negotiations. However, the latter part of 1992 brought some uncertainty on the conclusion of a general accord as the EC-US dispute on oilseeds and EC grain export volumes overshadowed all the other issues. In summer 1993, the prospects for a GATT agreement looked quite much better.

The purpose of this paper to analyse the implications of the CAP reform and of a more decoupled version of the reform which would reduce some of the remaining price distortions. It compares the outcomes of the actual reform with those of a decoupled version of the reform on world markets and on US policy objectives. It also addresses the likelihood of the disappearance of the trade tensions between the two countries and raises some doubts in this regard.

Section 2 reviews some of the EC-US agricultural disputes before and during the Uruguay Round. Section 3 describes the base-run and the two CAP reform scenarios analysed by simulations. Section 4 reports the results of the base-run simulation. Section 5 presents the simulated results of the CAP reform on EC agriculture and compares these results with the base-run. The implications of a decoupled version of the reform are analysed in Section 6. Section 7 explores the implications of these scenarios on international markets and focuses on the impacts on the USA. Section 8 concludes the paper.

2. The GATT context of the CAP reform

2.1. A brief review of EC-US agricultural trade relations

2.1.1. The special status of agriculture in the previous rounds

In the seven previous rounds, the notion that 'agriculture is different' was generally accepted. Therefore, agriculture was never really brought under the general GATT rules. It was granted exceptions from the general principles of the Agreement and some countries were allowed specific derogations. Import quotas (Article XI) and export subsidies (Article XVI) were tolerated, under some general conditions, for agricultural products. In 1955, the USA obtained a waiver of its GATT obligations under Section 22 of the Agricultural Adjustment Act of 1933. Variable levies were tolerated in the EC. It is interesting to note that several of these exceptions and derogations were incorporated into the GATT at the insistence of the USA.

Agriculture was largely left out, not of the discussions in the successive GATT rounds,[1] but of the commitments because of the pre-eminence of domestic issues over trade objectives in the agricultural policies of most contracting parties. A particular opportunity was missed in the Kennedy Round when the EC proposed to introduce a ceiling for its self-sufficiency ratio for important products and to bind the 'montant de soutien' which would have constrained the level of price support and hence, of border protection. But, the USA rejected the offer that it might have been wise to accept.[2]

Real commitments were nevertheless made in the successive rounds of negotiations, particularly on the part of the Community as concessions in exchange for being allowed to pursue its high grain price policy. Some of them seemed rather limited at the time, but have since become serious issues in agricultural trade relations. The zero binding tariff on oilseeds and non-grain feed in the Dillon Round and on grain substitutes (corn gluten feed) in the Kennedy Round has constrained the development of the CAP and given a leverage to other countries in the current negotiation.

The depressed world market prices for agricultural commodities in the early 1980s, the US farm sector crisis (partly due to the overvalued US dollar, but widely attributed to the CAP in US circles) and the worldwide dissatisfaction with farm policies have increased the pressure to launch a major review project by the Organization for Economic Cooperation and Development (OECD) and to include agricultural issues in a new round of negotiations.

The announced objective of the Uruguay Round, as stated in the Punta del Este Declaration, was no less than to achieve greater liberalization of agricultural trade by:

(i) improving market access (i.e. reducing import barriers),

(ii) 'improving the competitive environment by increasing discipline on the use of all direct and indirect subsidies and other measures directly or indirectly affecting agricultural trade, including the reduction of their negative effects and dealing with their causes' (*Focus,* October 1986, p. 4), and

(iii) reducing the adverse trade effects of sanitary and phytosanitary regulations.

Although all countries in principle agreed to bring agriculture further under the general GATT rules, it was clear from the start that there were varying degrees of enthusiasm regarding this project. It remains to be seen how far this round of negotiations can go in achieving a programme with such ambitions that it soon creates problems for nearly all countries in some sectors and in nearly all sectors for some countries.

It was also to become increasingly obvious that the discussions were to focus on trade rather than on far-reaching policy reforms that would encompass all countries and products. Opening trade opportunities for the more competitive exporters, breaking the most isolating import barriers, and minimizing concessions in the sensitive sectors have proved to be the rule of the game for all the players. The agricultural trade position and the types of policy instruments (i.e. export aids versus import barriers) have dictated the attitudes of the countries and largely determined the course of events. Given the size and the contrasting situations of both the EC and the USA in this respect, it is not surprising that the round has, once again, drifted towards a face-to-face struggle between the EC and the USA.

2.1.2. Focus on the EC-US agricultural conflict

The history and the role of agriculture in the GATT show that the successive rounds of negotiations were dominated by EC-US disputes. Several issues in the EC-US agricultural trade conflict emerged soon after the creation of the Common Market and the implementation of the CAP. Recent developments seem to have reached a new phase in the ongoing round.

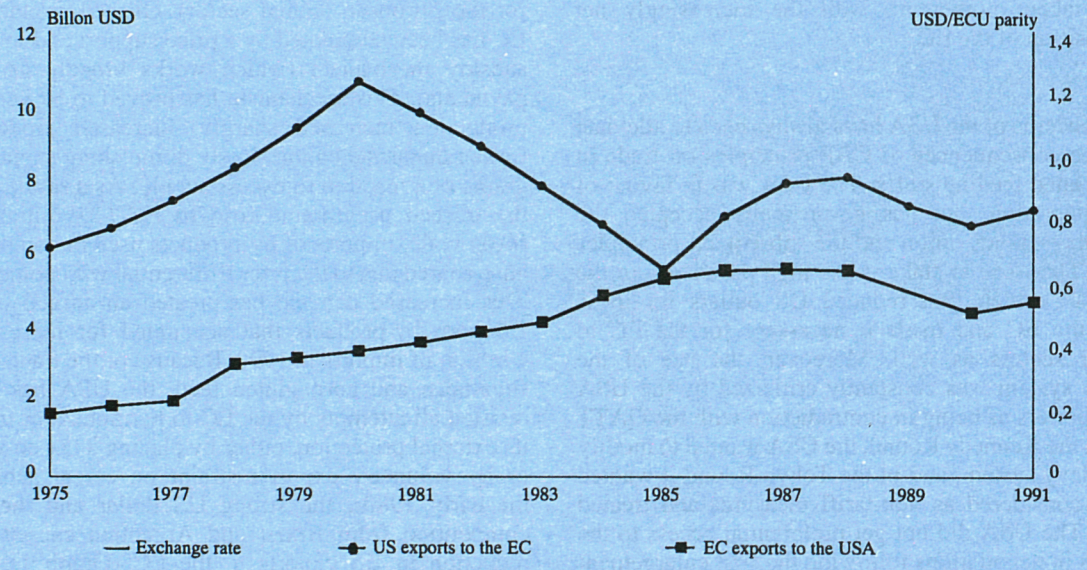
The trade balance in agricultural products between the EC and the USA has traditionally been in favour of the USA. US exports to the EC reached about USD 10 billion at the end of the 1970s. They fell to nearly USD 6 billion in 1985 and slowly recovered over the rest of the decade (Graph 1).

The composition of bilateral trade flows in agricultural products is, however, quite different (Graph 2). The US exports essentially basic commodities to the EC, (grains, oilseeds products and corn by-products). These are heavily regulated in both the EC and the USA, with a generally higher level of protection granted in the EC, except for corn by-products. EC exports to the USA include more processed food products with a high value per tonne and which are, for the main part, non-CAP commodities, like wine and beer, and to a lesser extent meat and dairy products supported in the EC but also subject to strict trade barriers in the USA.

[1] Until the Uruguay Round, domestic agricultural policies were regarded as non-negotiable (Hine et al., 1989).

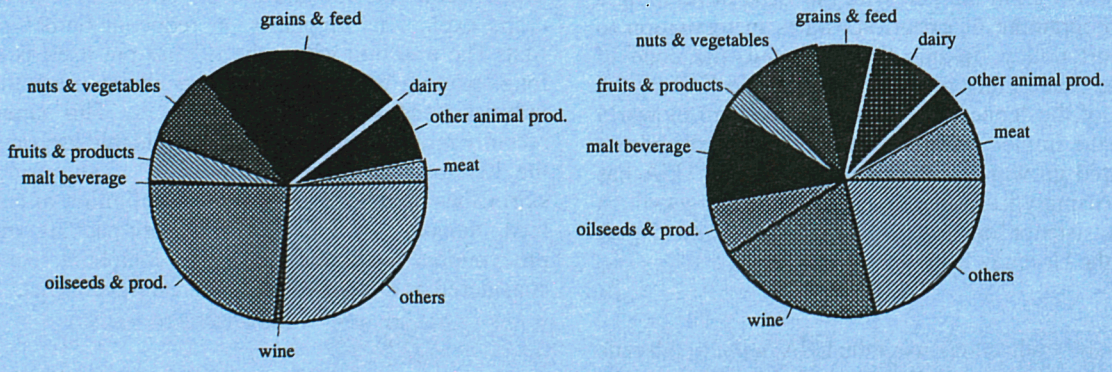
[2] As pointed out, for example, by Warley (1989, p. 308) and Josling et al. (1990, p. 295).

GRAPH 1: EC-US bilateral agricultural trade



Sources: USDA, *Agricultural statistics* (USA exports to the EC); USDA, *World agricultural trends and indicators* (EC exports to the USA); *La situation de l'agriculture dans la Communauté,* various issues (exchange rate).

GRAPH 2: **Structure of bilateral agricultural trade between the USA and the EC (1990)**



US exports to the EC
6775 million $

EC exports to the US
4434 million $

Sources: from USDA, Foreign Agricultural Trade of the United States, 1992.

The sources of the trade tensions between the EC and the USA have originated in both the bilateral trade interests and in the competition for outlets in third countries. The latter source has taken momentum with the increasingly net exporting position of the EC.

The major concerns of the USA have always been to alleviate or reverse the consequences of CAP principles on trade in grains and related feeding stuffs. The USA was in favour of European integration, but has never really accepted the creation of the customs union and the subsequent principles of the CAP. The issue at stake is the high protection in the EC for grains, which first reduced US outlets for these products in the EC and made it necessary for the EC to protect other sectors as well. Moreover, the use of the variable levy system was constantly criticized by the USA and other exporters as being in contradiction with the GATT principles. In the Kennedy Round, the USA wanted to modify the variable levy system, and in the Tokyo Round it wanted levies to be considered as non-tariff measures and treated accordingly. The USA did not get preferential access to the EC for grains in negotiations following the first enlargement of the EC, but did so in 1986 after the accession of Spain and Portugal.

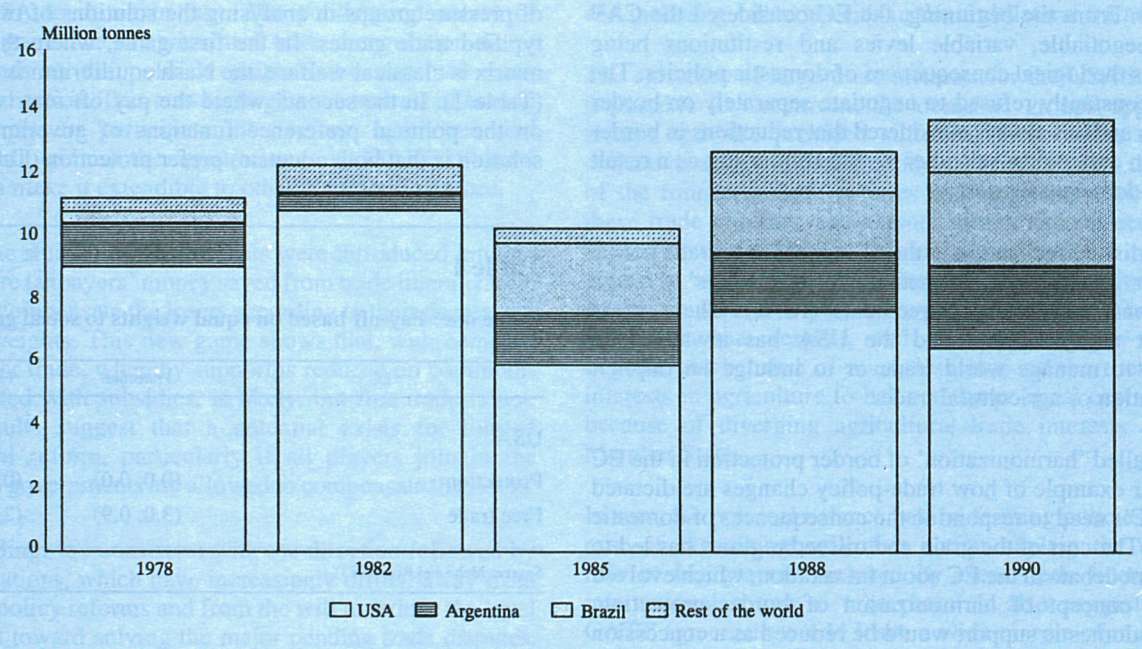
Tensions increased when the EC turned to a net exporting position in grains in the early 1980s. Variable restitutions, the major EC protection device, have been under constant pressure from the USA (the share of restitutions in EC agricultural expenditure increased from 20% in 1975 to 35% in 1990). This new situation has launched a creeping trade war on the world grain market, with the USA developing a permanent programme of export subsidies in retaliation to the EC export policy. In the Tokyo Round, the code of subsidies was made more precise under Article XVI by the introduction of the 'concept of an equitable share of world export', but the implementation of this vague limit did not prevent a rapid growth of EC grain exports. The USA has become increasingly frustrated by these developments which explain its insistence on a separate negotiation on export subsidies in the Uruguay Round.

Two other major trade concerns of the USA, namely oilseeds and corn by-products, are indirectly determined by the EC grain policy. The EC conceded a bound zero tariff on oilseed products in the XXIV-6 negotiation, on corn germ meal in 1962, and on corn gluten feed in the Kennedy Round in 1967. These concessions have gradually made it increasingly difficult for the EC to pursue its high grain price policy and provided the USA with a formidable leverage to keep the pressure on the EC. First, the EC wanted to increase its capacity to produce oilseeds in order to reduce its dependence on imports (a situation which the US soya-bean embargo and the peak world prices of 1972-73 revealed to be destabilizing for the European animal sector). Oilseed production in the EC has been stimulated by a price support and by a crushing subsidy mechanism (which works broadly as deficiency payments). This mechanism has proved to be very costly as production increased sharply. Increased production was further enhanced by the slowly diminishing support given to grains as a reaction to excess supply. As a result, the cost of the oilseed programme rose to ECU 3,4 billion in 1990. Meanwhile, imports of by-products used in compound feeds have soared due to the price differential with domestic grains. This increased demand has created an attractive outlet for US corn by-products that accounted for more than USD 1 billion of imports in 1990. Because of the trade interests in soya-bean and corn gluten feed, the USA has vigorously resisted all attempts by the EC to harmonize or to rebalance its external protection, either by placing a tax on vegetal fats or by voluntary export restraint on cereal substitutes. In the early 1980s, the strong US dollar and the emerging competition from Brazil and Argentina caused a general reduction in US exports to the EC (Graph 1), and more precisely of US trade shares in EC soya-bean imports (Graphs 3 and 4). Pressurized by the American Soyabean Association, the USA filed a GATT complaint in 1988 alleging that the EC discriminated against US exports of soya-beans. The appointed panel concluded in 1989 that this was indeed the case. The Commission accepted, with some reservations, the conclusions of the panel and implemented a subsidy per hectare of oilseeds produced.

These trade interests and the US competitive advantage in crops explain its emphasis on reducing border protection first. The trap into which the EC has put itself is due to its long-standing grain policy and its direct (restitutions) and indirect (feed imports) consequences. This situation has recently provided the USA with formidable leverage to press the EC towards reforming the CAP. The various recent skirmishes on other trade disputes (definition of corn gluten feed, delisting of US beef and pork-packing plants, the procymidone case, the EC sugar complaint, etc.) can be considered as minor avatars to the central conflict.

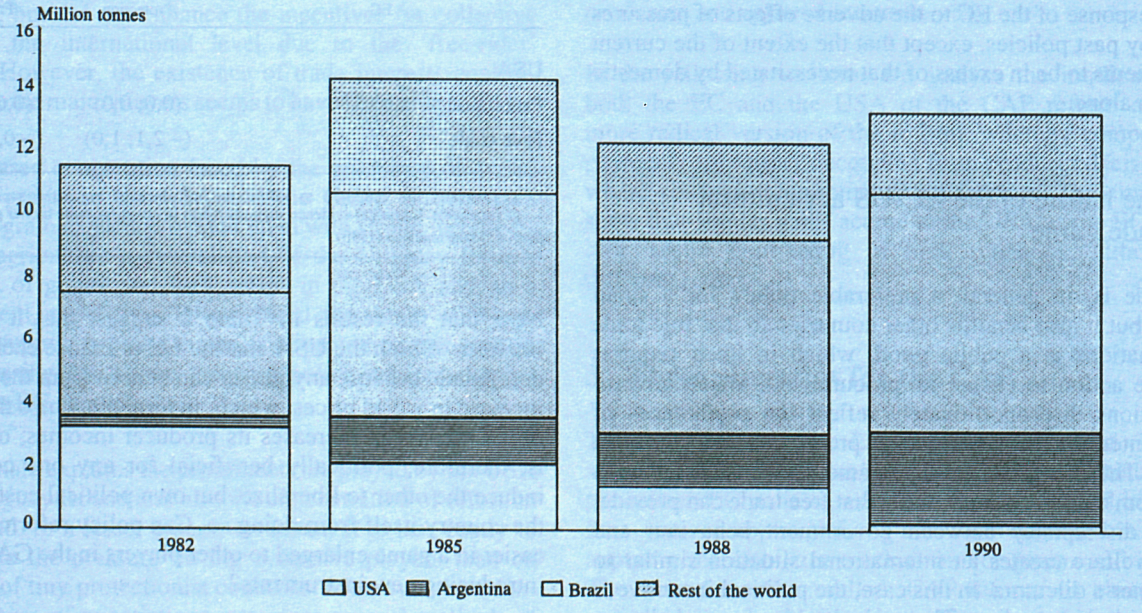
On the contrary, the EC's attitude in relation to the USA is not so much dictated by trade interests as by a continuous attempt to cope with the adverse consequences of earlier CAP decisions, a policy designed in response to domestic pressures. EC exports to the USA are mainly non-CAP products (Graph 2) which sell competitively and are designated targets for occasional retaliation (see, for example, the procymidone case).

GRAPH 3: EUR 12 soya-bean imports by source



Sources: USDA, *World agriculture,* March 1988; ISTA, *Oil World Annual,* various years.

GRAPH 4: EUR 12 soya-bean meal imports by source



Source: ISTA, *Oil World Annual,* various years.

As a consequence, the behaviour of the EC in the Uruguay negotiations has been mainly passive, or reactive to US pressures. From the beginning, the EC considered the CAP as non-negotiable, variable levies and restitutions being viewed as the logical consequences of domestic policies. The EC has constantly refused to negotiate separately on border measures and has always considered that reductions in border protection and export subsidies would follow suit as a result of lower domestic support.

Another distinctive feature in the EC approach to trade policy has been its desire to 'organize world markets' through international commodity agreements (ICAs). These ICAs have not really worked and the USA has always been reluctant to manage world trade or to indulge an implicit cartellization of agricultural trade.

The so-called 'harmonization' of border protection in the EC is another example of how trade-policy changes are dictated by the EC's need to respond to the consequences of domestic policies. The cost of the grain and oilseed regimes has led to a recurrent debate in the EC about fat taxation, which evolved into the concept of harmonization of border protection, whereby domestic support would be reduced as a concession for import taxation of animal feeds. Hence the inclusion of rebalancing in all the EC GATT proposals, a demand which the USA was never willing to consider as a possible concession.

The current reform of the CAP also reflects the typical lagged response of the EC to the adverse effects of pressures created by past policies, except that the extent of the current reform seems to be in excess of that necessitated by domestic pressures alone.

2.2. The nature of the EC-US agricultural trade game

Free trade is, in general, a preferable policy for a small country, but it also benefits other countries so that free trade among nations is a public good, which in itself requires collective action to ensure its procurement. When government actions disproportionately reflect the preferences of specific interests, they tend to make protectionism a dominant strategy. Therefore, the political game prevents society as a whole from capturing the benefits that free trade can provide, and the discrepancy between government behaviour and society welfare creates an international situation similar to the prisoner's dilemma. In this case, the political incentive is biased toward protection. The agricultural reform challenge in the EC and the USA exemplifies the difficulty in reaching an agreement in the GATT.

Mahé and Roe (1993) have illustrated the gap between the public-good nature of freer trade and the result of the actions of pressure groups in analysing the solutions of two EC-US typified trade games. In the first game, where the pay-off matrix is classical welfare, the Nash equilibrium is free trade (Table 1). In the second, where the pay-off matrix is based on the political preference functions of governments, the solution is that both countries prefer protection (Table 2).

Table 1

Game one: Pay-off based on equal weights to social groups

EC	Protection	Free trade
USA		
Protection	(0,0; 0,0)	(0,3; 8,5)
Free trade	(3,0; 0,9)	(2,7; 8,8)

Source: Mahé and Roe (1993).

Table 2

Game two: Pay-off based on a political preference function with different weights[1] for the various social groups

EC	Protection	Free trade
USA		
Protection	(0,0; 0,0)	(0,6; – 5,4)
Free trade	(– 2,1; 1,0)	(– 0,9; – 4,4)

[1] The weights are supposed to reflect the influence of organized social groups on governments. Empirical evidence suggests a bias in favour of some farmer groups.

Source: Mahé and Roe (1993).

Note that the results in Table 2 suggest that it is in the interests of both the USA and the EC to induce each other to deregulate, because any player can benefit from the resulting increase in world prices, which, in turn, alleviates the burden on its taxpayers, increases its producer incomes, or both. It is, therefore, politically beneficial for any one country to induce the other to liberalize, but own political costs prevent the country itself from doing so. Can policy reform be made easier in a game enlarged to other players in the GATT or by introducing new instruments?

Mahé and Roe have shown the existence of these political externalities in the agricultural trade negotiations. One exam-

ple is that when the rest of the OECD countries liberalize their agricultural policies, it becomes feasible - politically - for the USA to do so in part. The public-good nature of economic gains due to agricultural trade deregulation therefore extends to the political gains to be expected from multilateral action. This also highlights the interest of having the other players participate in a reform agreement and therefore not to limit the negotiation to an EC-US bilateral deal but to make it extendible to other contracting parties.

In the same study, new instruments were introduced into the game where taxpayers' money saved from trade liberalization is used to compensate the losers according to their decreasing political weights. This new game shows that, with compensation, freer trade, whereby support is reduced on commodities exported with subsidies, is likely, but free trade is not. These results suggest that a potential exists for limited multilateral reform, particularly if all players join in the move, and governments are allowed to compensate the losers.

These findings are consistent with the direction followed by the negotiations, which have increasingly drifted away from domestic policy reforms and from the will to reduce the level of support toward solving the major pending trade disputes. Compensation has been easily accepted during the Uruguay Round, as illustrated by the decreasing role devoted to the AMS (Aggregate measure of support) as a basis for negotiation and the increasing tolerance with respect to measures put in the green box, as the recent Washington deal illustrated. This increased the domestic political feasibilities of reform, but did not enhance the incentives for collective action at the international level due to the 'free-rider' problem. However, the existence of trade interests concentrated in some major players seems to have been able to do so.

The increased competition faced by the producers of grains and feed grains in the USA and the Cairns Group from European grain exports provided them with strong incentives to make agriculture a central part of the Uruguay Round. Producers of grains and feed grains in the USA and, to a lesser extent, the Cairns Group faced the threat of losing domestic support because the costs of providing this support was increasing due to the growing policy-induced competition from EC exports.

This rationale explains the prominent role played by the USA in the Uruguay Round and also the concentration of effort on the EC and, to a lesser extent, on Japan. It is less costly to concentrate the pressure on big defensive players than on hundreds of tiny protectionist countries. Moreover, broadening the issues of negotiations into more general methods of deregulation than pure reciprocal concessions will force the minor follower countries to conform to the agreement concocted by the big players, thus opening further outlets for exporters, reducing the domestic political cost of reforms and including bilateral deals in the multilateral framework.

The existence of large trade interests for the USA has made it possible to circumvent the domestic groups opposed to reform and also provided sufficient incentive to organize collective action at an international level. Hence, the focus of the round on trade policies and on commodities where these trade conflicts lie (namely grains and oilseeds). The capability of the USA to determine strongly the course of events in agriculture is of course reinforced by its general economic size as well as its political power. The EC is weaker in that respect, and it is more passive in the negotiations because of much less obvious short-term trade interests in agriculture to balance the political cost and also because of diverging agricultural trade interests between Member States.

In sum, the political balance behind farming policies and the cost of organizing collective action explain the catalytic role of big players, induced by clear trade interests, for international action to take place. It also suggests that a GATT agreement would leave a wide margin of manoeuvre in the continuation of income support and would focus on trade measures.

By and large, the EC agricultural reform can be viewed as the fine-tuned politically feasible response to these international pressures while, at the same time, soothing the domestic producers and national interests.

In the following sections, we analyse the implications on both the EC and the USA of the CAP reform and of a more radical version of the reform, whereby compensatory payments are further decoupled from producer decisions and where set-aside requirements are forgone. The simulations show that similar gains accrue to the USA as the EC sees its crop sector contracting in both scenarios, although by different routes.

3. Three scenarios for the CAP

Three scenarios for the EC have been simulated. The first scenario, called 'base-run', corresponds to a continuation of pre-reform EC policies, i.e. policies implemented before the first year of application of the CAP reform, but without applying the stabilizer mechanism for grains and oilseeds. The second scenario, called 'CAP reform', is based on the policy decisions as defined in the text adopted by the Council of Ministers on 22 May 1992 (European Commission, 1992). The third scenario, called 'decoupled reform', takes into

account the actual price-support changes decided in the CAP reform of May 1992, but it assumes that compensatory payments (grains, oilseeds and beef) are lump-sum transfers to farmers and that there is no set-aside. These three scenarios are simulated successively on the three subperiods 1993-96, 1996-99, and 1999-2002,[1] starting from a 1993 base which is projected from the 1990 database of the model by applying price and quota changes observed in 1990-91 and 1991-92, and price and quota decisions of spring 1992 for the 1992/93 marketing year.

The simulations are carried out with the MISS (modèle international simplifié de simulation) price-equilibrium projection model (see Annex). Time shifters in supply and demand equations are used in order to take technical change and income effects into account (Guyomard *et al.*, 1991). Technical change and demand shifters were initially calibrated so as to reproduce, in a scenario corresponding to agricultural policies applied over the 10-year period 1978-88, the evolution of world prices observed over that period (see Table A.2 in the Annex). Nevertheless, there is considerable uncertainty about the evolution of world market prices over the period 1992-2002. Over the period 1978-88, the world market prices of agricultural products fell much faster than in their long-term trend (Grilli and Yang, 1988). The assumption of the expert group is that it is unlikely that the trend in world market prices observed during the 1980s will continue to the end of the century. Therefore, technical change and demand shifters in the rest of the world have been revised so as to obtain, in the base-run scenario, a more modest decline in world prices over the next decade than the fall observed over the period 1978-88. Nevertheless, the hierarchy of evolutions of world prices observed over the period 1978-88 has been maintained over the decade 1992-2002 because it is assumed that it is led by fundamentals of technical change and demand. Initial and modified technical change shifters in the rest of the world are shown in Table 3. Changes in world prices over the three subperiods from 1993 to 2002, corresponding to the three scenarios, are presented in Table 4.

[1] The projection was extended to 2002 because this was requested by the expert group. We feel, however, that this time horizon is stretching the capability of the model too far.

Table 3

Initial and modified technical change and demand shifters in the rest of the world

(% per year)

	Initial shifters (based on the 1978-88 period)			New shifters (future world outlook[1])		
	Supply	Feed demand	Food demand	Supply	Feed demand	Food demand
Grains	3,7	1,6	– 0,1	3,3	1,6	2,4
Vegetable proteins	6,9	3,9	*	3,1	3,9	*
Vegetable oil	6,9	*	3,5	3,4	*	3,5
Corn gluten feed	6,7	3,0	*	3,4	3,0	*
Manioc	0,7	– 0,9	– 0,9	0,7	– 0,9	0,8
Other grain substitutes	3,0	1,5	*	1,2	1,5	*
Beef	0,1	*	0,8	0,1	*	5,3
Pigmeat, poultry and eggs	3,9	*	2,4	3,9	*	5,3
Milk	3,7	*	2,9	3,7	*	3,7
Sugar	2,8	*	2,3	2,8	*	3,5
Rest of agriculture	2,5	*	2,0	2,5	*	5,0
Other feed ingredients	0,5	0,5	*	0,5	0,5	*
Fertilizers	3,8	3,8	*	3,8	3,8	*
Other raw materials	2,5	2,5	*	2,5	2,5	*
Capital	0,5	0,5	*	0,5	0,5	*

[1] These adjustments basically reflect an expected upturn in world growth and a relative slowdown of technical change in developing countries.

Table 4

World price changes in 1993 ECU

(% changes over the three subperiods)

	1993-96	1996-99	1999-2002
	(a) Base-run		
Grains	– 2,16	– 2,17	– 2,23
Protein cakes	– 3,15	– 3,13	– 3,12
Oil	– 2,89	– 2,80	– 2,76
Corn gluten feed	– 4,59	– 4,62	– 4,72
Manioc	+ 0,04	+ 0,06	+ 0,07
Other grain substitutes	– 4,58	64,65	– 4,69
Beef	+ 2,50	+ 2,48	+ 2,45
Pork, poultry and eggs	– 2,13	– 2,04	– 2,06
Milk	– 2,04	– 2,01	– 2,07
Sugar	+ 1,63	+ 1,60	+ 1,59
Rest of agriculture	+ 0,53	+ 0,61	+ 0,74
	(b) CAP reform scenario		
Grains	+ 2,97	– 1,04	– 1,61
Protein cakes	– 5,36	– 2,47	– 2,89
Oil	– 0,50	– 2,98	– 3,59
Corn gluten feed	– 17,62	– 4,04	– 1;39
Manioc	0,20	+ 0,49	+ 0,92
Other grain substitutes	– 3,68	– 3,88	– 2,39
Beef	+ 8,10	+ 2,26	+ 1,77
Pork, poultry and eggs	– 0,95	– 3,22	– 2,56
Milk	+ 0,62	– 2,08	– 2,00
Sugar	+ 1,58	+ 1,62	+ 1,61
Rest of agriculture	+ 0,40	+ 0,64	+ 0,78
	(c) Decoupled CAP reform scenario		
Grains	+ 5,16	– 1,39	– 2,49
Protein cakes	– 2,60	– 2,34	– 1,49
Oil	+ 1,65	– 2,97	– 2,92
Corn gluten feed	– 19,34	– 3,81	– 0,65
Manioc	+ 0,47	+ 0,51	+ 0,81
Other grain substitutes	– 5,70	– 3,88	– 1,79
Beef	+ 9,17	+ 2,21	0,73
Pork, poultry and eggs	– 1,14	– 3,22	– 2,49
Milk	+ 1,05	– 2,23	– 2,06
Sugar	+ 1,57	+ 1,62	+ 1,61
Rest of agriculture	+ 0,12	+ 0,66	+ 0,86

In the three scenarios, it is assumed that the rate of inflation in the different countries is 3% per year and that prices of intermediate consumption increase at the same rate as inflation.[1]

3.1. First scenario: 'Base-run' or 'continuation of existing policies'

The first scenario maintains pre-reform policies in the EC, but does not include the stabilizer mechanism for grains and oilseeds which would require cuts in nominal terms, as suggested by the increases in supply shown below. This scenario implicitly assumes that the strict application of the stabilizers would have been unrealistic on political grounds. The producer price of grains is reduced by 3% per year in real terms and is therefore kept constant in nominal terms. In the case of oilseeds, the real producer price is reduced at the slightly lower rate of 2,5% per year (it increases in nominal terms by 0,5% per year). The prices of other products decrease in real terms, but increase in nominal terms. Milk and sugar quota levels, grain, milk and sugar co-responsibility levies, and the voluntary export restraint agreement (VERA) on manioc are kept at their 1993 levels.[2]

3.2. Second scenario: 'The CAP reform of May 1992'

The CAP reform scenario basically involves three features for the grain sector: a large price cut, non-decoupled payments, and a set-aside to further reduce exportable surpluses.

The CAP reform scenario is based on the policy decisions as defined in the text adopted in May 1992. EC support prices[3] for grains, beef and dairy products are then reduced over the period 1993-96 according to the price cuts defined in the reform, but direct payments (grains and beef) offset part of the resulting reduction in producer revenues from

[1] This assumption differs from the one we adopted in our previous analyses of the CAP reform (Guyomard, *et al.*, 1992; Guyomard and Mahé, 1992) where prices of intermediate consumption increased at a lower annual rate than inflation (1,5% instead of 3%) leading to a larger output growth because of better output-input price ratios.

[2] The assumptions and EC policy changes corresponding to this scenario are detailed in the Annex, Table A3, part (a) for the 1993-96 subperiod and part (b) for the two following subperiods 1996-99 and 1999-2002.

[3] It is assumed that market price changes follow institutional price changes.

market prices. Compensation to cereals, oilseeds and beef producers is assumed to be partly coupled, and the equivalent price taken into account by farmers in their production decisions is then assumed to be the sum of the new market price and the average direct payment (coupled compensatory payment assumption). However, autonomous rates of growth in crop yields (grains, oilseeds and protein crops) are reduced by two thirds with respect to historical growth rates, of which one third is attributed to the extensification assumption and one third to the induced innovation assumption. The CAP reform scenario therefore corresponds to an 'extensive-coupled-compensated' scenario. The set-aside programme, implemented through additional shifters for grains and oilseeds, reduces production of grains and oilseeds by 8,8% with respect to 1993 base levels.

More precisely, the CAP reform scenario is applied over the 1993-96 transition period with the following specific features:

(a) producer price cuts, in real terms, of 9% for grains, oilseeds and protein crops;

(b) user and consumer price cut, in real terms, of 32,8% for grains;

(c) producer price cuts, in real terms, of 14,9% for beef and 10,1% for milk;

(d) consumer price cuts, in real terms, of 22,6% for beef and 10,1% for the dairy products aggregate;

(e) reduction of the milk quota level by 2%;

(f) cut of the nominal protection coefficient (NPC) by 16,7% for the 'pigmeat, poultry and eggs' aggregate;

(g) no change in the quota level for sugar, but a price cut, in real terms, of 3%;

(h) reduction of 2% in protection for the 'rest of agriculture' aggregate;

(i) the voluntary export restraint agreement on manioc is dropped, but the current tariff of 6% is kept;

(j) a set-aside[1] of 9,8% is applied to the area under grains, oilseeds and protein crops. The percentage is the same for the three crops with an area-quantity impact coefficient (slippage coefficient) of 0,9; and

(k) historical rates of growth in yields are reduced by two thirds for grains, oilseeds and protein crops.

After 1996, i.e. over the subperiods 1996-99 and 1999-2002, the institutional prices of grains, beef and dairy products are cut by the same percentages as in the base-run scenario, until EC support prices meet world prices (the case of grains and beef over the period 1999-2002). As regards oilseeds, domestic and world prices are the same. For sugar and the rest of agriculture aggregate, domestic prices decrease at the same rate as in the base-run scenario. Milk and sugar quota levels are kept at their 1996 levels. Finally, annual technical shifters for supply are now set at 2,0% for grains and 2,3% for oilseeds.[2]

3.3. Third scenario: 'A decoupled CAP reform'

The basic idea underlying the third scenario is that compensatory payments can be made in a manner fully decoupled from producer decisions and are, as a consequence, not contingent on any set-aside requirement. Accordingly, the decoupled CAP reform scenario includes most of the features of the CAP reform, but no set-aside is assumed and compensatory payments are treated as lump-sum transfers[3] such that producer decisions follow the full price-support cut. Price changes in that scenario approximate to the support-price changes specified in the CAP reform.

As regards grains, a price cut in nominal terms of ECU 45 (green ecus) is then applied over the three-year period 1993-96, at both producer and user levels. Since compensatory payments are assumed to be fully decoupled, the price taken into account by grain producers in their decisions is the market price (and not the sum of this price and the average direct payment per tonne, as in the previous scenario). The full supply response embodied in the model is therefore obtained from the simulations. The same logic applies to oilseeds and beef. Domestic producer prices of oilseeds are the same as world prices, direct payments being assumed to be lump-sum transfers. For beef, the price cut applied over the three-year transition period is 15% (in nominal terms). Pork and poultry prices are cut in such a way that final prices reflect the impact on total cost of the decrease in the grain feed prices (in the simulation,

[1] Because there is no set-aside for small producers, the percentage to be set aside is equal to 9,8% and not 15%.

[2] The assumptions and EC policy changes underlying this scenario are detailed in the Annex, Table A3, part (a) for the subperiod 1993-96 and part (b) for the two following subperiods 1996-99 and 1999-2002.

[3] Such payments could be made annually over a certain period, but have to be based on past reference criteria and not condition of future behaviour for eligibility.

this price cut is obtained by adjusting the nominal protection coefficient by the relevant percentage). For dairy products, the quota level is reduced by 2% from 1993 to 1996 and the support price by 1,25% in nominal terms. The sugar quota is kept at its 1993 level and the producer price is pegged in nominal terms. Finally, autonomous rates of growth in crop yields (grains, oilseeds and protein crops) are reduced by two thirds with respect to historical growth rates, and the use of fertilizers and other intermediate inputs is decreased correspondingly. Annual technical change shifters for supply are then 1,2% for grains and 1,5% for oilseeds and protein crops (instead of 3,2 and 3,6% in the base-run scenario). The assumptions and policy changes implemented over the two following subperiods, i.e. over 1996-99 and 1999-2002, are the same as those of the second scenario.[1]

4. The base-run scenario

4.1. Commodity market balances in the European Community

4.1.1. Grains[2]

In the base-run scenario, EC grain production increases from 163,9 million tonnes in 1993 to 194,5 million tonnes in 2002 (+ 30,6 million tonnes or + 18,7%). Total consumption increases by 4,1 million tonnes and net exports increase by 26,4 million tonnes over the nine-year period. The support-price cut of 3% per year in real terms is obviously not enough to keep the production within the maximum guaranteed quantity (MGQ), but it induces a significant increase in feed demand (+ 6,2 million tonnes over nine years). Yearly supply and demand percentage changes are nearly constant over the three subperiods (+ 1,9% per year for supply and + 0,8% per year for feed demand) since policies and exogenous factors evolve similarly in the three subperiods.

[1] The assumptions and EC policy changes underlying this scenario are detailed in Annex 1, Table A4, part (a) for the subperiod 1993-96 and part (b) for the two following subperiods 1996-99 and 1999-2002.

[2] Excluding durum wheat and rice, and for EUR 12 without the new German *Länder*.

4.1.2. Other feeds

In the base-run scenario, the production of oil cakes increases by 4,0 million tonnes from 1993 to 2002 because the negative effect of the price cut on supply is more than offset by technical change impacts. Domestic use of protein feed continues to increase slightly (+ 0,2% per year), but at a much lower rate than over the past decade. Feed demand for grains increases at a higher, albeit modest, rate of 0,8% per year. The use of oil cakes suffers from competition from cheaper grains: the EC price of grains decreases at an annual rate of 3% in real terms, whereas the world price of oil cakes decreases at a lower rate of 1,1% per year in real terms. Feed demand for corn by-products and other grain substitutes increases considerably more than feed demand for oil cakes, as was already the case in the past. The share of grains and oil cakes in EC animal feed rations decreases, whereas the share of substitutes increases substantially.

4.1.3. Animal products

The results for the EC milk balance are dominated by the impacts of changes in supply control measures and, to a lesser extent, by the effects of price changes on domestic demand.[3] In the base-run scenario, the milk quota level is kept unchanged from 1993 to 2002 and the price is reduced by 1,5% per year in real terms. Therefore, net exports increase only slightly (+ 0,6 million tonnes over the decade) due to slightly lower domestic use.

Beef production increases only very slightly with respect to 1993, but domestic demand for beef decreases at a higher rate in absolute value due to negative demand trends and to competition from cheaper pork and poultrymeat. Therefore, net beef exports increase substantially (from 0,9 million tonnes in 1993 to 1,5 million tonnes in 2002).

Grain-fed pork and poultry production expands significantly in the base-run scenario because technical change shifters are important in this sector and have not been assumed to slow down. Supply grows rapidly (+ 24,6% from 1993 to 2002, i.e. + 6,3 million tonnes) and net exports of pork and poultry increase substantially (+ 2,5 million tonnes from 1993 to 2002). The latter development for pork and poultry, however, does not consider fully the implications of the likely increased price instability which could reduce producer incentives. It neglects environmental constraints

[3] The same applies to sugar.

which are bound to become more drastic. It assumes that outlets on the world market can be found and that a GATT agreement does not bring additional constraints. These assumptions must be considered as quite optimistic and the projected situation reflects a potential rather than a forecast.

Table 5

Base-run (i.e. 'continuation of existing policies') scenario: Production, feed use, other uses and net trade in the European Community

(million tonnes)

	1993	1996	1999	2002
Production				
Grains[1]	163,9	173,5	183,7	194,5
Oil cakes[2]	14,9	16,1	17,5	18,9
Beef	8,1	8,1	8,1	8,2
Pork and poultry	25,6	27,5	29,1	31,9
Milk	96,7	96,7	96,7	96,7
Sugar	15,9	15,9	15,9	15,9
Feed use				
Grains	79,7	81,6	83,7	85,9
Oil cakes	41,4	41,5	41,7	42,0
Corn gluten feed	9,5	10,3	11,2	12,2
Manioc	5,8	5,8	5,8	5,8
Other grain substitutes	28,3	29,6	31,1	32,7
Other uses				
Grains	49,5	48,8	48,1	47,4
Oil	7,1	6,9	6,6	6,4
Beef	7,2	7,0	6,8	6,6
Pork and poultry	24,0	24,7	25,5	26,2
Milk	76,2	76,0	75,8	75,6
Sugar	11,1	10,8	10,6	10,4
Net exports[3]				
Grains (X)	+ 34,7	+ 43,1	+ 51,9	+ 61,1
Oil cakes (M)	− 26,4	− 25,4	− 24,3	− 23,1
Corn gluten feed (M)	− 8,1	− 8,9	− 9,8	− 10,8
Manioc (M)	− 5,8	− 5,8	− 5,8	− 5,8
Other grain sugstitutes (M)	− 6,8	− 4,6	− 2,0	+ 1,1
Beef (X)	+ 0,9	+ 1,1	+ 1,3	+ 1,5
Pork and poultry (X)	+ 1,6	+ 2,8	+ 4,1	+ 5,7
Milk (X)	+ 13,3	+ 13,5	+ 13,7	+ 13,9
Sugar (X)	+ 4,8	+ 5,0	+ 5,2	+ 5,5

[1] Excluding rice and durum wheat, and without the new German *Länder*.
[2] Protein feed includes oil cakes from domestic seeds and other vegetable proteins.
[3] (X) means net exports are positive; (M) means net imports are positive.

Table 6

Base-run (i.e. 'continuation of existing policies') scenario: Production, feed use, other uses and net trade in the European Community

(annual rate of change in %)

	1993-96	1996-99	1999-2002	1993-2002
Production				
Grains[1]	+ 1,9	+ 1,9	+ 1,9	+ 1,9
Oil cakes[2]	+ 2,6	+ 2,8	+ 2,6	+ 2,7
Beef	+ 0,1	+ 0,1	+ 0,4	+ 0,2
Pork and poultry	+ 2,4	+ 1,9	+ 3,1	+ 2,5
Milk	0	0	0	0
Sugar	0	0	0	0
Feed use				
Grains	+ 0,8	+ 0,9	+ 0,9	+ 0,8
Oil cakes	+ 0,1	+ 0,2	+ 0,2	+ 0,2
Corn gluten feed	+ 2,7	+ 2,8	+ 2,9	+ 2,8
Manioc	0	0	0	0
Other grain substitutes	+ 1,5	+ 1,7	+ 1,7	+ 1,6
Other uses				
Grains	− 0,5	− 0,5	− 0,5	− 0,5
Oil	− 1,0	− 1,5	− 1,0	− 1,2
Beef	− 0,9	− 1,0	− 1,0	− 1,0
Pork and poultry	+ 1,0	+ 1,1	+ 0,9	+ 1,0
Milk	− 0,1	− 0,1	− 0,1	− 0,1
Sugar	− 0,9	− 0,6	− 0,6	− 0,7
Net exports[3]				
Grains (X)	+ 7,5	+ 6,4	+ 5,6	+ 6,5
Oil cakes (M)	− 1,3	− 1,5	− 1,7	− 1,5
Corn gluten feed (M)	+ 3,2	+ 3,3	+ 3,3	+ 3,3
Manioc (M)	0	0	0	0
Other grain substitutes (M)	− 12,2	− 24,2	:	:
Beef (X)	+ 6,9	+ 5,7	+ 4,9	+ 5,8
Pork and poultry (X)	+ 20,5	+ 13,6	+ 11,6	+ 15,2
Milk (X)	+ 0,5	+ 0,5	+ 0,5	+ 0,5
Sugar (X)	+ 1,4	+ 1,3	+ 1,9	+ 1,5

[1] Excluding rice and durum wheat, and without the new German *Länder*.
[2] Protein feed includes oil cakes from domestic seeds and other vegetable proteins.
[3] (X) means net exports are positive; (M) means net imports are positive.

4.2. World and EC market prices

Nearly all world prices fall moderately in real terms, so that nominal prices increase (grains, non-grain feed ingredients, dairy products, and pork and poultry). The two significant

exceptions in this general pattern are beef and sugar which exhibit world price increases in real terms due to lower rates of technical change and/or higher income elasticity (beef). Another feature worth pointing out is the larger decrease of world prices in real terms for non-grain feed ingredients than for grains. These developments in world prices are due, in part, to the assumption that the fundamentals of the world economy are such that world prices will exhibit smaller downward trends than in the past decade (slowdown of technical change and upturn in food demand in the rest of the world due to economic recovery[1]). Obviously, there is considerable uncertainty about the evolution of world prices over the next decade and alternative assumptions, leading to different results, could be made.[2]

It is worth noting that, particularly because of the assumed upturn in world prices, the 'continuation of past policies' reduces the gap between EC and world prices. Accordingly, EC nominal rates of protection decrease for all products, and more particularly for beef, pork and poultry, and grains (in 2002, EC and world prices of pork and poultry are equal). Nevertheless, the level of price support remains important for grains, oilseeds, milk and sugar.

4.3. EC budget and EC farm incomes

EC budget expenditure in the MISS model is smaller than the total EAGGF (European Agricultural Guidance and Guarantee Fund) outlays for various reasons.

First, as imports and exports are assumed to be perfect substitutes, only net trade is represented. Therefore, tariffs and levy proceeds are deducted from gross export subsidies.

Second, only policies significantly affecting trade are included. MISS nominal rates of protection are thus lower than the corresponding OECD producer subsidy equivalents (PSEs) because the latter include various items such as government subsidies to research and regional aids.

Third, intervention outlays and interest costs on storage are not included. Nevertheless, potential increases in stocks are treated as additional exports so that the associated refund costs are included (net exports correspond to exportable surpluses rather than to actual exports).

Table 7

Base-run scenario: World and EC prices

	1993	1996	1999	2002
(a) World prices (1993 budget ECU)				
Grains	102,2	99,9	97,8	95,6
Protein cakes	142,1	137,6	133,3	129,2
Oil	389,0	377,8	367,2	357,0
Corn gluten feed	101,9	97,3	92,8	88,4
Manioc	82,7	82,8	82,8	82,9
Other grain substitutes	88,4	84,3	80,4	76,6
Beef	2 536,6	2 599,9	2 664,4	2 729,6
Pork, poultry and eggs	1 429,5	1 399,1	1 370,6	1 342,3
Milk	157,0	153,8	150,7	147,6
Sugar	242,0	245,9	249,9	253,9
(b) Ratio of European Community prices to world prices				
Grains	1,68	1,57	1,46	1,36
Protein cakes	1,93	1,84	1,76	1,68
Corn gluten feed	1,00	1,00	1,00	1,00
Beef	1,53	1,40	1,29	1,18
Pork, poultry and eggs	1,20	1,13	1,06	1,00
Milk	2,03	1,98	1,93	1,88
Sugar	2,18	2,08	1,98	1,89

The budgetary consequences of a continuation of existing policies are less dramatic than generally expected. This result is due, to a large extent, to the relatively optimistic assumption on world price developments. Furthermore, it does not take interest and storage costs into account, which should increase in that scenario, particularly for grains and beef. Costs decrease in real terms by 0,8% per year on average over the period 1993-2002. However, they increase in nominal terms by more than 2,0% per year. Despite the large increase in net exports, restitutions on grains increase

[1] Note again that the MISS model calculates world price changes endogeneously.

[2] In our previous assessments of the implications of the continuation of existing policies and of the CAP reform, the shifters used were calibrated on the past decade and, accordingly, world prices were falling more rapidly in real terms than in the present case. It may be important to note that when the general trend moves upwards (as with the new assumptions on the rest of the world agreed by the expert group), world prices in the feed area follow suit so that the grain to by-products price ratio decreases in the EC. Hence, the slowing down of the substitution process at the expense of grains observed in the last decade.

only slightly in nominal terms due to the decline of the nominal rate of protection. The same pattern applies to beef restitutions. Restitutions on pork and poultry are phased out over the period and fall to zero in 2002.

EC farm incomes (measured by gross value-added) decrease in real terms by 0,9% per year over the period 1993-2002 (from ECU 122,8 to ECU 113,3 billion). Although the joint representation of the farming sector does not provide clear-cut indicators for separate commodity groups, it is clear that crop (grains and oilseeds) and beef producers would be the most affected, whereas milk and sugar producers will be less affected. A modest 2% per year rate of decrease in the farm labour force[1] would allow farm incomes per head to increase by 1% per year in real terms.

4.4. Two alternative scenarios for the European Community under the past policy regime lead to different aggregate indicators

The base-run scenario analysed above provides an optimistic picture for the EC agricultural sector mainly because (i) domestic prices decrease in real terms, but increase or are constant in nominal terms, and (ii) the gap between internal and world prices gets narrower. Technical change partly offsets the impacts of real price decreases on supply so that real incomes per head may increase. Export refunds per tonne fall because the closing gap between EC and world prices offsets the negative impact on the EC budget of increasing export volumes. Obviously, this base-run scenario does not correspond to a strict application of the stabilizer mechanism for grains and oilseeds in which support-price cuts have to be specified in nominal terms and not in real terms.

An alternative scenario corresponding to a continuation of past policies with the following qualifications: (i) strict application of the stabilizer mechanism for grains and oilseeds, (ii) application of nominal price cuts observed over the period 1988-92 for beef, dairy products and sugar, (iii) inflation rate of 3% per year, but a lower growth rate of prices of intermediate consumption of 1,5% per year, and (iv) use of historical technical change and income shifters, i.e. calibrated over the period 1978-88, for the rest of the world, has been previously simulated over the transition period 1993-96 (Guyomard *et al.*, 1992; Guyomard and Mahé, 1992). From the EC farmer's point of view, the latter scenario is clearly less favourable than the base-run scenario considered here. Real incomes decrease by 11,0% over the three years of the transition period, whereas they decrease by only 2,9% in the base-run scenario. But this scenario leads to a significant decrease in EC expenditure (about ECU – 4,0 billion (1993 ecus)), whereas it is nearly constant in the base-run scenario. This alternative reveals the built-in trade-off between farm incomes and budget expenditure. This trade-off is illustrated by the outcome of a last scenario corresponding to an application of EC price trends observed over the decade 1978-88 (using historical shifters for the rest of the world, a 3% per year rate of inflation and a 1,5% per year rate of growth of intermediate consumption prices). In this case, EC farm incomes are nearly constant in real terms but EC budget expenditure increases by more than 24% from 1993 to 1996.

These alternative ways to design a reference scenario highlight the sensitivity of the picture of the 'outcome of the CAP reform' to the definition of the base-run which should always be kept in mind.

5. The CAP reform scenario

5.1. Commodity market balances in the European Community

5.1.1. Grains

The obvious emphasis placed by the designers of the CAP reform on the grain sector is sensible in view of its importance in land use, in crop rotations and in animal-crop interactions via the animal feed sector. The logic of the reform is clear and may be outlined as follows: (i) market support prices for grains are to be brought closer to world prices, over a short period (three years), in order to increase domestic demand and especially feed use; (ii) this price cut, compensated by direct payments, should induce producers to adopt less intensive production techniques, which in the medium term should slow down the trends of yields; (iii) in the short-term, production should decrease as a result of the set-aside required for eligibility for direct payments; (iv) lower production and expanded domestic use would result in a better balance of the EC grain market.

This rationale of the CAP reform is confirmed by the simulation over the transition period 1993-96. The set-aside and the lessening of productivity gains decrease grain

[1] This rate is lower than the 2,76% (for EUR 9) observed over the period 1982-92 (Folmer *et al.*, 1993).

production by 11,5 million tonnes from 1993 to 1996. At the end of the transition period, the grain crop is 21,1 million tonnes lower in the CAP reform scenario than in the base-run scenario. Compared with the base-run, derived and final demands for grains are stimulated by lower user-prices, but this positive effect is partially dampened by the cuts in support to the animal sector, either directly (– 15% for the beef price, partially compensated by increased premiums) or indirectly (automatic decrease in pork and poultry border protection following the grain price cut). Feed demand reaches 87,1 million tonnes in 1996, i.e. 5,5 million tonnes above the corresponding level in the base-run scenario and 7,4 million tonnes above the 1993 quantity. EC net exports of grains[1] fall to 12,7 million tonnes in 1996, that is 22,2 million tonnes less than in 1993 and 31 million tonnes less than in the base-run scenario. The CAP reform will then reduce EC grain export surpluses, essentially by curtailing supply and, to a lesser extent, by stimulating feed demand.

Over the second subperiod 1996-99, support prices fall by 9% in real terms. As a consequence, EC prices are in line with world prices after 1999. Over this second subperiod, the production of grains increases by about 3 million tonnes and feed consumption by 4,4 million tonnes. Other uses drop by 0,7 million tonnes and net exports are nearly constant at 12,1 million tonnes. During the third subperiod 1999-2002, the nominal protection on grains is zero and EC and world prices both decrease by only 1,6% in real terms. The stimulation effect on feed demand is therefore smaller than in the previous subperiod (+ 1,4 million tonnes instead of + 4,4 million tonnes) and net exports start increasing again (+ 2,6 million tonnes from 1999 to 2002) as supply keeps rising (+ 2,8 million tonnes).

Wide differences in terms of export volumes between the base-run and the CAP reform scenarios are reflected in world prices. From 1993 to 1996, the world price of grains decreases by 2,2% in real terms in the base-run scenario, but increases by 3,0% in real terms in the CAP reform scenario as EC net exports are reduced by 22,2 million tonnes with respect to 1993. During the next two subperiods, world prices in real terms fall more rapidly in the base-run (nearly – 2,2% over each three-year subperiod) than in the CAP reform scenario (– 1,0% from 1996 to 1999 and – 1,6% from 1999 to 2002). However, as the rate of inflation is 3% per year, these modest declines in real terms correspond to significant increases in nominal terms.

[1] Excluding rice and durum wheat, and without the new German *Länder*.

5.1.2. Other feeds

In 1996, the production of oilseeds is 2,1 million tonnes lower in the CAP reform than in the base-run scenario. Because of compensatory payments, this lower production is due to set-aside and extensification rather than to 'effective' price cuts. From 1996 to 2002, production increases again (about + 2,3% per year) since technical change more than offsets the decrease, in real terms, of compensatory payments.

On the feed-demand side, the most conspicuous impact of the reform is the large substitution in animal rations between grains and cakes over the transition subperiod 1993-96. Grain feed use increases by 7,4 million tonnes over the three years (+ 9,3%), whereas the consumption of oil cakes and protein feeds drops by 4,1 million tonnes (– 10,0%). The use of grain substitutes still grows over this period of drastic changes in price ratios (+ 5,2% for corn by-products, for example), but at a much lower rate than in the base-run scenario (+ 8,4% for corn by-products). With the CAP reform, protein cakes are much less price-competitive with respect to grains. The domestic ratio of protein cakes to grain prices rises from 0,83 in 1993 to 1,16 in 1996, i.e. + 39,8%. This picture is in contrast with the case of grain substitutes. Substitutes are mainly by-products, have few other outlets than the EC feed market and have a small export supply elasticity from the USA and the rest of the world to the EC. As a consequence, their prices follow the decline in EC grain prices so that the competitive price edge of substitutes with respect to grains is only slightly reduced, while the price competitiveness of protein cakes falls sharply. As an illustration, the EC price ratio of corn gluten feed to grains increases 'only' from 0,59 in 1993 to 0,73 in 1996 (+ 23,7%, compared with + 39,8% in the case of protein cakes).

After 1996, the impact of the reform is nearly exhausted. Grain feed use still increases, but more slowly than over the transition subperiod (+ 1,1% per year instead of + 3,1%). The use of non-grain feeds grows slightly in the case of protein cakes, but substantially as regards substitutes, i.e. at rates similar to those observed in the base-run scenario. This result is a direct consequence of assuming that the price-autonomous trends of incorporation of animal feed ingredients observed in the past remain unchanged. Obviously, an alternative outcome more favourable to EC grain-use expansion may not be excluded, whereby current incorporation trends (high for oil cakes and grain substitutes and low for domestic grains) would be adjusted to be 'grain using

and imported-feed-ingredient saving'.[1] Clearly, the choice of incorporation trends for by-products is somewhat speculative and the modelling exercise which relies upon constant behavioural parameters clearly approaches its limits in the present case.

5.1.3. Animal products

As in the base-run scenario, the EC milk balance is dominated by the impacts of quota changes on supply and by the effects of support-price changes on demand. The milk quota level is reduced by 2% from 1993 to 1996 and is later kept unchanged. The price is reduced by 10,1% in real terms over the first subperiod and by 4,5% in real terms over each following subperiod. During the first subperiod 1993-96, production decreases by 2,0 million tonnes as a result of the quota cut and net exports decline by a similar amount, since domestic demand response to the price cut is small and nearly offset by positive income effects. From 1996 to 2002, net exports of dairy products increase only slightly and are nearly the same in the CAP reform and the base-run scenarios, a result which was to be expected since the reform left milk and sugar virtually unaffected.

Beef surpluses are significantly lower in the CAP reform scenario than in the base-run because (i) the direct effect of the own-price cut of 15% in nominal terms on beef demand is large enough to dominate the substitution effect of the falling price of pork and poultry, and (ii) supply is lower, since the price cut is only partially compensated by increased beef premiums. Beef surpluses are about 0,8 million tonnes lower in the CAP reform than in the base-run scenario at the end of each three-year subperiod.

Grain-fed animal products, i.e. pork and poultry, expand significantly in the CAP reform scenario because they benefit from the price fall which spread over all feed ingredients and from steady technical change effects. As compared with the base-run, the production increase is larger in the CAP reform scenario because the substantially greater feed-cost decrease is only partly offset by the reduction in support to pork and poultry. Over the period, supply is about 0,8 million tonnes larger than in the base-run. Demand also expands even more, so that net exports are smaller than in the base-run (except in the last subperiod).

[1] Furthermore, it is also probable that imports of say corn gluten feed will decrease in larger proportions if the new US price ratio between corn and corn gluten feed, which is likely to make the latter more attractive to US compounders, induces a strong demand in the USA. EC imports would decrease even more if the USA would cut sugar prices and subsidies to ethanol production.

Table 8

CAP reform scenario: Production, feed use, other uses and net trade in the European Community

(million tonnes)

	1993	1996	1999	2002
Production				
Grains[1]	163,9	152,4	155,6	158,4
Oil cakes[2]	14,9	14,0	14,5	16,1
Beef	8,1	7,9	7,9	7,9
Pork and poultry	25,6	27,9	31,0	34,0
Milk	96,7	94,7	94,7	94,7
Sugar	15,9	15,9	15,9	15,9
Feed use				
Grains	79,7	87,1	91,5	92,9
Oil cakes	41,4	37,3	38,1	39,7
Corn gluten feed	9,5	10,0	10,6	11,8
Manioc	5,8	5,9	6,0	6,4
Other grain substitutes	28,3	29,5	31,2	33,6
Other uses				
Grains	49,5	52,7	52,0	50,8
Oil	7,1	7,0	6,7	6,5
Beef	7,2	7,5	7,3	7,0
Pork and poultry	24,0	25,5	26,3	27,1
Milk	76,2	76,2	76,1	76,0
Sugar	11,0	10,8	10,6	10,4
Net exports[3]				
Grains (X)	+ 34,7	+ 12,5	+ 12,1	+ 14,7
Oil cakes (M)	− 26,4	− 23,2	− 23,6	− 23,6
Corn gluten feed (M)	− 8,1	− 8,4	− 9,3	− 10,4
Manioc (M)	− 5,8	− 5,9	− 6,0	− 6,4
Other grain substitutes (M)	− 6,8	− 4,9	− 2,6	− 0,3
Beef (X)	+ 0,9	+ 0,3	+ 0,5	+ 0,8
Pork and poultry (X)	+ 1,6	+ 2,3	+ 4,0	+ 7,0
Milk (X)	+ 13,3	+ 11,3	+ 11,5	+ 11,6
Sugar (X)	+ 4,8	+ 5,1	+ 5,3	+ 5,5

[1] Excluding rice and durum wheat, and without the new German *Länder*.
[2] Protein feed includes oil cakes from domestic seeds and other vegetable proteins.
[3] (X) means net exports are positive; (M) means net imports are positive.

Table 9

CAP reform scenario: Production, feed use, other uses and net trade in the European Community

(annual rate of change in %)

	1993-96	1996-99	1999-2002	1993-2002
Production				
Grains[1]	− 2,4	+ 0,7	+ 0,6	− 0,4
Oil cakes[2]	− 2,1	+ 1,2	+ 3,6	+ 0,9
Beef	− 0,8	0	0	− 0,3
Pork and poultry	+ 2,9	+ 3,6	+ 3,1	+ 3,2
Milk	− 0,7	0	0	− 0,2
Sugar	0	0	0	0
Feed use				
Grains	+ 3,0	+ 1,7	+ 0,5	+ 1,7
Oil cakes	− 3,4	+ 0,7	+ 1,4	− 1,4
Corn gluten feed	+ 1,7	+ 2,0	+ 3,6	+ 2,4
Manioc	+ 0,6	+ 0,6	+ 2,1	+ 1,1
Other grain substitutes	+ 1,4	+ 1,9	+ 2,5	+ 1,9
Other uses				
Grains	+ 2,1	− 0,4	− 0,8	+ 0,3
Oil	− 0,5	− 1,4	− 1,0	− 1,0
Beef	+ 1,4	− 1,0	− 1,4	− 0,3
Pork and poultry	+ 2,0	+ 1,0	+ 1,0	+ 1,4
Milk	0	0	− 0,1	− 0
Sugar	− 0,9	− 0,6	− 0,6	− 0,7
Net exports[3]				
Grains (X)	− 28,8	− 1,0	+ 6,7	− 9,1
Oil cakes (M)	− 4,2	+ 0,6	0	− 1,2
Corn gluten feed (M)	+ 1,2	+ 3,4	+ 3,8	+ 2,8
Manioc (M)	+ 0,6	+ 0,6	+ 2,1	+ 1,1
Other grain substitutes (M)	− 10,3	− 19,0	− 51,3	− 29,3
Beef (X)	− 30,6	+ 18,6	+ 17,0	− 1,3
Pork and poultry (X)	+ 12,9	+ 20,2	+ 20,5	+ 17,8
Milk (X)	− 5,3	+ 0,6	+ 0,3	− 1,5
Sugar (X)	+ 2,0	+ 1,3	+ 1,2	+ 1,5

[1] Excluding rice and durum wheat, and without the new German *Länder*.
[2] Protein feed includes oil cakes from domestic seeds and other vegetable proteins.
[3] (X) means net exports are positive; (M) means net imports are positive.

5.2. World and EC market prices

As expected, the CAP reform scenario has a significant impact on world prices for grain and non-grain feeds, particularly over the first subperiod 1993-96 when CAP reform changes are implemented. In 1996, net exports of grains from the EC are considerably reduced by the reform (12,5 million tonnes instead of 43,1 in the base-run) and the world price is 5,3% higher as a consequence. In 2002, it is still 7,1% higher in the CAP reform scenario than in the base-run.

The effect of the CAP reform on the world prices of oil cakes is modest. They are only slightly lower than in the base-run. This outcome is in line with the fairly limited impact of the reform on net imports (− 2,2 million tonnes with respect to the base-run in 1996), since output reduction accounts for nearly half of the drop in feed use and therefore dampens the world implications of the reform in this area. This is in contrast with the grain case, where both supply and demand adjustments work in the same direction to cut exportable surpluses and boost world prices.

World prices of corn by-products are more deeply affected by the CAP reform because the EC feed sector is the almost unique outlet for these ingredients and EC prices must follow, to a large extent, the price cuts of EC grains. EC prices of corn by-products equal world prices, which have to drop accordingly since their by-product nature results in an inelastic supply. The case of manioc is different because of the EC voluntary export restraint agreement, which in the past was driving EC prices to much higher levels than world prices. The termination of VERA in the CAP reform scenario does not induce significant increases of use and imports. Only the rent currently attached to VERA is eliminated and the world price is therefore little affected.

When compared with the base-run scenario, the world prices of the various animal products are affected by the CAP reform in different ways. They are higher for beef and dairy products because of the smaller EC net exports. They are lower for pork and poultry because of the larger EC net exports induced by the reform. World prices of sugar are unaffected.

5.3. EC budget and EC farm incomes

In the CAP reform scenario, budget costs increase by ECU 6,4 billion (1993 ecus) over the three years of the transition period. The savings on restitution payments, mainly on grains and beef, are offset by the introduction of compensatory payments for grains, by the new premiums granted to the beef sector and by the cost of the set-aside programme. In 1996, expenditure is ECU 6,4 billion (1993 ecus) higher in the CAP reform scenario than in the base-run scenario and the gap is still ECU 5 billion in 2002. However, this expenditure does not take into account storage costs where considerable savings should occur under the CAP reform as compared with the base-run. Expenditure decreases in real terms after 1996, by ECU 1,4 billion (1993 ecus) from 1996

to 1999 and by ECU 1,3 billion (1993 ecus) from 1999 to 2002. The assumption that compensatory payments and animal premiums are kept constant in nominal terms explains this result.

EC farm incomes fall in real terms by 6,0% over the transition period 1993-96. An annual rate of labour outmigration of 2% would maintain real farm incomes per head nearly constant. Incomes decrease at much lower rates thereafter, by 1,2% from 1996 to 1999 and by 0,5% from 1999 to 2002. At the end of the decade, incomes are about the same in the CAP reform and in the base-run scenarios, but the downward trend is higher in the base-run scenario than under the CAP reform.

Table 10

CAP reform scenario: World and EC prices

	1993	1996	1999	2002
(a) World prices (1993 budget ECU)				
Grains	102,2	105,2	104,1	102,4
Protein cakes	142,1	134,5	131,2	127,4
Oil	389,0	387,1	375,5	362,1
Corn gluten feed	101,9	83,4	80,6	79,5
Manioc	82,7	83,0	83,3	84,1
Other grain substitutes	88,4	85,1	81,8	79,9
Beef	2536,6	2742,1	2804,1	2853,6
Pork, poultry and eggs	1429,5	1416,0	1370,4	1335,4
Milk	157,0	158,0	154,7	151,6
Sugar	242,0	245,8	249,8	253,8
(b) Ratio of EC prices to world prices				
Grains	1,68	1,09	1,00	1,00
Protein cakes	1,93	1,00	1,00	1,00
Corn gluten feed	1,00	1,00	1,00	1,00
Beef	1,53	1,08	1,00	1,00
Pork, poultry and eggs	1,20	1,00	1,00	1,00
Milk	2,03	1,81	1,77	1,72
Sugar	2,18	2,08	1,98	1,89

6. A decoupled CAP reform scenario

6.1. Commodity market balances in the European Community (see Tables 11 and 12)

6.1.1. Grains

In the decoupled CAP reform scenario, the EC returns to self-sufficiency for grains in 1996. Production falls by 23,7 million tonnes during the transition period (only 11,5 million tonnes in the CAP reform scenario). The price cut of 32,8% in real terms now has its full impact on production, since the decoupled payments do not keep marginal land in production as in the CAP reform scenario. Moreover, the extensification and induced technical change effects are the same in both the CAP reform and the decoupled CAP reform scenarios because the marginal prices are also identical. Feed use increases substantially over the transition subperiod (+ 6,9 million tonnes, i.e. + 2,8% per year). It increases in a similar way to the CAP reform case for basically the same reasons, since only feed demand for beef is further reduced slightly by the decoupling of the premiums in this sector.

The EC self-sufficiency in grains lasts until the end of the following subperiod, i.e. 1999. The price is kept constant in nominal terms over the second subperiod 1996-99 and it hits the world price in 1999 (as in the actual CAP reform scenario). The impact of this price evolution on production is more than offset by technical change effects (although technical change biases have been reduced with respect to historical rates, + 2,0% per year versus + 3,2% per year, respectively). Production increases by 3 million tonnes from 1996 to 1999, feed use by 4,2 million tonnes, but other utilizations decrease by 0,8 million tonnes. EC net exports are thus nearly constant.

Over the third subperiod, EC prices follow world prices (– 2,5% in real terms from 1999 to 2002). Hence, production increases by a quite significant volume (+ 8,7 million tonnes, i.e. + 2,0% per year) and net exports reach about 8 million tonnes in 2002.

The self-sufficiency position of the EC in 1996 in the decoupled run is the outstanding difference from the CAP reform scenario analysed in the previous section, where net exports amount to 12,7 million tonnes at this date. From 1996 to 1999, the EC price of grains is constant in nominal terms in the two reform scenarios. After 1999, the EC price of grains follows the world price in the two scenarios and the

EC is exporting grains without restitutions at the end of the decade. The Community then complies with the Blair House compromise as far as grains are concerned. This result should be viewed with regard to the 'optimistic' assumption on world price trends over the next decade. The compatibility issue on subsidized exports of grains is clearly contingent on future developments in world markets (see Guyomard et al., 1993).

The comparison between the two reform scenarios deserves some scrutiny in order to explain the differences, essentially in grain exports. In the decoupled CAP reform, the 32,8% price cut in real terms at the producer level triggers a full supply response, including downward adjustments in yields and acreage. In the CAP reform, compensatory payments are assumed to be coupled and there is no 'price effect' in nominal terms on the cropped area. As the model does not allow for a separate response of yields and area, the extensification effect is a control variable in the simulations. It has been assumed that this extensification effect is very low (– 2,8%[1]). It corresponds to an elasticity of yields with respect to the price of grains of 0,10. This low extensification effect explains why grain production is higher in the CAP reform scenario (152,4 million tonnes in 1996) than in the decoupled run (140,2 million tonnes). More knowledge of the response of yields to price changes is required to reduce the uncertainty about this extensification effect in the context of the CAP reform scenario. For illustrative purposes, the CAP reform has also been simulated over the period 1993-96 under two alternative assumptions: first, an extensification effect of 5,6% (i.e. an own-price elasticity of yields of 0,20), and second, an extensification effect of 7,4% (i.e. an own-price elasticity of yields of 0,30). In the first case, the supply of grains is now equal to 147,9 million tonnes and net exports to 8,0 million tonnes. In the second case, the supply is equal to 143,4 million tonnes and net exports to 3,4 million tonnes, and the EC grain balance is then very close to self-sufficiency, as in the case of the decoupled CAP reform[2].

6.1.2. Other feed and animal products

With regard to animal feed rations, the global picture of the decoupled CAP reform scenario does not differ from the one derived from the CAP reform scenario because the price cut of EC grains is the same at the user level and support prices of animal products behave in the same way. The increased competitiveness of grains with respect to other feed ingredients leads to a significant increase in feed demand for domestic grains, particularly over the subperiod of application of the reform (+ 6,9 million tonnes from 1993 to 1996). The derived demand of oil cakes decreases by 5,2 million tonnes from 1993 to 1996. It increases from 1996 to 2002, at the same rate as in the CAP reform scenario but at a much lower rate than in the base-run scenario. Imports of substitutes increase due to positive incorporation trends and decreasing world prices, again at the same rate as in the CAP reform scenario but at a much lower rate than in the base-run scenario.

[1] The extensification effect then reduces the supply shifter for grains, initially equal to 9,6%, to 9,6 – 2,8 = 6,8%, over three years.

[2] In these two scenarios, the area effect of the set-aside programme is introduced with the same slippage coefficient as in the CAP reform case.

Table 11

Decoupled CAP reform scenario: Production, consumption, feed use, other uses and net trade in the European Community

(million tonnes)

	1993	1996	1999	2002
Production				
Grains[1]	163,9	140,2	143,2	151,9
Oil cakes[2]	14,9	10,3	11,2	12,0
Beef	8,1	7,7	7,7	7,9
Pork and poultry	25,6	28,4	31,6	34,5
Milk	96,7	94,7	94,7	94,7
Sugar	15,9	15,9	15,9	15,9
Feed use				
Grains	79,7	86,6	90,8	93,2
Oil cakes	41,4	36,2	37,0	38,5
Corn gluten feed	9,5	9,7	10,6	11,7
Manioc	5,8	5,9	6,1	6,4
Other grain substitutes	28,3	29,4	31,2	33,7
Other uses				
Grains	49,5	52,7	51,9	50,9
Oil	7,1	6,9	6,6	6,4
Beef	7,2	7,5	7,3	7,0
Pork and poultry	24,0	25,6	26,3	27,0
Milk	76,2	76,3	76,2	76,1
Sugar	11,0	10,8	10,6	10,4
Net exports[3]				
Grains (X)	+ 34,7	+ 0,9	+ 0,5	+ 7,8
Oil cakes (M)	– 26,4	– 25,9	– 25,8	– 26,5
Corn gluten feed (M)	– 8,1	– 8,3	– 9,2	– 10,3
Manioc (M)	– 5,8	– 6,0	– 6,1	– 6,4
Other grain substitutes (M)	– 6,8	– 4,2	– 2,0	+ 0,2
Beef (X)	+ 0,9	+ 0,2	+ 0,4	+ 0,9
Pork and poultry (X)	+ 1,6	+ 2,8	+ 5,3	+ 7,4
Milk (X)	+ 13,3	+ 11,3	+ 11,4	+ 11,5
Sugar (X)	+ 4,8	+ 5,1	+ 5,3	+ 5,5

[1] Excluding rice and durum wheat, and without the new German *Länder*.
[2] Protein feed includes oil cakes from domestic seeds and other vegetable proteins.
[3] (X) means net exports are positive; (M) means net imports are positive.

Supplies of animal products are quite close in the two reform scenarios. The difference in beef production is only 0,2 million tonnes due to the decoupling of beef premiums in the decoupled run. The expansion of the pork and poultry sector is slightly larger in the decoupled scenario than under the CAP reform because of the enhanced shift of primary factors from crops to the livestock sector.

Table 12

Decoupled CAP reform scenario: Production, consumption, feed use, other uses and net trade in the European Community

(annual rate of change in %)

	1993-96	1996-99	1999-2002	1993-2002
Production				
Grains[1]	- 5,1	+ 0,7	+ 2,0	- 0,8
Oil cakes2	- 11,6	+ 2,8	+ 2,3	- 2,4
Beef	- 1,6	+ 0,0	+ 0,9	- 0,3
Pork and poultry	+ 3,5	+ 3,6	+ 3,0	+ 3,4
Milk	- 0,7	0	0	- 0,2
Sugar	0	0	0	0
Feed use				
Grains	+ 2,8	+ 1,6	+ 0,9	+ 1,8
Oil cakes	- 4,4	+ 0,7	+ 1,3	- 0,8
Corn gluten feed	+ 0,7	+ 3,0	+ 3,4	+ 2,3
Manioc	+ 0,6	+ 1,1	+ 1,6	+ 1,1
Other grain substitutes	+ 1,3	+ 2,0	+ 2,6	+ 2,0
Other uses				
Grains	+ 2,1	- 0,5	- 0,7	+ 0,3
Oil	- 1,0	- 1,5	- 1,0	- 1,2
Beef	+ 1,4	- 0,9	- 1,4	- 0,3
Pork and poultry	+ 2,2	+ 0,9	+ 0,9	+ 1,3
Milk	+ 0,0	- 0,0	- 0,0	- 0,0
Sugar	- 0,9	- 0,6	- 0,6	- 0,7
Net exports[3]				
Grains (X)	- 70,4	- 17,8	+ 149,9	- 15,3
Oil cakes (M)	- 0,6	- 0,1	+ 0,9	+ 0,0
Corn gluten feed (M)	+ 0,8	+ 3,5	+ 3,8	+ 2,7
Manioc (M)	+ 1,1	+ 0,6	+ 1,6	+ 1,1
Other grain substitutes (M)	- 14,8	- 21,2	:	:
Beef (X)	- 39,4	+ 25,9	+ 31,0	+ 0,0
Pork and poultry (X)	+ 20,5	+ 23,7	+ 11,8	- 18,6
Milk (X)	- 5,3	+ 0,3	+ 0,3	- 1,6
Sugar (X)	+ 2,0	+ 1,3	+ 1,2	+ 1,5

[1] Excluding rice and durum wheat, and without the new German *Länder*.
[2] Protein feed includes oil cakes from domestic seeds and other vegetable proteins.
[3] (X) means net exports are positive; (M) means net imports are positive.

6.2. World and EC market prices

As in the case of the CAP reform scenario, the decoupled CAP reform has a significant impact on world prices. World price behaviour in the three scenarios differ significantly over the period 1993-96. Grain prices (in real terms) fall by 2,2% in the base-run, but increase by 3,0% in the CAP reform and by 5,2% in the decoupled CAP reform scenario, in response to changes in EC net exports over the period (+ 12,1 million tonnes, - 22,2 million tonnes and - 33,8 million tonnes, respectively). The world prices of oilseeds decrease slightly more in the CAP reform scenario than in the two other scenarios. Feed use of oil cakes is nearly the same in the two reform scenarios, but the decoupling of subsidies leads to an EC production which is much lower in the decoupled run than in the CAP reform. The world prices of animal products are very close in the two reform scenarios and need no further elaboration. The same remark applies to sugar for obvious reasons.

Table 13

Decoupled CAP reform scenario: World and EC prices

	1993	1996	1999	2002
(a) World prices (1993 budget ECU)				
Grains	102,2	107,4	105,93	103,3
Protein cakes	142,1	138,4	135,23	133,1
Oil	389,0	395,4	383,7	372,5
Corn gluten feed	101,9	82,2	79,1	78,6
Manioc	82,7	83,1	83,5	84,2
Other grain substitutes	88,4	83,3	80,1	78,7
Beef	2536,6	2769,2	2830,5	2851,1
Pork, poultry and eggs	1429,5	1413,3	1367,8	1333,8
Milk	157,0	158,6	155,1	151,9
Sugar	242,0	245,8	249,8	253,8
(b) Ratio of EC prices to world prices				
Grains	1,68	1,08	1,00	1,00
Protein cakes	1,93	1,00	1,00	1,00
Corn gluten feed	1,00	1,00	1,00	1,00
Beef	1,53	1,08	1,00	1,00
Pork, poultry and eggs	1,20	1,00	1,00	1,00
Milk	2,03	1,80	1,76	1,72
Sugar	2,18	2,08	1,98	1,89

6.3. EC budget and EC farm incomes

EC budget expenditure, net of storage costs, increases by ECU 4,7 billion (1993 ecus) over the first subperiod 1993-96. As under the CAP reform, the savings on restitutions (grains, beef, and pork and poultry) are offset by direct transfers to farmers. However, expenditure is lower in the decoupled scenario than in the CAP reform scenario because there is no set-aside. From 1996 to 2002, expenditure decreases by ECU 2,3 billion (1993 ecus) due to the decrease of direct transfers in real terms according to the inflation rate.

Farmers are better off with decoupling than with the CAP reform scenario (ECU 116,2 billion (1993 ecus) instead of ECU 115,4 billion). This result is consistent with the fact that compensation is calculated on the basis of the initial situation and that farmers are more free to adjust in the case of decoupled subsidies[1].

In sum, the main change brought by the complete decoupling of compensatory payments would be to reduce the supply of grains and oilseeds, since the elimination of the incentives to crop marginal lands in order to capture the premiums more than offsets the abandonment of the set-aside. World prices are slightly higher for grains, oilseeds and beef than under the actual reform scenario. Near self-sufficiency is likely to eliminate the issue of compatibility between the reform and the GATT requirements for the main crops. Moreover, the situation of incomes and budget costs is improved by the decoupling of payments.

7. Implications for EC-US relations

The implications of the CAP reform on the USA arise from at least three sources: (i) changes in US exports to the EC, (ii) expected US gains in exports to the rest of the world as a result of reduced EC competition, and (iii) terms of trade gains and, possibly, farm-income effects.

[1] This is also a consequence of the convexity in prices of the restricted profit function. This point is made by Sarris (1992) and can generally be seen as follows. We note f(p, Z) the sector profit function, where p is the price of grains and Z is the vector of other variables (prices of outputs and variable inputs, production quotas, quasi-fixed factors). We note p^0 the price of grains under the pre-reform CAP and p^1 the price of grains under the CAP reform. In order to simplify the presentation, we assume that there is no set-aside and that direct payments compensate exactly the difference $(p^0 - p^1)\cdot y^0$, where y^0 is the pre-reform level of grain production. By Hottelling's lemma, we have $fp(p^0, Z) = y$. By convexity of the profit function, we have: $f(p^1,Z) + y^0\cdot(p^0 - p^1) \geq = f(p^0, Z)$. The profit under the assumption that compensatory payments are fully decoupled (left-hand side of the inequality) is then greater than the profit obtained under the assumption that compensatory payments are fully coupled (right-hand side of the inequality).

Table 14

EC agricultural budget and EC farm incomes

(billion 1993 ECU)

	1993	1996	1999	2002
(a) Base-run scenario				
Budget	18,6	18,7	18,2	17,3
Incomes	122,8	119,3	116,1	113,3
(b) CAP reform scenario				
Budget	18,6	25,1	23,7	22,3
Incomes	122,8	115,4	114,0	113,5
(c) Decoupled CAP reform scenario				
Budget	18,6	23,3	22,0	21,0
Incomes	122,8	116,2	115,2	116,0

MISS is basically a price-equilibrium model extended to include a simplified 'rest of the economy' supplying inputs to the farming sector at near infinitely elastic supply so that the prices of these inputs are led by the inflation rate. Therefore, the EC and US agricultural sectors face the rest of the world and no bilateral trade flow is represented. Trade is expressed only in terms of net exports since imports and exports are assumed to be perfectly substitutable. This framework limits our analysis of the interactions between the EC and the USA to world price effects. However, the price effects of the CAP reform on the USA are expected to dominate in the long term, since it is the nature and level of relative support provided to the farming sector in competing countries which determine the international location of productions, excess demands or supplies, relative prices, farm incomes and/or budget costs, depending on the degree to which policy instruments isolate domestic from world markets.

7.1. World prices

In the base-run scenario, nearly all world prices decline moderately in real terms. The prices of grains, oilseeds and grain substitutes decrease most. The significant exception is beef, which exhibits price increases in nominal and real terms due to a lower rate of technical change and a higher income elasticity than other food products. These

developments in world prices largely depend on the assumptions made on technical change and on world-demand prospects. They also depend on the changes in EC price-support policies in the base-run. There is room for debate here, and alternative assumptions could be made on exogenous variables depending on world economic growth in the next decade with different results for the trends in world prices.

The main effect of the CAP reform is to reduce grain exports by stimulating domestic demand for feed and by controlling production growth. World grain prices are 5,3% higher in 1996 and 6,4% higher in 1999 with respect to the base-run scenario. The corn gluten feed price falls sharply and is 14% lower than in the base-run. From 1993 to 1999, the world price ratio of corn gluten feed to grains falls by about 5% in the base-run and by 22,5% in the CAP reform scenario. The world prices of manioc and other grain substitutes fall less because their implicit protection is adjusted downwards and their supply elasticity is larger. The world prices of animal products are less affected by the CAP reform, save for beef, and, to a much smaller extent, milk, the prices for which would be 5,2 and 2,7%, respectively, higher in the CAP reform than in the base-run scenario.

In the decoupled CAP reform scenario, world prices are not much different from their levels under the actual CAP. The slight difference, mainly visible until 1996, originates from a further contraction of the EC production of crops and beef due to the complete decoupling of payments. The magnitude, however, is limited for grains as the set-aside requirement, according to our interpretation and parameters, partly offsets the incentives to produce created by acreage payments. The world prices of grain-fed animal products (i.e. pork and poultry) and of grain substitutes would be about the same in a fully decoupled CAP reform than in the actual CAP reform. Sugar prices are basically unaffected, since no policy change is conducted on this commodity which is otherwise little affected by the prices of other crops because of the quota restriction. The same reason explains why world dairy prices are the same in the two CAP reform scenarios. It is also noticeable that the discrepancies in world prices between the actual and the decoupled CAP reforms fade over time and almost disappear at the end of the decade.

To sum up, the overall picture of world price changes due to the two types of reform is that world grain prices improve moderately. On this point, the decoupled reform has the largest impact. In the CAP reform scenario, the prices of oilseeds are a little below their level than those in the base-run scenario, but it is not the case in the decoupled reform. Corn gluten feed prices are driven down sharply in the two reform scenarios. The prices of animal products are also raised by the reform projects, but only in 1996 for pork and poultry prices, which are thereafter heavily influenced by EC and world grain prices.

Table 15

World prices, in real ECU per tonne

(1993 ECU, with a 3% per year rate of inflation)

	1993	1996	1999	2002
(a) Base-run scenario				
Grains	102,2	99,9	97,8	95,6
Protein cakes	142,1	137,6	133,3	129,2
Oil	389,0	377,8	367,2	357,0
Corn gluten feed	101,9	97,3	92,8	88,4
Manioc	82,7	82,8	82,8	82,9
Other grain substitutes	88,4	84,3	80,4	76,6
Beef	2 536,6	2 599,9	2 664,4	2 729,6
Pork, poultry and eggs	1 429,5	1 399,1	1 370,6	1 342,3
Milk	157,0	153,8	150,7	147,6
Sugar	242,0	245,9	249,9	253,9
(b) CAP reform scenario				
Grains	102,2	105,2	104,1	102,4
Protein cakes	142,1	134,5	131,2	127,4
Oil	389,0	387,1	375,5	362,1
Corn gluten feed	101,9	83,4	80,6	79,5
Manioc	82,7	83,0	83,3	84,1
Other grain substitutes	88,4	85,1	81,8	79,9
Beef	2 536,6	2 742,1	2 804,1	2 853,6
Pork, poultry and eggs	1 429,5	1 416,0	1 370,4	1 335,4
Milk	157,0	158,0	154,7	151,6
Sugar	242,0	245,8	249,8	253,8
(c) Decoupled CAP reform scenario				
Grains	102,2	107,4	105,93	103,3
Proteins cakes	142,1	138,4	135,23	133,1
Oil	389,0	395,4	383,7	372,5
Corn gluten feed	101,9	82,2	79,1	78,6
Manioc	82,7	83,1	83,5	84,2
Other grain substitutes	88,4	83,3	80,1	78,7
Beef	2 536,6	2 769,2	2 830,5	2 851,1
Pork, poultry and eggs	1 429,5	1 413,3	1 367,8	1 333,8
Milk	157,0	158,6	155,1	151,9
Sugar	242,0	245,8	249,8	253,8

Table 16

Effects of EC scenarios on world prices (ratio of 1996 world prices in the three EC scenarios relative to the base-run)

	Base-run	Reform	Decoupled reform
Grains	1,00	1,05	1,07
Protein cakes	1,00	0,98	1,01
Oil	1,00	1,02	1,05
Corn gluten feed	1,00	0,86	0,84
Manioc	1,00	0,99	1,00
Other grain substitutes	1,00	1,01	0,99
Beef	1,00	1,05	1,06
Pork, poultry and eggs	1,00	1,01	1,01
Milk	1,00	1,03	1,03
Sugar	1,00	1,00	1,00

7.2. Implications for the USA

It is difficult to model the complex US farm programmes correctly. Our quantitative assessment meets clear limitations in this respect and will have to be supplemented by verbal comments based on the economic rationale of US policy instruments defined in the Farm Act of 1990. In our representation, target prices of grains are exogenous but loan rates follow the trends of world prices. The loan rate on soya-beans is treated in the same way.[1] The market prices of pork and poultry, and of corn gluten feed also follow world prices. For dairy products,[2] beef and sugar, domestic prices are pegged in nominal terms.

The main effects of the simulated EC scenarios on the USA are summarized in Table 16. The main observation is that, except for budget costs and the trade balance on grains, the difference between the three EC scenarios is not very large, in spite of the noticeable discrepancies in world prices highlighted previously.

Under the base-run scenario in the EC, the terms of trade for US exports would deteriorate and the export value of grains would be ECU 0,7 billion (1993 ecus) lower in 1996 than in 1993 and ECU 1,5 billion (1993 ecus) lower in 1999 than in 1993. Net exports of oilseeds (and derived products) and of corn gluten feed would continue to grow slightly in value.

As expected, the actual CAP reform appears attractive to the USA. Better grain prices reduce the US budget cost for grains by an extra ECU 1,2 billion (1993 ecus) in 1996, and net exports of grains are ECU 0,6 billion higher in value (in 1996). The only minor adverse effect is due to the loss of export value for oilseeds and corn gluten feed because of the declining feed demand from the EC animal sector. The decoupled reform would look even better from the US standpoint. The main reason is the moderate increase in world prices of grains and oilseeds. Some further limited savings in programme costs would be obtainable and the trade balance would also improve by about ECU 0,7 billion (1993 ecus). Only the farm incomes of meat producers would be slightly hurt by higher feed costs.

The consequences of the two EC reform scenarios on US agricultural incomes are small in relative terms and probably less reliable because of the way US policy programmes are expressed. The US income indicator reacts, in the main, to world grains, oilseeds and pork and poultry prices. There is no distinction made between participants and non-participants in the US crop programme and no benefit from better world prices to US grain producers is represented in the model. Moreover, world grain prices affect the feed cost of US livestock producers, and better grain prices on the market (as a result of the two EC reform scenarios, for example), translate into an income loss for the US farming sector as a whole. For this reason, the CAP reform looks better than the decoupled alternative from the US farm income point of view. Because of the absence of an adequate representation of non-participants in the US crop programme, the result in Table 16 is probably too pessimistic for the USA. No estimation of the impacts of the reform scenarios on the other US programmes has been attempted since they are expected to be small and difficult to capture in a modelling framework.

7.3. Trade in commodities and in livestock products on a more competitive basis

The CAP reform has clearly been designed to solve the problems of the EC cash crop sector. The global benefits to the USA in terms of budget or trade are clear-cut. The reform will also have drastic effects on price ratios in the livestock sector which could potentially shift the EC-US trade conflict from grains and feeds to livestock products.

[1] An alternative solution could be to peg the loan rates according to the principle of marketing loans, but the loan rates themselves may be adjusted by policy-makers.

[2] This is also a debatable representation as there is an extensive discretionary power given to the administration to adjust the policies if programme costs increase. The cost associated with dairy policy must be considered as 'potential' rather than automatic.

GRAPH 5: Price ratio between grain-fed animals (pork and poultry) and grains in the European Community and the USA under the CAP reform scenario

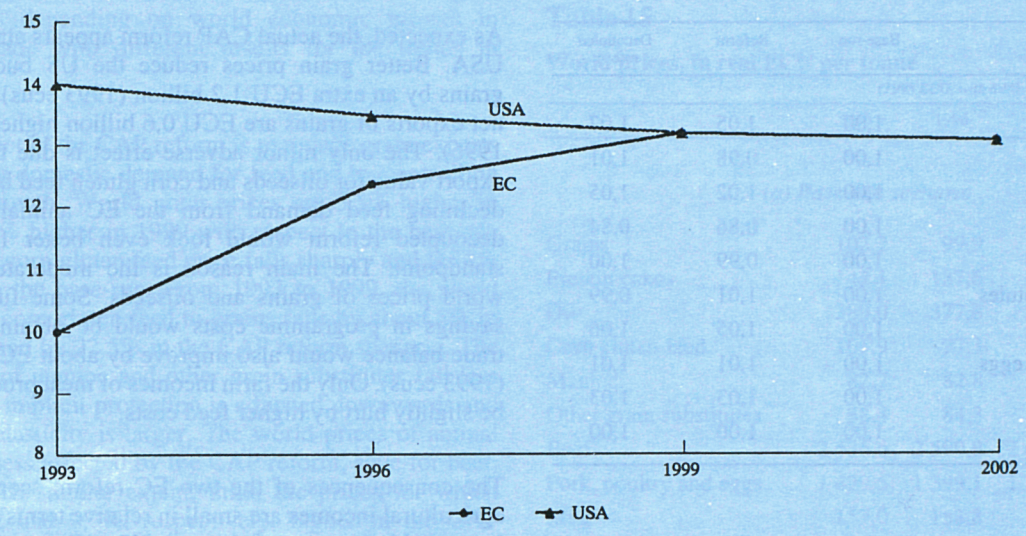


Table 17

Main effects of EC scenarios on the USA in 1996 and in 1999

(billion 1993 ECU)

	1993	1966			1993		
		Base-run	Reform	Decoupled reform	Base-run	Reform	Decoupled reform
Farm income	77,5	76,0	76,0	75,7	74,8	74,1	73,7[1]
Budget costs							
Grains	7,2	6,1	4,9	4,4	5,0	3,5	3,1
Dairy	0,7	0,8	0,8	0,7	0,8	0,0	0,8
Trade balance							
Grains	7,1	6,4	7,1	7,4	5,6	6,5	6,7
Oilseeds	4,2	4,3	4,1	4,5	4,4	4,7	4,8
Corn gluten feed	0,7	0,7	0,6	0,6	0,8	0,6	0,6

Graph 5 shows the dramatic changes in the price ratio between grain-fed animals (i.e. pork and poultry) and grains in both the EC and the US.[1] Over the next decade, this price ratio would increase by about 30% in the EC and decrease by about 10% in the USA. By the end of the decade, both countries should export these products on a nearly competitive basis, at least in terms of both price and cost.

The prospects for trade expansion in livestock products (poultry, pork and even dairy) are good because these products are income-elastic, and consumption should grow

[1] Similar patterns of evolutions would be observed as regards other animal products and other feed.

as the upturn in the world economy gains momentum. This should be particularly true in the fast-growing newly industrialized countries (NICs) of East Asia, where land is scarce and where environmental concerns will increasingly constrain domestic production.

As the basic price cost ratios turn in favour of the EC, one should expect that trade conflicts will take momentum on poultry and pork products, either on bilateral trade flows between the EC and USA or on third market outlets. The use of limited but targeted subsidies to capture market shares in this area are not an unrealistic scenario. EC dairy products are also potentially competitive, as the general movement to lower opportunity cost of land in the EC (dampened, however, by the acreage payments) and lower feed costs will drive the shadow price of milk in the EC closer to the world price. The EC will therefore be able to develop a more competitive position on cheese and other dairy products if the market organization is adjusted in an appropriate manner.

It is to be expected that non-tariff barriers, new technologies (hormone) and sanitary regulations will become even more important issues in this area than they are now. The GATT should play an increased role and adequate surveillance procedures by the Secretariat will become a major stake as it is clear that few countries can resist the temptation to use non-tariff barriers on such sensitive products.

7.4. The operation of the CAP with market prices in the vicinity of world prices

The assessment of the implications on EC-US relations based on the model has focused on basic trends and long-term issues. The major changes in EC market prices for grains and feed do, however, raise short-term issues related to the operation of the CAP with domestic prices close to unstable world prices.

It is likely that corn supply in the EC, at some stage in the transition period at least, falls short of domestic demand, while wheat net exports would keep positive. In such a case, the operation of the CAP would certainly create a wedge between wheat and corn prices because of Community preference. As Surry (1992) has shown, market prices are driven up to the threshold price in a net importing situation and driven down to the intervention price in a net exporting case. Higher prices for corn than for wheat in the EC would trigger outlets for US corn, but also make Community preference (ECU 45/tonne ('green' ecus), which is much higher than the target -intervention price wedge of ECU 10 /tonne ('green' ecus) more dissuasive. Skirmishes on the implementation of the minimum access as specified in the GATT draft Final Act are therefore likely.

Such circumstances would also affect the issue on grain substitutes, particularly trade in corn gluten feed (CGF). First, the continuation of unabated US flows of CGF exports to the EC, as projected by the model, calls for some qualifications. This outcome is probable as long as EC market prices for grains are significantly above US and world prices. However, with world prices rising in nominal terms, our scenario of aligning EC prices to world prices is likely. It would, of course, be even more likely if the US dollar gets closer to its purchasing parity (PP) value, if world economic growth accelerates and if the EC set-aside is not adjusted quickly enough to changes in market or weather conditions. Such optimistic or booming prospects on world markets, which cannot be discarded, would drastically change the prospects for feed substitutes in the EC. Even in the absence of rebalancing, transportation costs should provide some wedge between US and EC values of CGF, both led by similar world prices. The use of CGF in the US compound feed sector should take place under these circumstances because the EC price premium would disappear, potentially leading to a dramatic fall in US exports of CGF to the EC. A US dollar appreciation would clearly enhance the probability of this course of events.

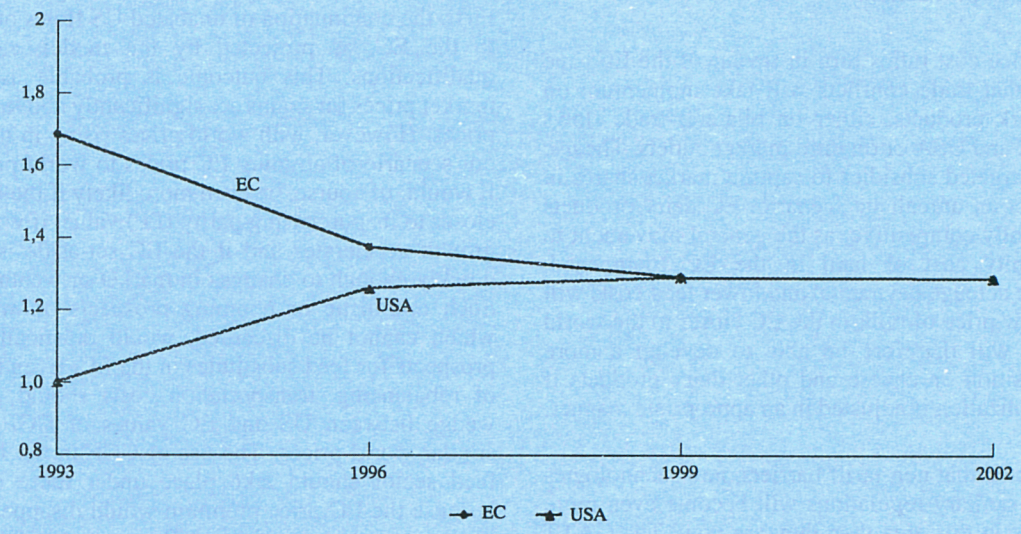
The trend in world grain prices would also change the fundamentals of EC grain exports. The management of restitutions will be more subject to world price shocks as the necessary level of subsidization becomes low or zero. The EC could then target more precisely its restitutions, as the USA does now, on specific markets to be contested or preserved.

Altogether, the likely picture of EC imports and exports in the grain and feed area is clearly moving toward more instability in prices, subsidies and trade flows. The macro-economic factors worldwide, and in both the EC (through the working of the European Monetary System (EMS) and the switch-over) and in the USA (exchange rate), will be essential elements of agricultural trade. Because of the likely shocks and ratchet effects on flows due to changing price relations, conditions are set for a pursuit of conflicts between the two players. Even the signing of a peace clause is not likely to overcome the potential trade conflicts created by the fundamentals.

8. Conclusion

The CAP reform process raises two interesting issues. The first is the understanding of the recent history of the CAP. The second deals with the future developments of the

GRAPH 6: **Price ratio between grains and corn gluten feed in the European Community and the USA under the CAP reform scenario**



EC's agricultural trade. EC-US relations are intertwined in both issues.

It is hardly debatable that the end-product of the CAP reform process has been designed to placate the everlasting demands of the USA, supported by other agricultural exporters and channelled into the GATT framework. It is quite striking that, under circumstances which were similar from an intra-EC standpoint, dairy surplus and cost problems were solved in a very different manner. Of course, domestic pressures have contributed to the final package, but important objectives, such as a more equal distribution of income support, have almost disappeared, and compensatory payments have been increased to allow for the market-oriented policy.

It is obvious that the reform was eventually limited to the crop sector for which trade interests were at stake, while the dairy and sugar sectors (where price and trade distortions are even larger) were left virtually untouched. The set-aside was initially a way to cut surpluses and to reduce the existing bias of income support in favour of large producers. In the end, the surplus-cutting purpose has only been kept in order to accommodate foreign pressures while preserving the principle of a floor price above world market level.

Interestingly, our assessment suggests that the actual CAP reform and a fully decoupled CAP reform do not have significantly different implications as far as US interests are concerned. The set-aside of productive land is best understood as a price paid by crop producers to keep both a safety net based on the intervention price and payments attached to production capacity and therefore to assets. Future developments on world markets may lead to the rationale behind this package being seriously questioned.

It is tempting to expect that the positive effects of the reform on the USA will solve the agricultural trade conflicts between the EC and the USA. We do not foresee that the peace clause mentioned in the GATT deal will be smoothly implemented. First, after a few years of reduced surpluses, the export capacity of the EC in the grain sector will be restored on a large scale. Moreover, it should spread and take momentum in the grain-fed animal sector where the USA has increased exports markedly over the last decade. Although the fundamentals suggest that both countries could export these commodities on a competitive basis, since domestic prices should be very close to world prices, skirmishes on both the phasing-out of export subsidy programmes and the search for new promising outlets are more likely than a smooth

process. Even non-tariff barriers or health-related trade policies will be temptations hard to resist.

The closer proximity of EC and world grain prices being likely, and even more so if trends in world prices return to secular levels and if the US dollar becomes stronger, EC imports of substitutes can be subject to large cuts which US producers may not accept without reacting. On the other hand, if EC grain prices meet world prices, then no reason to reduce exports through set-aside will remain, and the EC may increase its exports while still using the budget allowed by the GATT on specific markets as the USA does through its export enhancement programme. Such developments will not take place without tensions between the two large exporters.

The achievement of the CAP reform and of the Uruguay Round has been to revert the trend toward distorted agricultural trade. If world prices follow higher trends than those of the last decade, the general conditions will clearly limit, but not eliminate, trade tensions. But the efficiency of the GATT in the discipline of remaining trade instruments and non-tariff barriers remains to be seen.

References

AGRA-Europe, various issues.

European Commission (1988), 'Disharmonies in EC and US agricultural policy measures', report to the European Commission, Brussels.

European Commission (1991), 'The development and future of the common agricultural policy', COM(91) 258 final/3.

European Commission (1992), 'Volet agricole de la négociation GATT et réforme de la PAC', Commission communication SEC(92) 2267 final.

Focus, GATT newsletter, various issues.

Folmer, C., Keyzer, M. A., Merbis, M. D., Stolwijk, H. J. J. and Veenendaal, P. J. J. (1993), 'CAP reform and its differential impact on Member States', SOW-VU, Research Memorandum, 93-01.

Grilli, E. R. and Yang, M. C. (1988), 'Primary commodities, manufactured good prices and the terms of trade of developing countries: What the long run shows', *World Bank Economic Review,* 2, pp. 1-47.

Guyomard, H., Mahé, L. P. and Tavéra, C. (1991), 'Technical change and EC-US agricultural trade liberalization', *Journal of Agricultural Economics,* 42, 2, pp. 119-137.

Guyomard, H., Léon, Y. and Mahé, L. P. (1992), 'La réforme de la PAC et les négociations du GATT: un pas nécessaire pour un compromis minimal?', *Economie et Statistique,* 254-255, 41-61.

Guyomard, H. and Mahé, L. P. (1992), 'The CAP reform and the GATT negotiation: Between political economy and mercantilism', 28th EAAE Seminar, Lisbon, Portugal.

Guyomard, H., Mahé, L. P., Munk, K. and Roe, T. (1993), 'Agriculture in the Uruguay Round: Ambitions and realities', *Journal of Agricultural Economics,* 44, 2, pp. 245-263.

Guyomard, H., Mahé, L. P., Roe, T. and Tarditi, S. (1993), 'The CAP reform and EC-US relations: The GATT as a cap on the CAP', International agricultural trade consortium, *New dimensions in North American-European agricultural trade relations,* Le Castella, Isola Capo Rizzuto, Calabria, Italy.

Hine, R. C., Ingersent, K. and Rayner, A. J. (1989), 'Agriculture in the Uruguay Round', *Journal of Agricultural Economics,* 50, pp. 385-396.

Josling, T. E., Sanderson, F. H. and Warley, T. K. (1990), 'The future of international agriculture relations: Issues in the in the GATT negotiations', in 'Agricultural protectionism in the industrial world', Sanderson, F. H. (ed.), *Resources for the future,* Washington, USA.

Mahé, L. P. and Tavéra, C. (1989), 'Bilateral harmonization of EC and US agricultural policies', *European Review of Agricultural Economics,* 15, pp. 327-348.

Mahé, L. P. and Roe, T. (1993), 'Political economy of trade negotiations: An empirical game theory analysis, in Bellamy, M. and Greenshields, B. (eds), *Issues in agricultural development: Sustainability and cooperation,* IAAE Occasional Paper No 6.

Sarris, A. H. (1992), 'Implications of EC economic integration for agriculture, agricultural trade, and trade policy', 31st EAAE Seminar, Frankfurt-on-Main, Germany.

Surry, Y. (1992), 'Un modèle de transmission des prix garantis des céréales dans la Communauté économique européenne', *Cahiers d'économie et sociologie rurales,* 22, pp. 9-35.

Warley, T.K. (1989), 'Agriculture in the GATT: Past and future', in 'Agriculture and governments in an interdependent world', Proceedings of the XXth Conference of the IAAE, Dartmouth.

Annex 1

An outline of the MISS (modèle international simplifié de simulation) and a synoptic presentation of the scenarios

The world is divided into four zones: European Community, USA, centrally planned economies and the rest of the world. The agricultural sector is disaggregated into 11 outputs and 10 inputs, i.e. six inputs of agricultural origin for animal feed and four inputs not produced by the farming sector (Table A1). The behaviour of the model is driven by matrices of direct- and cross-price elasticities of agricultural output supply, derived demand and final demand. The complete system of agricultural output supply and derived demand is derived from a sector-restricted profit function which satisfies the theoretical properties of symmetry, linear homogeneity and convexity with respect to prices. Domestic prices can be either exogenously fixed or linked to world prices by protection rates, as in the case of fixed *ad valorem* tariffs, subsidies or taxes, for example. Shifts of supply and demand due to technical change, set-aside, extensification or income growth can be implemented, as well as production and import quotas.[1] Supply and derived demand shifters were calibrated on the basis of the 1978-88 period by correcting actual trends of production and disappearance volumes for price changes in order to get estimates of pure technical change effects; final demand trends were also corrected for price effects.[2]

The base period is 1990 for budget costs, protection estimates and animal products and 1989/90 for crop products. Animal-feed use is represented by its ingredients and the oil included in supply corresponds to the oil content of oilseeds which are domestically produced. The data and parameters were calibrated so as to approximate budget, income and trade as well as possible. The shifters (Table A.2) were initially calibrated so as to reproduce, in a base-run scenario corresponding to policies applied over the period 1978-88, the evolution of world prices observed over that period. Nevertheless, in the various scenarios described in the paper, these shifters have been modified in the rest of the world in order to reproduce better evolutions of world prices, as expected by the World Bank (Grilli and Yang, 1988), over the next decade than those observed over the period 1978-88.

[1] The effects of quota level changes on quantities supplied and demanded are taken into account via corresponding shadow price changes.

[2] For more information on commodity and policy instrument coverage, and details on the model assumptions and structure, see Mahé and Tavéra (1989) and Guyomard *et al.* (1991).

Table A1

Agricultural outputs and inputs covered in the model and corresponding abbreviations

Outputs		Inputs	
Grains[1]	(GRA)	Grains[1]	(GRA)
Vegetable proteins	(VPR)	Vegetable proteins	(VPR)
Vegetable oil[2]	(OIL)	Corn by-products	(CGF)
Corn gluten feed	(CGF)	Manioc	(MAN)
Manioc	(MAN)	Other grain substitutes[3]	(OGS)
Other grain substitutes[3]	(OGS)	Milk	(MIK)
Beef	(BEE)	Other feed ingredients	(OFI)
Pigmeat, poultry and eggs	(P&P)	Fertilizers	(FER)
Milk	(MIK)	Other intermediate consumption	(OIC)
Sugar	(SUG)	Capital services	(CAP)
Rest of agriculture	(ROA)[4]		

[1] Wheat and coarse grains.
[2] Except for olive oil included in the rest of agriculture.
[3] Citrus pulp, millings and other vegetable by-products.
[4] Olive oil, vegetables, fruits, wine, sheep- and goatmeat. This residual group allows the model to cover the whole of the farming sector.

Table A2

Original technical change shifters for supply (S), derived demand (D) and final demand (F)

(% per year)

	EC			USA			Rest of the world		
	S	D	F	S	D	F	S	D	F
Grains	3,2	1,5	− 0,9	1,3	2,1	2,5	3,7	1,6	− 0,1
Vegetable proteins	3,5	2,5	*	1,1	0,9	*	6,9	3,9	*
Vegetable oil	3,5	*	− 1,7	1,1	*	− 0,8	6,9	*	3,5
Corn by-products	0,3	6,0	*	8,0	2,4	*	6,7	3,0	*
Manioc	*	2,6	*	*	*	*	0,7	− 0,9	− 0,8
Other grain substitutes	6,6	4,0	*	1,9	2,9	*	3,0	1,5	*
Beef	1,0	*	− 1,0	0,1	*	− 1,6	0,1	*	0,8
Pigmeat and poultry	3,2	*	0,5	2,7	*	1,3	3,9	*	2,4
Milk	2,4	*	0,0	2,3	*	0,1	3,7	*	2,9
Sugar	2,3	*	− 0,5	− 0,8	*	− 2,9	2,8	*	2,3
Rest of agriculture	0,2	*	− 0,5	− 0,2	*	− 0,5	2,5	*	2,0
Other feed ingredients	1,7	1,8	*	− 0,1	− 0,1	*	0,5	0,5	*
Fertilizers	3,0	3,1	*	0,3	0,3	*	3,8	3,8	*
Other raw materials	1,2	1,3	*	1,3	1,3	*	2,5	2,5	*
Capital	0,0	0,5	*	0,1	0,1	*	0,5	0,5	*

Table A3

EC policy changes and assumptions in the base-run scenario

	Continuation of existing policies
	(a) 1993-96
Grains	Price cut of 9,0% (supply and demand)
Oilseeds and protein crops	Price cut of 7,5% (supply)
Beef	Price cut of 6,0% (supply and demand)
Pork, poultry and eggs	NPC decrease of 6,0% (supply and demand)
Milk	Price cut of 4,5% (supply and demand) No quota level change
Sugar	Price cut of 3,0% (supply and demand) No quota level change
Rest of agriculture	NPC decrease of 2% (supply and demand)
Intermediate consumption	No price cut
	(b) 1996-99 and 1999-2002
Grains	Price cut of 9,0% (supply and demand)
Oilseeds and protein crops	Price cut of 7,5% (supply)
Beef	Price cut of 6,0% (supply and demand)
Pork, poultry and eggs	NPC decrease of 6,0% (supply and demand)
Milk	Price cut of 4,5% (supply and demand) No quota level change
Sugar	Price cut of 3,0% (supply and demand) No quota level change
Rest of agriculture	NPC decrease of 2,0% (supply and demand)
Intermediate consumption	No price cut

NB: Price changes are specified in real terms assuming a 3% per year rate of inflation.

Table A4

EC policy changes and assumptions in the CAP reform scenario

	CAP reform
	(a) 1993-96
Grains	Price cut of 9,0% for supply (coupled payments) and of 32,8% for demand Set-aside of 9,8% (grains, oilseeds and protein crops) Extensification assumption: growth rate of yields over three years reduced from 9,6 to 3,6% (– 66%)
Oilseeds and protein crops	Price cut of 9,0% on the supply side (coupled payments) Set-aside of 9,8% Extensification assumption: growth rate of yields over three years reduced by 66% (see grains)
Beef	Price cut of 14,9% for supply and of 22,6% for demand
Pork, poultry and eggs	Complete liberalization
Milk	Price cut of 10,1% (supply and demand) Quota cut of 2,0%
Sugar	Price cut of 3,0% (supply and demand) No quota level change
Rest of agriculture	Nominal rate of protection decrease of 2,0% (supply and demand)
Intermediate consumption	No price cut
	(b) 1996-99 and 1999-2002
Grains	Price cut of 9,0% (supply and demand) from 1996 to 1999; no price cut from 1999 to 2002[1] Technical change shifter set to 6,0% over three years for supply
Oilseeds and protein crops	Technical change shifter set to 7,0% over three years for supply
Beef	Price cut of 6% (supply and demand) from 1996 to 1999 No price cut (supply and demand) from 1999 to 2002[2]
Pork, poultry and eggs	EC price follows world price
Milk	Price cut of 4,5% (supply and demand) No quota level change
Sugar	Price cut of 3,0% (supply and demand) No quota level change
Rest of agriculture	NPC decrease of 2,0% (supply and demand)
Intermediate consumption	No price cut

NB: Price changes are specified in real terms assuming a 3% per year rate of inflation.

[1] In 1999, for grains, EC market price = world price (i.e. NPC = 1).

[2] In 1999, for beef, EC market price = world price (i.e. NPC = 1).

Table A5

EC policy changes and assumptions in the decoupled CAP reform scenario

	Decoupled CAP reform
	(a) 1993-96
Grains	Price cut of 32,8% (supply and demand) No compulsory set-aside Extensification assumption: growth rate of yields over three years reduced from 9,6 to 3,6% (– 66%)
Oilseeds and protein crops	Complete liberalization for supply (cut of the NPC by 49,5%) No compulsory set-aside Extensification assumption: growth rate of yields reduced by 66% (see grains)
Beef	Price cut of 22,6% (supply and demand)
Pork, poultry and eggs	NPC decrease of 16,7% (supply and demand) so that NPC = 1 in 1996
Milk	Price cut of 10,1% (supply and demand) Quota cut of 2,0%
Sugar	Price cut of 3,0% (supply and demand) No quota level change
Rest of agriculture	NPC decrease of 2,0% (supply and demand)
Intermediate consumption	No price cut
	(b) 1996-99 and 1999-2002
Grains	Price cut of 8,7% (supply and demand) from 1996 to 1999 No price cut (supply and demand) from 1999 to 2002[1] Technical change shifter set to 6,0% over three years for supply
Oilseeds and protein crops	Technical change shifter set to 7,0% over three years for supply
Beef	Price cut of 6,0% (supply and demand) from 1996 to 1999; no price cut (supply and demand) from 1999 to 2002[2]
Pork, poultry and eggs	EC price follows world price
Milk	Price cut of 4,5% (supply and demand) No quota level change
Sugar	Price cut of 3,0% (supply and demand) No quota level change
Rest of agriculture	NPC decrease of 2,0% (supply and demand)
Intermediate consumption	No price cut

NB: Price changes are specified in real terms assuming a 3% per year rate of inflation.
[1] In 1999, for grains, EC market price = world price (i.e. NPC = 1).
[2] In 1999, for beef, EC market price = world price (i.e. NPC = 1).

The development of agricultural policies and trade relations in response to the transformation in Central and Eastern Europe

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[1] The views expressed in this paper are those of the author and cannot be attributed to the European Commission. Helpful comments from William Floyd, Ulrich Knüppel and Manfred Teutemann and participants in the December 1992 meeting of the International Agricultural Trade Consortium are gratefully acknowledged.

Graphs

1. Transfers to agricultural producers and relative value-added in OECD countries, average 1980-90 **40**

2. Transfers to agricultural producers and share of net agricultural export in agricultural production in OECD countries, average 1980-90 **40**

1. Introduction

The purpose of this paper is to assess the likely implications for European agricultural policy, and in particular for trade policy, of the political and economic changes in Central and East European Countries (CEECs) in the wake of the breakdown of Communist rule.

The paper begins with a brief characterization of the basic pattern in agricultural development and agricultural policy worldwide. In this context it discusses the comparative advantages of agriculture in the CEECs .

The paper then attempts to establish a framework for understanding agricultural policy, based on public finance and political economy arguments.

Using this framework, the likely evolution of agricultural policy in the CEECs and the European Community (EC) is discussed, with a separate assessment of how the prospects of full EC membership for the CEECs is likely to influence these policies.

Then the development of trade relations and other bilateral relations are discussed. A final section summarizes and concludes the paper by identifying the challenge to EC decision-making.

2. The global perspective

Productivity gains, in particular within the developed part of the world, have increasingly outstripped the increase in demand for agricultural products over the last 30 years. If left to market forces, this would lead to lower prices for agricultural products and, by implication, lower remuneration of factors of production employed in agriculture than of those employed in other sectors of the economy, putting pressure on these factors to leave the agricultural sector. Unanticipated reductions in agricultural prices would also result in significant capital losses which would often be endured by family enterprises.

Policy-makers in the industrial countries have, with few exceptions, responded to this by supporting the income of their farmers, generally by market price support.

The fact that, over a long period, governments have allowed only a partial adjustment of the factor allocation has resulted in an increasing agricultural overcapacity worldwide.

Agricultural policy reform and international trade agreements may speed up the adjustment process. Agricultural overcapacity is likely to remain for many years to come, however, and the basic tendency for increases in agricultural production, due to technological progress, to outstrip the increases in demand for agricultural products is also likely to continue. It is therefore likely that the downward pressure on agricultural world market prices will remain. During the last 10 years, the decline has been spectacular. According to OECD statistics, the decline in world market prices has been in the order of 6% for crop products and 4% for animal products. The annual decrease may slow down, but the downward trend in agricultural prices is likely to persist.

The widespread opinion that the CEECs have a comparative advantage in agriculture must be assessed against this background. It may well be true when they are compared with developed countries where agricultural production is highly subsidized. This, however, does not imply that they are competitive at world market prices.

3. A framework for agricultural policy analysis

There is a distinctive worldwide pattern in agricultural protection. Among developed countries, the level of support as illustrated in Graphs 1 and 2 is higher:

(i) the greater the difference between the value-added for employment in agriculture and in industry in general, and

(ii) the lower the degree, i.e. the higher the share of net agricultural export in agricultural production.

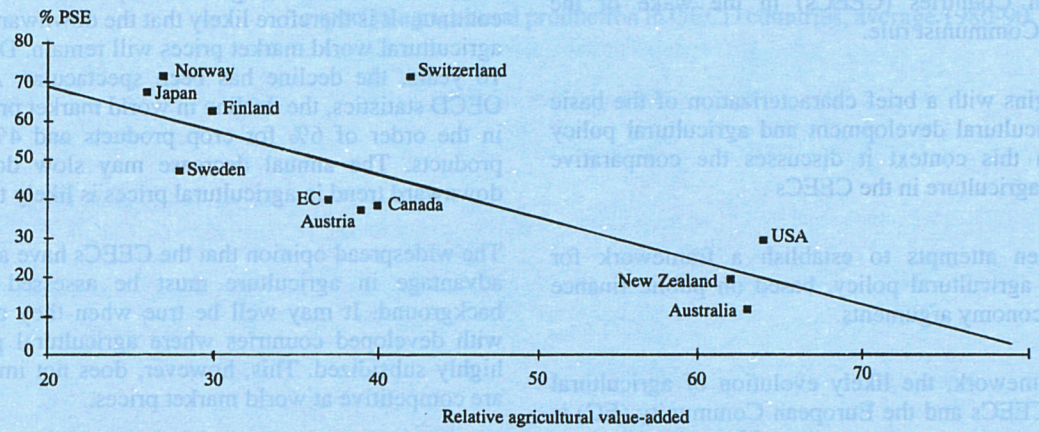
A number of authors[1] have attempted to explain this pattern within a framework which draws on both public finance and political economy arguments.

The basic assumption is that governments behave as if they were maximizing a preference function defined — as a social welfare function — on the real income of different social groups.

In the normative interpretation of public finance theory, the social welfare function is generally specified as indicating that different weights are attached to the increase in income for different social groups due to equity considerations. The increase in the income of a household with a relatively low

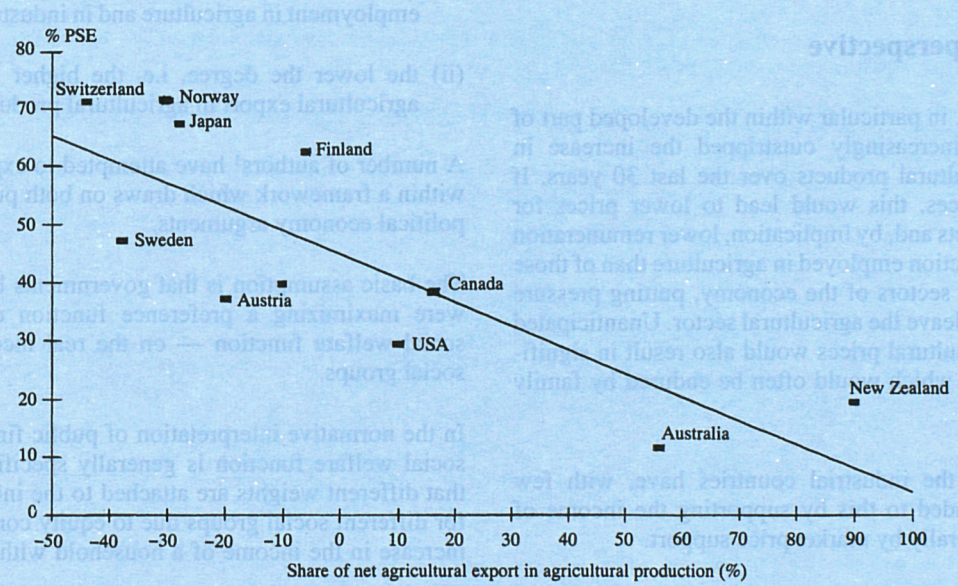
[1] Stiglitz (1987); Gardner (1987, 1989 and 1992); Lindert (1991); Rausser and de Gorter (1991) and others.

GRAPH 1: Transfers to agricultural producers[1] and relative value-added[2] in OECD countries, average 1980-90



1 Producer subsidy equivalent (PSE) relative to value of agricultural production at producer prices.
2 Agricultural gross value-added per person employed in the agricultural sector relative to gross value-added per person employed in the whole economy.
Sources: OECD; PSE database; national accounts.

GRAPH 2: Transfers to agricultural producers[1] and share of net agricultural export in agricultural production in OECD countries[2], average 1980-90



1 Producer subsidy equivalent (PSE) relative to value of agricultural production at producer prices.
2 Value of agricultural net export at world market prices relative to value of agricultural production at domestic producer prices.
Sources: OECD; PSE database; national accounts.

income is given a relatively high weight. However, in the positive interpretation of public finance theory, which is used here, the social welfare weights are seen as reflecting partly the influence of groups outside government which are competing for influence on government policy-making and partly the common interests of all groups in society in maintaining social peace. In public finance theory, the social welfare weights are taken as given, but they may be explained using political economy arguments. The high welfare weights attached to farmers' income may therefore, in this interpretation of public finance theory, be due to rent-seeking behaviour as much as to low farm income, and the heavy discounting of the long-term benefits of a more efficient resource allocation may be seen as being due to the short time horizon which often characterizes political decision-making. Public finance theory recognizes that the redistribution of income involves economic costs. The level of agricultural support, therefore, reflects a trade-off between redistributional benefits and economic costs of redistributing income. Furthermore, the choice of instruments to achieve the redistribution reflects a trade-off between different types of economic costs.

These trade-offs change over time and space which helps to explain the changes in government policy over time and differences in policy in different countries.

3.1. The level of market price support

When market price support is the instrument chosen to support farmers, the level of support will be higher (see Munk, 1989):[1]

(i) the lower the level of income of farm households relative to that of households employed in other sectors;

(ii) the more production is concentrated among farmers with small incomesk;

(iii) the higher the income elasticity of the agricultural commodity in question, i.e. the smaller the proportion of the transfer from consumers which comes from low-income households;

(iv) the greater the net import of the supported commodity, i.e. the more favourable the impact on the government budget;

(v) the smaller the supply-price elasticity, i.e. the smaller the distortion costs in production (as would be the case if the use of intermediate inputs and the mobility of primary factors were low, and if the support were provided for a short-term period), and

(vi) the smaller the demand-price elasticity, i.e. the smaller the costs in terms of consumption distortion.

3.2. The choice of market price support

Government choice of support instrument will reflect a trade-off between the different types of costs: the direct administrative costs and distortion costs due to the application of the instrument itself and the indirect costs due to the administrative and distortion costs associated with raising government revenue. Price support will, in its pure form, be associated with relatively small administrative costs, in particular for importing countries, because it only requires control at international borders, whereas direct income support measures (output subsidies, deficiency payments), primary factor subsidies and decoupled direct income support (lump-sum payments) are administratively more costly (because they require more detailed information and imply more difficult enforcement), but are less distorting. Furthermore, market price support has a lower budget cost than direct income support measures.

This suggests that market price support is most likely to be used:

(i) when supply and demand elasticities are low so that the direct distortion costs are low;

(ii) for commodities which are imported (rather than exported), where the effect on the government budget is positive;

(iii) when the decrease in income to which the policy is a response is considered to be temporary so that the set-up costs of administering more complex support schemes play an important role relative to the distortion costs;[2] and

(iv) when the administrative infrastructure is weak so that the implementation and enforcement costs of alternative transfer instruments are high and the opportunity cost of government revenue is high.

[1] This and the following two points assume that the social welfare weight given to the income of a given farm household will be higher, the lower its income relative to the average income in society.

[2] Price support which has been introduced to deal with a temporary shock tends to be maintained after the situation returns to normal (Stiglitz, 1987; Gardner, 1992). This can only be partly explained within the public finance framework. The introduction of a support instrument may induce rent-seeking behaviour by interest groups. This implies that the social welfare weights in the government preference function are not independent of the instruments.

3.3. Changes in the level and form of government support in the course of economic development

Changes in agricultural policy over time may be attributed to:

(i) changes in the economic situation of farmers relative to other social groups, changing the redistributional benefits of transferring income to farmers;

(ii) changes in the influence of agricultural interests on government decision-making reflected in changes in the government preference function;

(iii) changes in the economic costs of different instruments to support farmers' income, changing the trade-offs subject to which the government preference function is maximized.

During periods of industrial take-off, the relative decline in the demand for agricultural products generates the structural adjustment problem, eroding the income position of farmers relative to that in other sectors of the economy, and at the same time creates more favourable conditions for agricultural interests to be expressed through collective action.

The cost of market price support has increased in relation to that of direct income support in many highly industrialized countries. This is partly because the administrative cost advantage of market price support compared with direct income support has been eroded in the cause of economic development.

This helps to explain why agricultural protection in many countries was introduced during periods of industrial take-off and that in many highly industrialized countries there is a tendency to move from market price support towards direct income support.

4. Development of agricultural policies in the European Community and the Central and East European countries

We now use the framework established above to suggest a likely evolution of agricultural policies in the EC and the CEECs.

4.1. Assumptions

It is notoriously difficult in the best of circumstances to establish the comparative advantages of different countries at the sectoral level. In the case of the CEECs, for obvious reasons, this is more difficult than in the case of mature market economies.

In the absence of conclusive evidence, for the sake of this analysis, we assume that the marginal rate of transformation between agricultural products and industrial products[1] is not consistently higher in the CEECs than in the EC countries. It will be higher for some labour-intensive products, but for some capital-intensive products (in particular highly processed products) the opposite will be the case. However, the rate of transformation in the CEECs is lower than on the world market and is likely to remain so for the next decade.

We furthermore, for the sake of the analysis, assume that the CEECs will achieve membership of the EC in 10 years' time and that this will involve the application of the CAP in the CEECs after a five-year transition period. This means that the EC and the CEECs will have common external border protection in 15 years' time.

We assume that both the EC and the CEECs want integration primarily for political reasons and that the EC is willing to make significant transfers to the CEECs to stabilize the political and economic situations in these countries. We assume that both the EC and the CEECs will adjust their agricultural policies to maximize net benefits according to the type of preference functions described above, i.e. with regard not only to economic efficiency but also to the structural adjustment problems in their agricultural sectors, taking into account the integration objective as a side condition.

4.2. EC agricultural policy

The framework established above suggests that in the EC, irrespective of the recent changes in the CEECs, there has been, and will continue to be, a shift from market price support to direct income support.

The capacity to adjust and the severity of the structural adjustment problem have decreased in most EC countries as the share of the agricultural labour force in total employment has shrunk, and the possibility of combined part-time farming with employment in industry has increased with the development of transport infrastructure and industrial growth in rural areas. In fact, in many EC regions, the current income of farm households may not differ a lot from that of urban households (Hill, 1992).

[1] That is the amount of agricultural products which can be obtained for one unit of industrial products.

The basic objective of the EC agricultural policy, to support farmers' income, has therefore diminished in importance. The cost of providing income transfers by traditional market price support has, however, increased as the supply elasticity of agricultural products has increased, and as the EC has become an exporter for most agricultural products. The cost of providing income transfers (permanently or as compensation for a rapid decrease in agricultural prices) in the form of direct income support has decreased. The administrative costs of direct income support schemes which require the registration and collection of information from individual farmers have decreased with the spectacular advances in data-processing technology and as the number of farmers has declined.

This shift from market price support to direct income support will imply a significant reduction in EC agricultural prices, in particular for those products for which the EC is an exporter. Market price support for cereals has already been partly substituted by direct payments as a result of the May 1992 reform decision. The support prices for cereals are likely, within a 10-year time horizon, to be further reduced to world market level. This will also be the case for cereal-based products such as pork and poultry. The protection of other crop products, such as fruit, vegetables and sugar beet, and of animal products, such as milk and beef, are also likely to be reduced, but not as drastically. The shift from market price support to direct income support for these products involves significantly higher increases in budget cost (given that compensation will be paid) as very substantial transfers from consumers (in the order of ECU 50 billion) need to be transformed into transfers from taxpayers. For cereals, only a small part of the transfer provided under market price support comes from non-agricultural consumers. The shift has therefore been easier than it will be for other products. Whereas it is likely that there will be no border protection for cereals and cereal-based products in 10 years' time, considerable protection is likely to remain for other products.

The CAP will increasingly lose its character as an open-ended market price support system. Either prices will be at world market levels and support will be provided by direct payments or production will be constrained by quota regulation as in the case of milk and sugar. Beef prices will be reduced significantly for budgetary reasons and support increasingly provided in the form of direct payments subject to quota regulations.

4.3. Agricultural policies in the Central and East European countries

The CEECs will for some time have relatively weak administrative systems and the opportunity cost of government revenue will be very high because efficient broad-based tax systems, such as a general income tax or VAT, are not administratively feasible. Nor is an efficient social security net in place to provide targeted income transfers. The CEECs have large agricultural labour forces. The empirical evidence is not conclusive but labour productivity in the agricultural sector in these countries seems to be lower than in other sectors, when assessed at world market prices. The increase in productivity is unlikely to be higher in the agricultural sector than in other sectors over a 10-year time horizon. At world market prices, the income of those employed in agriculture will therefore not match that obtained in the industrial sector. The mobility of labour from rural to urban areas will be difficult due to weak transport infrastructures and shortages in urban housing.

In other words, the CEECs seem to be in a situation similar to that of the EC countries after World War II and, more recently, that of the newly industrialized countries (NICs) in South-East Asia. The development of agricultural policies in the CEECs is likely, therefore, to follow the same pattern as in the abovementioned countries. Given the high opportunity costs of government revenue and the lack of effective administration, market price support policies will seem an attractive solution. One would expect the introduction of market price support policies, as has already been the case, even in Poland, which has been under strong external pressure to adopt a very liberal trade regime. Policy-makers in the CEECs, as in other countries, will give high priority to avoiding social unrest, even at the cost of distortions of the resource allocation (and, in my opinion, rightly so). When deciding on levels of price support, especially for basic foodstuffs such as bread, not only will the interests of farmers be taken into account, but also, given the importance of the cost of food in the consumer's budget and the weak social security net, those of low income urban workers.

Because of the high opportunity costs of government revenue (reflected in the problems of avoiding high rates of inflation), governments will avoid, as far as possible, solutions which create budgetary costs. Direct income support measures, direct consumer subsidies and market price support for exported agricultural products are therefore likely to be limited. Due to the importance of consumer interests, the level of market price support for imported agricultural products is also likely to be lower than in recent years in the EC.

For these reasons, agricultural policies in the CEECs will have a bias towards self-sufficiency and this tendency will be reinforced by food security considerations. If the CEECs are not given privileged access to the EC market, the implication is that by the time of accession, the CEECs are likely to be more or less self-sufficient in agricultural products.

4.4. The effect on the EC of the CEEC integration in the CAP

If, at the time of accession, the East and Central European countries are basically self-sufficient in agricultural products (as argued above), the application of the CAP market price support system for milk, beef and sugar will imply a transfer from their own consumers to their own producers, without any cost to the EC budget. Increasing production in a highly protected sector (such as milk) would, after accession, be constrained by quota regulations and would be unlikely to lead to major increases in export subsidies. With present EC regulations, the only sector where there could be a problem, from the point of view of the EC budget, is beef, but this sector is likely to be reformed before accession.

The extension of the hectare payments under the new CAP regime for cereals and oilseeds and the various premiums in the animal sector could create significant costs to the EC budget after accession. It is, however, not obvious that such payments will be extended to the farmers in the CEECs as it may be argued that these payments are compensation for the decrease in prices as part of the CAP reform. The EC may have an incentive to adjust its policies by moving more swiftly than it would otherwise, making these payments independent of current production decisions, in order to emphasize their compensatory character. This will also be an attractive solution in the context of enlargement with the EFTA countries, allowing these countries to provide direct income support to their farmers at higher levels than in the EC.

4.5. Adjustment of the EC agricultural policies

Contrary to the opinion of several authors (for example, CEPR, 1992; Gros and Ludlow, 1992), the budget costs resulting from the integration of the CEECs in the CAP are likely, for the reason given above, to be low and, therefore, unlikely to exert further pressure on the CAP. This does not, however, mean that the situation in the CEECs will not induce further adjustments to the CAP than would otherwise be the case, but this is due to pressures in the period before accession, where the EC is being called upon to provide access to its market before it has the means to control imports into the CEECs from third countries and agricultural production in the CEECs. The CEECs, and particularly Poland, have large agricultural labour forces and severe structural adjustment problems in their agricultural sectors. As the EC, in general, is committed to assisting in the transition in the CEECs, it will, in deciding on how to provide access for agricultural products from the CEECs, take into account the effect this can have on the social situation in rural areas in the CEECs. To provide privileged access in highly protected markets is very costly to the EC (as explained below). In order to reduce the cost of providing access to agricultural imports from the CEECs, the EC will therefore have an incentive to reduce its level of border protection more rapidly than it would otherwise have done. This implies a further shift away from market price support towards direct income support and to the use of other measures to deal with the structural adjustment problems in the EC agricultural sector. However, due to the budget costs of replacing market price support with direct payments, it is unlikely that this will result in total elimination of market price support prior to accession.

4.6. The effect on the Central and East European countries of integration in the CAP

Under the assumption that the CEECs will, at the time of accession, basically be self-sufficient in agricultural products, since they are not competitive in agriculture at world market prices and cannot afford to develop substantial subsidized exports for the reasons mentioned above, they are not likely to derive sizeable transfers from the rest of the EC by integration into the CAP. Furthermore, due to quantitative restrictions, they cannot expect to do so subsequent to accession. The CEECs are likely to experience a harmonization loss when, at accession, they have to adopt prices, for example for milk, which, based on their own preferences with respect to the balance between consumer and producer interests, are higher than they would like to see.

4.7. Adjustment of CEEC policies

The CEECs have an incentive to expand their agricultural production prior to accession for agricultural products which are highly protected in the EC, especially for products where they are less than self-sufficient. It will, however, be a risky strategy, particularly for products where a CEEC is in an export position, as it will not be able to foresee either the changes to the CAP or the effect which such a strategy could have on the date and conditions of accession.

5. EC-CEEC economic integration and the impact on agricultural trade relations

The EC will provide assistance to solve the structural adjustment problems in the CEECs. Such assistance is likely to take into account, on the one hand, the need to maintain

income at acceptable levels in rural areas and, on the other, that investments funds, including those provided by the EC, are channelled into sectors which are profitable at world market prices. A trade-off between these two objectives has to be established. At present within the agricultural sector, the CEECs seem to have a comparative advantage in labour-intensive production and agricultural products but not in highly processed products adapted for high-income export markets.

5.1. Development of EC-CEEC agricultural trade relations

The overall interest of the EC in supporting the transition in the CEECs is to develop trade with them. This is also likely to bring benefits to the EC in its own right. However, for sectors where the EC supports its agriculture by market price support, such a policy is very costly. Privileged access to imports from the CEECs in the form of tariff concessions for agricultural exports from them have the effect of a special-purpose grant tied to agricultural exports to the EC. Such grants will, in general, be of less value to the CEECs than untied grants corresponding to the costs to the EC budget of the tariff concession.[1] Furthermore, the high-quality agricultural products demanded on the EC market are unlikely to derive from that part of agricultural production where the CEECs have a comparative advantage.

There are two ways out of this dilemma for the EC.

The first is to reduce the level of market price support. This has already been done for some products. After the implementation of the May 1992 reform of the CAP, there is likely to be little or no border protection in the EC for cereals and cereal-based products. Therefore, the opening-up of trade for these products will not pose a significant problem for the EC. Whether the CEECs will be able to develop profitable exports to the EC at these prices is another matter. However, even subsidized CEEC exports would not, under this condition, pose a major problem for the EC.

For the reasons given above (the budgetary implications), this avenue is not likely to be followed for sugar, milk, beef or fruit and vegetables. Since the CEECs are also likely to protect their agricultural sectors (Poland has, for example, already introduced tariffs on agricultural products at 20 to 40%), although at a level far below the present EC level, another avenue for the development of trade in agricultural products is possible. This involves the EC and the CEECs granting mutual and balanced privileged access to each other's markets. This would allow the exploitation of comparative advantages within agriculture without providing increased levels of support to the agricultural sector as a whole, neither in the CEECs nor in the EC. The EC is likely to have a comparative advantage in capital-intensive agricultural products, for example, highly processed dairy products, whereas the CEECs are likely to have a comparative advantage in labour-intensive products, for example, fruit and vegetables. Thus EC dairy products could be given privileged access to the CEEC market while the rest of the world would face tariffs higher than those on EC imports. In exchange, the CEECs would obtain privileged access to the fruit and vegetable segments of the agricultural market in the EC. Such a development, by approaching the level of protection in the CEECs and the EC, would also be a step in the direction of full integration of the CEECs in the EC agricultural market. After accession, the EC and the CEECs will naturally have total privileged access to each other's market.

5.2. The Community exerting influence on the agricultural policy in the Central and East European countries

It will be in the interest of the EC not to stimulate agricultural production which is not profitable at world market prices in order to avoid an increase in the agricultural overcapacity of an enlarged Community. This is another reason why privileged access for agricultural imports from the CEECs on a unilateral basis is not an attractive way for the EC to provide assistance to the CEECs. The EC is also likely to have an interest in promoting a convergence of agricultural policies in the CEECs to the CAP, even though this may be in conflict with the first objective, especially to the extent that this contributes to stabilizing the social situation in the CEECs. Finally, it will be in the interest of the EC that the

[1] A tariff reduction on agricultural imports from the CEEC provides a transfer from the EC to the CEEC amounting to the import times the tariff concession. The tariff will replace imports from other countries or increase EC exports by an amount which corresponds to the increased imports from the third country receiving the concession. The transfer will, therefore, be financed by the EC budget. In the case of the EC being in an export position, the budget costs will be greater than the transfer due to the difference between cif and fob prices. The tariff reduction will increase marginal costs in the CEEC by the reduction in the tariff, and the increase in income to the producers in the third country in question will, therefore, be less than the transfer. Tariff concessions require rules of origin to be observed and generally imply extra administrative costs. Tariff quotas which provide tariff concessions only for a limited quantity of export to the EC are, in general, even less cost-effective, as the benefit to the CEEC may well be limited and as the costs due to complicated administration and rent-seeking behaviour may be significant. These costs may be particularly onerous for the CEEC which is in the process of establishing a market economy based on price signals rather than quantitative regulations.

various CEECs do not create barriers for agricultural trade among themselves.

The assistance provided to the CEEC, both in the form of trade concessions and in investment grants, will provide the EC with some leverage in influencing the policies in the CEECs, but it is difficult to say to what extent it will be politically opportune for the EC to use this leverage.

5.3. The implications for international trade relations

The logical implication of the mutual desire of the EC and the CEECs for integration is the enlargement of the EC trade bloc. For those who believe that the CEECs can be persuaded to adopt free agricultural trade, this may be seen as detrimental to improved trade relations between the EC and its agricultural exporting trade partners.

This is probably not the case. The CEECs seem likely to develop protectionist agricultural policies even without the prospect of EC integration following the worldwide patterns in agricultural policies, as illustrated in Graphs 1 and 2. The EC, on the other hand, is likely to adopt lower levels of protection than the Member States would do individually, because high levels of protection generate transfers which may cause tension in cooperation. Furthermore, recent experience has also shown that it is very difficult, within the GATT context, to discipline the use of domestic support measures. This is more easily done within a trade bloc, such as the EC, than in worldwide multilateral trade agreements. In this context, it is worth noting that the level of protection in the EC is the lowest of all the European OECD member States.

There is a close parallel between the integration process taking place in Europe and that in North America, which suggests that there will be mutual understanding between the two blocs that the regional integration process requires a certain discrimination against outsiders. This need not mean increased distortions between the regional trade blocs, as argued above. Regional integration may not only benefit the development of trade within the blocs, but also between them, as more stringent discipline on protectionist measures within a bloc also reduces the distortion of external trade.

6. Concluding remarks

This paper considers the agricultural aspects of the challenge which the transformation in the CEECs poses to the EC.

On the one hand, the challenge concerns the adjustment of its own policies and, on the other, the development of economic relations with the CEECs.

EC agricultural policy has already been changed and is likely to be further changed to facilitate the import of agricultural products from the CEECs. The move from market price support to direct income support and to the use of other measures to deal with the structural adjustment problems in the agricultural sector has gained momentum due to the new situation in the CEECs.

With respect to the development of economic relations with the CEECs, the challenge to the EC has at least four dimensions:

(i) how to devise its assistance programme for investment in the CEEC agro-food sector;

(ii) how to develop its agricultural trade relations with the CEECs prior to accession;

(iii) how to use EC leverage to influence the CEEC agro-food investment policy, and policies with respect to trade among the CEECs themselves and with third countries;

(iv) how to specify the time and form for the integration of CEEC agriculture in the CAP.

This paper, contrary to some other analyses,[1] takes into account that agricultural policies formation reflects a trade-off between economic efficiency considerations and distributional and other broader social objectives.

From this perspective, the development of agricultural trade between the EC and CEECs on the basis of substantially increased privileged access to the EC market for highly protected agricultural products while the CEECs maintain free trade with the rest of the world is not likely, partly because this would be extremely costly for the EC, both economically and politically, and partly because the CEECs are likely, for distributional reasons, to adopt the same agricultural policies as all other developed countries. A scenario where the EC and the CEECs, prior to accession, on the basis of their comparative advantages, provide each other with privileged access seems more likely and consistent with the mutual long-term objective of integration of the CEECs and the EC. This implies that the CEECs prior to accession will create tariff barriers against agricultural imports from third countries, supporting a price level above world market level, taking into account CEEC producer, consumer and taxpayer interests, without, however, the EC providing an incentive for the CEECs to increase the level of support above that which the CEECs are willing to pay for themselves. After accession, the use of trade-distorting support measures will be reduced, as reflected by the change in EC agricultural policy which has already taken place, resulting in an overall trade-liberalizing effect of EC-CEEC integration.

[1] See, for example, CEPR (1992, pp. 82 and 83).

References

Atkinson, A. B. and Stiglitz, J. E. (1980), *Lectures on public economics,* London, McGraw-Hill.

CEPR (1992), 'Is bigger better? The economics of EC enlargement', CEPR annual report.

Gardner, B. L. (1987), The economics of agricultural policies, New York, Macmillan Publishing Company.

Gardner, B. L. (1989), 'Economic theory and farm politics', *American Journal of Agricultural Economics,* 71, pp. 1165-1171.

Gardner, B. L. (1992), 'Changing economic perspectives on the farm problem', *Journal of Economic Literature,* Vol. XXX, pp. 62-101.

Gros, D. and Ludlow, P., (1992), *The European Union and the future of Europe,* CEPS.

Hill, B. (1992), 'Total income of agriculture households: 1992 report', Luxembourg, Eurostat.

Honma, M. and Hayami, Y. (1986), 'The determinants of agricultural protection levels: An econometric analysis', in Anderson, K. and Hayami, Y., with associates, *The political economy of agricultural protection: East Asia in international perspective,* London, Allen and Unwin, pp. 39-49.

Lindert, P. H. (1991), 'Historical patterns of agricultural policy', in Timmer, C. P. (ed.), *Agriculture and the States,* pp. 29-83.

Munk, K. J. (1989), 'Price support to the EC agricultural sector — An optimal policy?' *Oxford Review of Economic Policy,* Vol. 5, No 2, pp. 76-89.

Munk, K. J., Koester, U., Kwiecwiski, A. and Rembisz, W. (1990), 'Agricultural trade policy strategy for Poland', in Polish/European Community/World Bank Task Force, *An agricultural strategy for Poland,* World Bank, Washington, DC.

Newbury, D. (1987), 'Agricultural taxation: The main issues'. In Newbury, D. and Stern, N. (eds), *The theory of taxation for developing countries,* Oxford University Press, pp. 166-386.

OECD (1992), *Agricultural policies, markets and trade — Monitoring and outlook,* Paris.

Polish/European Community/World Bank Task Force (1990), *An agricultural strategy for Poland,* World Bank, Washington, DC.

Rauser, G. and de Gorter, H. (1990), 'Endogenizing policy in models of agricultural markets', in Maunder, A. (ed.), *Agriculture and government in an interdependent world,* Aldershot, UK, Gower.

Sah, R. and Stiglitz, J. (1987), 'The taxation and pricing of agriculture and industrial goods in developing economies', in Newbury, D. and Stern, N. (eds.), *The theory of taxation for developing countries,* Oxford University Press, pp. 426-462.

Stiglitz, J. (1987), 'Some theoretical aspects of agricultural policies', *Research Observer.*

The consequences of common agricultural policy reform for developing countries

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The World Bank and the OECD Development Centre[1]

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1. Introduction

The effect of CAP reform on developing countries cannot easily be distinguished from other economic changes, such as those arising from the GATT negotiations, the single European market (SEM), and the results of international trade and macroeconomic reforms, not least those in developing countries (LDCs) and Eastern Europe.

While the reform of the CAP will have direct effects on developing countries' trade in cereals, sugar, meat and tobacco, the trade in tropical products is expected to be more affected by the SEM. Although the current proposal for CAP reform does not include sugar, it is likely that the EC Commission will re-examine the sugar regime in line with the reform of cereals and oilseeds and other competitive crops.

The signatories to the recent Lomé IV declared that 'no ACP State shall be placed, as regards access to its traditional markets and its advantages on those markets, in a less-favourable position than in the past or present'. Nevertheless, many LDCs worry that the SEM may result in higher effective external barriers, so that intra-EC trade could be encouraged to the cost of traditional traders.

Most ACP countries are heavily dependent on the production and trade of agricultural products. They are likely to be affected by both the CAP reform and the results of the Uruguay Round of the GATT. Although only 34 ACP States are members of the GATT, and only 15 of them participate actively at the negotiations, the effects of the Uruguay Round will be relevant both because it is likely to imply EC reforms not included in the CAP reforms, and notably in sectors other than agriculture, and because it will imply a simultaneous set of reforms in other countries. This paper aims to differentiate the CAP reforms from those in the GATT, although clearly in the case of EC agriculture an overlap is anticipated.

The aim of the paper is to provide an indication of the consequences of CAP reform for developing countries and offer perspectives on future trade relations between the EC and LDCs.

We begin with a brief description of the CAP and its interaction with economy-wide reforms in the EC, other OECD countries and developing countries. A global general equilibrium model is then used to examine the effects of EC policies on world prices. Chapter 4 examines specific issues which are beyond the scope of the model, beginning with the relationship between CAP reform and the single market. We then review the EC trade policy towards LDCs, focusing on the preferential trade agreements, and notably The Lomé Convention, the Mediterranean Agreements, and the Generalized system of preferences. Next, we consider the impact of the CAP reform on a number of key commodities such as cereals, beef and sugar. Finally, the paper considers non-traditional products and the issue of value-added of traditional products, and the growing significance of non-tariff measures affecting trade between the EC and developing countries.

2. Sequencing and extent of CAP reform

The aim of the common agricultural policy (CAP) is (Article 39 of the Treaty of Rome): to increase productivity by promoting technical progress and the rational development of agricultural production, with an optimum use of resources, including labour; to ensure a fair standard of living for the agricultural community; to stabilize the market; to guarantee food supplies; and, to provide food for consumers at reasonable prices.

To meet these objectives different market structures have been gradually instituted. The rules of market organization vary from product to product and now cover 94% of all EC farm output. Around 70% of products[1] benefit from a support price system, a minimum guarantee price and variable import levies calculated according to the difference between an EC fixed price and the world price; a 21% share[2] is protected by trade barriers to preclude low-price imports from third countries; about 2,5% of produce[3] is regulated through a deficiency payment system giving direct subsidies to guarantee a minimum income for the producer; and, direct aid per hectare planted or quantity produced is granted to 0,5% of EC production.[4]

For many years the common agricultural policy has been criticized by Member States, mainly because of its high budgetary expenditure. Other countries, and notably the major agricultural traders, have also voiced increasingly strong criticism focusing on the CAP's effects on world prices. Price guarantees have meant that EC production has continually grown. This has generated excessive levels of intervention stocks for the main agricultural commodities, oversupply of world market and rising budgetary expendi-

1 Including cereals, sugar, dairy products, livestock and meats, table wine and some fruit and vegetables.
2 Including other fruit and vegetables, eggs and poultry.
3 Including hard wheat, olive oil, oilseeds and tobacco.
4 Including cotton seed, flax, hemp, hops, silkworms, seeds and dehydrated fodder.

ture. In addition, only a minority of farmers benefit from most of the budgetary expenditure and the CAP does not provide an effective solution to the problem of farm income and has not alleviated rural inequality.

Minor changes in the functioning of the CAP have been made over the years in response to EC budgetary pressures and changes in the external environment, but the principles of high domestic support prices and of variable import levies have remained unchanged. In July 1991 the EC Commission proposed its most drastic reforms to date. In broad terms, it proposes a partial substitution of high guarantee prices by a combination of lower (guarantee) prices and direct payment to farmers, such as income compensations.

The target price for cereals will be ECU 100 per tonne, i.e. around one third below the existing average buying-in price for cereals, while the intervention price and the threshold price will be respectively 10% below and above the target price. To compensate for the income loss caused by the reduction of institutional prices, a compensatory payment will be provided on a per hectare basis.

For oilseeds and protein crops, the existing institutional prices will no longer apply and the support will be granted with direct per hectare aid to the producers. The tobacco sector will be reformed regrouping the varieties in a lower number of groups, and introducing a single premium for each group and a system of production quota at member country level. The existing regime for sugar, expiring at the end of 1993, will probably be reviewed in the light of the reform of the above crops.

Reform proposals for milk aim at an additional reduction of the global quota, i.e. a 3% cut in individual reference quantities, with this abatement counterbalanced by an annual compensation of ECU 50 per tonne of milk over 10 years. Reduction of institutional prices for dairy products will average 10%, while an annual premium per dairy cow will encourage extensive dairy farming. For beef, a 15% cut in the intervention price will be counterbalanced by the increase of the annual premiums for male bovines and suckler cows. In the case of sheepmeat, the reform proposals freeze the number of eligible ewes at the 1990 level.

As far as fresh and processed fruits and vegetables are concerned, the EC Commission has proposed not to modify the existing stabilizer regimes which involve intervention thresholds with reductions in basic and buying-in prices (fresh products) and cuts in production aids (processed products), when guarantee thresholds are overstepped.

3. Modelling the global impact

3.1. The RUNS model

We begin by presenting a succinct description of the rural/urban-North/South (RUNS) global applied general equilibrium model.[1] The model's geographic coverage encompasses the world. The world is divided into 22 regions/countries. Each region has a fully-modelled general equilibrium economy.[2] The model contains 20 commodities, 15 of which are agricultural. RUNS is dynamic, spanning the time period 1985-2002. Most of the simulations will involve shocks which are applied in the year 1993.

Each regional economy is modelled as two dual economies: rural versus urban. The rural economy produces exclusively agricultural commodities. Capital is specific to each of the two sectors. However, labour is partially mobile between the rural and urban sectors, responding to changes in per capita income differentials. While RUNS can incorporate urban unemployment via a sticky wage mechanism, all these simulations used the full employment version of the model.

The agricultural supply functions have not been widely used, but are similar to other flexible functional forms and are well-behaved supply functions. Production and demand in the rest of the economy use very traditional functional forms (for example, the extended linear expenditure system, and CES production functions in the urban sector). Household and government savings are determined endogenously. Foreign savings are exogenous, and investment is determined by aggregate savings.[3]

Agricultural commodities are modelled as homogeneous goods, and are not origin specific. Domestic consumers are indifferent about buying wheat from the EC or from any other region. Therefore, trade in agricultural commodities is determined as the difference between domestic supply and aggregate domestic demand, which includes both household demand and intermediate demand (seed and feed). The non-agricultural (or urban) commodities are modelled as being differentiated by region of origin. This assumption is known as the Armington assumption.[4] This allows demand for the urban goods to be determined via a nested-demand system. Aggregate demand for a commodity is split between

[1] For a complete description of RUNS see Burniaux and van der Mensbrugghe.
[2] No region has been designated as a rest of the world residual.
[3] The model is capable of using a different closure rule with an explicit investment function and foreign savings determined endogenously.
[4] See Armington (1969).

a domestic good and an aggregate imported good. The aggregate imported good is further split by region of origin. For example, US consumers determine an aggregate demand for motor vehicles. This aggregate demand is then split between the purchases of US made cars and foreign cars. The aggregate demand for foreign cars is then split across countries (Japan versus Germany, for example). While the particular functional form chosen in the RUNS model, the CES, has been criticized, the Armington assumption has proven to be a useful tool in almost all trade modelling exercises.

Agricultural policies are modelled as a combination of three instruments. First, domestic agricultural prices are modelled via a price transmission equation. Changes in domestic agricultural prices are a weighted average of changes in world agricultural prices and a domestic price index. This is in a sense a reduced form equation of governmental and other institutional controls over the domestic rural to urban terms of trade. With a price transmission of 0, changes in world agricultural prices are not transmitted at all to domestic farmers. The output prices are completely determined by changes in urban prices. Countries with such policies are called non-adjusting countries and farmers in these countries are completely isolated from the vagaries of the international markets. By and large, this has been the case of the EC, the former socialist economies of Eastern Europe (EET) and the Soviet Union (CIS), and a number of developing economies. In the case of the EC, the high level of domestic isolation is the result of an effort to guarantee a relatively good standard of living for farmers: domestic agricultural prices have been kept above world prices. In the case of many other regions, it is urban consumers who have been the target of relative income support: domestic agricultural prices have been kept below world prices. With a price transmission of 1, there is perfect price pass-through, changes in world prices are completely transmitted to domestic agricultural prices. This is equivalent to perfect tariffication. Many regions fall somewhere in between full transmission and zero transmission. The level of transmission is exogenous, therefore, the price wedge (which is defined to be the ratio of the domestic price to the world price), is endogenous, unless the price transmission is 1. The second instrument enables exogenous shifts in the price wedge, i.e. a shift in the price transmission intercept. For example, EC domestic prices can continue to follow the normal pattern of adjustments, but may require an exogenous correction mechanism if the price wedges were to generate unsustainable budgetary costs. The third instrument is a commodity and region specific input subsidy.

The base period's (1985-90) price wedges and input subsidies for the OECD countries have been developed from the OECD's tables on producer subsidy equivalent (PSE) measures.[1] For the developing regions, the model relies on estimates produced by the US Department of Agriculture.[2] The latter data is less complete than the data for the OECD countries. The price transmission elasticities have been estimated from price time series published by the FAO. These elasticities have been estimated for each commodity and region.[3] The intercept terms for the OECD countries have been calibrated so that the price wedges generated by the model for the period 1985-90 match the observed price wedges. The intercept terms are then fixed for the period 1993-2002.

3.2. The reference run I: Business as usual

The policy environment

For the purposes of this exercise, we will define two reference simulations. The first will be known as the business-as-usual reference run. (This is somewhat misleading since it does assume changes in price policies in the EC. It represents the consensus view of the evolution of domestic and world agricultural prices and agricultural supplies.) The following items describe the basic features of reference run I:

(i) Real world prices of all agricultural commodities decline by 0,5% per annum from 1993-2002, except for oil seeds which decline by 0,9% per annum;

(ii) EC domestic prices (in real terms) evolve as follows (between 1993 and 2002) in % per annum:

Cereals	– 3,0
Oil seeds	– 2,5
Sugar	– 1,0
Beef, veal and sheepmeat	– 2,1
Other meats	– 1,8
Dairy	– 1,5

(iii) The price wedge (as defined by the ratio of domestic to world prices) in 1993 is given by:

Cereals	1,7
Oil seeds	1,9
Sugar	2,2
Beef, veal and sheepmeat	1,5
Other meats	1,2
Dairy	2,0

[1] See OECD (1991).
[2] See USDA (1989).
[3] For the purposes of this paper, we have assumed perfect price transmission in all regions. The OECD price wedges have been calibrated for the period 1985-90, and are assumed to remain constant at their 1990 levels through the year 2002. In other words, in all simulations, we have assumed full tariffication.

No changes are assumed in any other agricultural policy, including land set-asides, compensation, and quotas.

3.2.1. Results of reference run I

With an almost constant real world price and declining domestic price, the price wedge itself must be declining. Table 1 indicates the changes in the price wedges.

Table 1

Changes in price wedges, 1996-2002

	1996	1999	2002
Cereals	1,6	1,5	1,4
Sugar	2,2	2,1	2,1
Beef, veal and sheepmeat	1,4	1,4	1,3
Other meats	1,2	1,1	1,1
Oil seeds	1,8	1,7	1,6
Dairy	1,9	1,9	1,8

Source: Authors' calculations

Table 2

Production trends, (base: 100)

	1996	1999	2002	% p.a.
Wheat	105	109	114	1,5
Coarse grains	105	110	115	1,6
Sugar	100	100	100	0,0
Beef, veal and sheepmeat	105	109	114	1,4
Other meats	108	116	124	2,4
Oil seeds	106	113	119	2,0
Dairy	100	100	100	0,0

Source: Authors' calculations.

The production trends are lower than those in the past. The reduction in farm gate prices in many of the commodities, leads to a reduction in supply (as compared to a base scenario with no changes in the price wedge). The demand trends in cereals tend to be less than the supply trends, leading to increases in net exports. Table 3 shows the net trade trends (these are harder to interpret than self-sufficiency rates which are a more stable statistic than net trade).

Table 3

Net trade trends

	1996	1999	2002	% p.a.
Wheat	108	116	126	2,6
Coarse grains	132	104	105	0,5
Sugar	77	48	20	- 16,2
Beef, veal and sheepmeat	- 89	- 5	132	3,1
Other meats	122	146	183	6,9
Oil seeds	103	107	106	0,7
Dairy	- 969	- 3 480	- 3 787	:

Source: Authors' calculations

In the case of beef, etc., the EC hovers around self-sufficiency, alternating between small imports and small exports. In the case of dairy, the EC is a small exporter in 1993, and its imports increase slowly from 1994 onwards.

3.3. The reference II: CAP reform — Complete decoupling

The following items indicate the changes made to RUNS to implement CAP reform. In this version of CAP reform, there is full decoupling, compensation is provided to rural households as a lump sum payment, without any direct effect on production variables.

(i) Prices. Between 1994 and 1996 farm gate prices are reduced in real terms by the following amounts: 37% for cereals, 55% for oil seeds, 10% for dairy, 23% for beef, veal and sheepmeat, and 3% for sugar. Other prices are determined endogenously. Subsequent to 1996, nominal prices are held constant, therefore, real prices will fall at the rate of inflation, we have assumed 3% per annum. The price wedge is never allowed to fall below 1.

(ii) A total of USD 14 billion (1985) is allocated in 1996 as compensation. Assuming a dollar inflation rate of 4%, this amounts to USD 21,6 billion in 1996 dollars (or roughly ECU 16,6 billion, in 1996). In subsequent years, the compensation amount is adjusted for the number of farm households (using farm labour as a proxy). If the number of households decreases by 10%, the compensation amount will also decrease by 10%.

(iii) Total land set-aside is 8% for all of the EC.

3.3.1. Results of CAP I — Complete decoupling[1]

In general, world prices will increase. The fall in production from lower EC production induces an increase in world agricultural prices, except in other meats which becomes relatively more profitable in the EC, leading to a rise in production.

Table 4

Percentage change in world prices in 2002

	Reference (change between 1993-2002)	CAP I (change in 2002 compared to reference)	CAP II (change in 2002 compared to reference)
Wheat	– 0,5	5,6	5,3
Coarse grains	– 0.5	4,8	5,2
Sugar	– 0,5	3,0	2,1
Beef, veal and sheepmeat	– 0,5	6,3	6,1
Other meats	– 0,5	– 0,5	– 0,6
Vegetable oils	– 0,9	8,3	7,9
Dairy	– 0,5	5,1	5,1

The rise in world prices is not sufficient to overcome the significant drop in domestic prices. The price wedge is eliminated in cereals, beef, veal and sheepmeat, and oil seeds. The wedge remains significant for sugar, which is not part of CAP reform, and for dairy where the reduction of the quota has less impact.

Table 5

Price wedges in 2002

	Reference	CAP I	CAP II
Wheat	1,35	1,00	1,00
Coarse grains	1,35	1,00	1,00
Sugar	2,10	1,81	1.83
Beef, veal and sheepmeat	1,30	1,00	1,00
Other meats	1,07	1,20	1,20
Vegetable oils	1,64	1,00	1,00
Dairy	1,83	1,50	1,50

[1] Unless stated otherwise, all monetary values are in billions of 1985 US dollars. CAP I refers to CAP reform with a fully decoupled compensating mechanism. CAP II refers to CAP reform with partial decoupling.

Within the EC, we witness the following production trends, using 1993 = 100 as the base.

Table 6

Production trends (base: 1993 = 100)

	1996	1999	2002	% p.a.
Wheat	89	96	103	0,3
Coarse grains	92	98	105	0,6
Sugar	103	100	95	– 0,5
Beef, veal and sheepmeat	99	102	108	0,9
Other meats	120	132	145	4,2
Oil seeds	75	81	87	– 1,5
Dairy	105	102	99	– 0,2

The supply trends are significantly lower than in the business-as-usual scenario. For example, wheat production is down by 10% under CAP reform compared to reference I, coarse grains down by 9%, and oil seeds down by 27%. Given the reduction in internal prices, demand increases, and we estimate the following consequences on net trade trends (always using 1993 as the base).

Table 7

Net trade trends (base: 1993)

	1996	1999	2002	% p.a.
Wheat	61	77	97	– 0.3
Coarse grains	23	47	75	– 3.2
Sugar	92	23	– 54	:
Beef, veal and sheepmeat	2 569	3 592	3 722	49,5
Other meats	235	306	396	16,5
Oil seeds	608	608	615	22,5
Dairy	50	– 6 234	– 12 268	:

Again, the trade numbers are sometimes difficult to interpret because of the change in signs and the volatility of the net trade statistic. In wheat, there will be an absolute decrease in the volume of exports in 2002 (about 3%) compared to 1993. Compared to the reference I scenario, exports of wheat decline by 23% in the year 2002 (more than the 21% agreed to by the EC and the USA). For coarse grains, the drop is even greater, with a decline in exports of 29% in 2002 (compared with the volume of exports in reference I). In sugar, the EC becomes a (slight) net importer as opposed to being a small net exporter in reference I. In the beef, veal

and sheepmeat sector, the EC is just about self-sufficient in reference I, with a small level of imports. It becomes a much more significant importer under CAP I. The reverse is true in other meats, where export volume increases by about 116% between the reference I simulation and the CAP I simulation by the year 2002. The volume of vegetable oil imports increases dramatically, by 480%, as there is a large drop in production, and a significant increase in demand, both household and for feed. There is also an increase in the volume of net import demand for dairy products, where the volume of imports increases by 153% in the year 2002 between the two reference scenarios. The changes in net trade between 1993 and 2002 in dairy in both reference scenarios appear large. This reflects the very low level of imports in 1993 (or equivalently, the high degree of self-sufficiency).

Table 8

Trade and welfare changes in 2002 (compared to reference)

	CAP I Change in agricultural net trade (billion 1985 USD)	CAP II Change in agricultural net trade (billion 1985 USD)	CAP I Change in welfare (% of reference GDP)	CAP II Change in Welfare (% of reference GDP)
Low income Asia	0,3	0,4	– 0,1	– 0,1
China	0,6	0,5	– 0,2	– 0,2
India	0,6	0,8	0,1	0,1
Upper income Asia	0,2	0,0	– 0,3	– 0,3
Indonesia	0,3	0,2	– 0,1	– 0,1
Africa	0,1	0,0	– 0,3	– 0,3
Nigeria	0,0	– 0,1	– 0,1	– 0,1
South Africa	0,0	0,0	– 0,1	– 0,2
Maghreb	0,0	0,2	– 0,3	– 0,3
Mediterranean	0,0	0,0	– 0,3	– 0,3
Gulf Region	– 0,5	– 0,5	– 0,3	– 0,3
Latin America	1,8	2,1	0,5	0,4
Brazil	1,4	1,6	0,3	0,3
Mexico	0,3	0,4	0,0	– 0,1
USA	3 8	4,6	– 0,1	– 0,1
Canada	0,9	1,0	0,0	0,0
Australia, New Zealand	1,2	1,5	0,3	0,2
Japan	– 0,4	– 0,5	– 0,1	– 0,1
EC	– 13,8	– 16,5	– 0,3	– 0,2
European Free Trade Area	0,1	0,3	– 0,2	– 0,2
European economy in transition	1,3	1,4	0,0	0,0
Former Soviet Union	2,2	2,6	0,1	0,1

As reflected in Table 8, the effect on net agricultural trade is a reduction of USD 13,8 billion (1985 USD), in the year 2002, albeit the EC remains a net agricultural exporter. The main beneficiaries are all of Latin America, North America, Australia/New Zealand, and the former Soviet Union, with lesser net gains by China and India.

The welfare impacts are minor except for Latin America and Brazil. The EC sees a loss of 0,3%. While not going into detail, the welfare impacts on the rest of the world can normally be deduced from their net trade position and the sign change of the world price. Net importers will suffer from world price increases, net exporters will benefit. CAP reform, while possibly removing significant price distortions in the EC, appears to have negative but small impacts on welfare. In a world of second best, this is not a surprising outcome.

3.4. CAP reform — Partial decoupling

This simulation is almost identical to the previous one, however, the compensation payment is linked to land use. In the RUNS model, we have assumed that the compensation is in the form of a subsidy on land use, and we have calibrated the subsidy so that the compensation amount is the same as the decoupled compensation in CAP I, i.e. USD 14 billion. The effect of the subsidy on land is to increase the price of land as demand for land increases. One of the main effects of this, compared to the previous simulation, is that there is a substitution away from land use in livestock production, towards more use of feed. Despite the increased demand for feed, world prices decrease for cereals, compared to the decoupled simulation. Cereal production is higher, as the economic incentives for production are better, and land is not transferred as much to the production of livestock, leaving more surface available for cereals. The rise in the world price is none the less modest when comparing CAP I and CAP II.

The supply trends under CAP II are outlined in Table 9, and the impacts on the EC's net trade are shown in Table 10.

Table 9

Supply trends under CAP II

	1996	1999	2002	% p.a.
Wheat	92	99	106	0,6
Coarse grains	94	101	108	0,9
Sugar	107	103	99	– 0,1
Beef, veal and sheepmeat	97	100	106	0,6
Other meats	118	130	143	4,0
Oil seeds	80	86	92	– 0,9
Dairy	102	99	96	– 0,4

Table 10

Impact on EC's net trade under CAP II

	1996	1999	2002	% p.a.
Wheat	57	75	97	- 0.4
Coarse grains	- 12	23	55	- 6,5
Sugar	116	49	- 26	:
Beef, veal and sheepmeat	2 941	3 855	3 911	50,0
Other meats	214	287	378	16,0
Oil seeds	624	614	612	22,0
Dairy	- 1 267	- 7 123	- 12 728	:

The net impact on trade is to decrease exports of cereals compared to CAP I. Higher supply of cereals does not fully meet increased demand for feed. As the numbers in Table 8 show, the aggregate impact on the value of agricultural trade is modest. The EC's agricultural trade balance deteriorates by only USD 2,7 billion.

For the rest of the world, as well, the welfare changes are practically the same. The overall conclusion is that the compensation mechanism does not appear to have a significant impact on the consequences of CAP reform (as modelled using RUNS). The main difference lies in a slightly modified production structure in agriculture in the EC.

4. Specific issues

4.1. The EC internal market

The single European market (SEM), to be completed by the end of 1992, was intended to enhance the performance of the 12 Member States of the European Community, and to improve the EC's international competitiveness.

By 1993, there will be virtually free intra-EC movements of labour, capital goods and services as a result of removal of legal and technical barriers and border controls, the liberalization of controls and restriction on intra-EC transport, and the fiscal harmonization. The SEM will enable domestic producers to become more competitive by creating economies of scale, by offering a wider range of market opportunities and a wider access to factors of production which enhance productivity growth. EC consumers are also expected to benefit from a wider range of more competitively-priced products and services.

The SEM will build an integrated economic and commercial area with a greater economic strength and political influence. But, the EC may turn out to be more protectionist towards other countries because of the aggregate effects of the harmonization of technical rules and standards, of the local content requirements, and the abolition of internal border control and non-tariff barriers. Nevertheless, in specific sectors the SEM could also advantage non-EC countries. As an example, a more integrated EC may encourage imports of manufactures from LDCs by removing some national import quotas.

The EC is the world's foremost trading power, accounting for 22% of the world trade in goods, although it has lost market share to Japan, Korea and the USA in the last 15 years. The European Commission has estimated that the SEM will have an additional positive impact on internal growth. Despite considerable debate as to the expected orders of magnitude of these growth effects, they are conservatively valued at 4 to 7% of GDP over five years. The IMF has estimated that a change of 1% of growth in the EC leads to around 0,2% growth in the African and Latin American countries. Thus, the positive effects of the SEM on the EC growth will be partially reflected in higher LDC growth.

The SEM in agricultural commodities will have a variable impact on developing countries. For example, new internal trade arrangements for coffee might favour the LDCs, but rising taxes on tobacco might damage them; in addition, the harmonization of standards may serve to discriminate against goods not produced within the EC, and will affect mainly LDCs' exports of meat, fruit and vegetables, fish and shellfish. Technical standards are likely to be higher than those currently effective in individual Member States and certain LDCs' exports will have greater difficulty in complying with them. Imports of meat and shellfish may be prohibited or be subject to specific treatment and EC certification of slaughterhouses or processing plants.[1]

4.2. Lomé Convention and other special trading arrangements

Various preferential trading agreements link the EC to the less-developed countries, including the Lomé Convention signed by 69 African, Caribbean, and Pacific (ACP) countries, the Mediterranean Agreements and the Generalized System of Preferences (GSP). Other agreements link the EC to other LDCs, such as Latin American and Asian countries, but in practice their significance is very limited.

[1] At present this certification is only required for exports of red meat.

4.2.1. The Lomé Agreement

A package of arrangements under the fourth Lomé Convention currently regulates trade and overall economic relations between the EC and 69 African, Caribbean and Pacific (ACP) countries. It provides certain trade advantages to ACP countries over other countries by making access to the EC market somewhat easier.

Under the Lomé Convention, many exports from ACP countries are exempt from customs duties and free from quantitative restrictions (quotas). ACP countries are not required to offer reciprocal trade concessions. However, preferential concessions are not widespread and apply with some restrictions, particularly in the agricultural sector. Generally, commodities covered by the CAP and subject to the variable levy system, do not have free access to the EC market, but exports from ACP countries get more favourable treatment than those from other third countries. Special trade protocols operate for specific commodities such as sugar, beef, cereals and rum.

Under the sugar protocol, the EC and the ACP countries undertake to respectively purchase and deliver at guaranteed prices agreed quantities of raw sugar. Free access to the EC market is allowed for some 1,3 million tonnes of white sugar equivalents, i.e. around 53% of ACP sugar exports.[1] The EC domestic surplus of sugar is disposed of on the world market. To the extent that Lomé protocol sugar re-enters the world market, it contributes to the dampening effects of EC sugar policies on world sugar prices. In this sense, as we note below, it reduces the export earnings of non-ACP countries, as well as the non-EC exports of the ACP countries themselves.

In the case of beef, some ACP countries are allowed to export to the EC market fixed quotas of meat free of duty[2] and subject to only 10% of the variable import levy. The remaining 90 per cent of the border tax is charged in the exporter country and the receipts are utilized to develop the local beef sector.

ACP exports of cereals to EC market are exempt from customs duty too, but they are subject to the variable levy. However, some reductions in this levy are accorded for maize, millet, sorghum and rice. The complete removal of tariffs on vegetable oils (excluding olive oils) are granted for imports from ACP countries, while various oilseeds (including their oil and cake derivatives) are included in the Stabex scheme.

The Stabex is a compensatory finance scheme operating in adverse harvest years which attempts to stabilize the export income of ACP countries, in part through direct compensations for losses in export earnings. The Stabex scheme covers around 50 commodities, including bananas, coffee, cocoa, groundnuts, oilcakes, tea, cotton, sisal, timber and palm products. It is notable that only a few of these commodities are included in the CAP coverage.

4.2.2. Impact of the Lomé Agreement

The final purpose of the EC trade policy with regard to the ACP countries is to promote the economic and social development of those countries and to establish close economic relations between the EC and the ACP countries (Article 131 of the Treaty of Rome). To achieve this goal, an intermediate objective is to encourage the growth of trade between EC and ACP countries (Article 129 of the Treaty of Rome).

After 16 years and four successive agreements, the net effect of this cooperation remains a subject of continuing analysis. A number of evaluations of the extent to which the Lomé Convention has promoted trade between the EC and the ACP countries have been conducted using market share analysis.[3]

Currently, more than 90% of ACP exports to the EC consist of minerals and agriculture commodities,[4] while the ACP imports of finished goods from the EC represent more than 80% of the total. Nevertheless, since 1975, the ACP's share of EC imports of agricultural products from all LDCs declined from 31 to 25%, and for all products averaged 16%. However, these figures do not necessarily imply the failure

[1] The mutual purchase and delivery agreement for sugar sets for each countries the quantities of brown or white (raw or refined) cane sugar — expressed in metric tonnes of white (refined) sugar — having free access to the EC market. The 1991/92 quota size for the 18 ACP signatories was (1 000 thousand tonnes of white sugar): Mauritius (481), Fiji (165,3), Guyana (159,4), Jamaica (118,7), Swaziland (117,8), Barbados (50,3), Trinidad and Tobago (43,8), Belize (40,3), Zimbabwe (30,2), Malawi (20,8), Saint Christopher and Nevis (15,6), Madagascar (10,8), Tanzania (10,2), Congo (10,2), Côte d'Ivoire (10,2), Kenya (0), Uganda (0), Suriname (5,7). The quotas of the last three countries were reduced to zero because they failed to deliver to the EC their agreed quantities. However they remained signatories of the sugar protocol.

[2] Only six countries are allowed to export preferential quotas of some 50 000 tonnes of beef. In particular, Botswana gets a quota of 18 916 tonnes, Namibia 10 500 tonnes, Zimbabwe 8 100 tonnes, Madagascar 7 579 tonnes, Swaziland 3 363 tonnes, and Kenya 142 tonnes.

[3] There are various indicators — and different results — for measuring market shares such as a country's share of extra-EC imports (as used by the Commission), or of total EC imports (intra plus extra-EC imports) (Yeats, 1981), or of total consumption (Bale and Duncan, 1983).

[4] In 1989, agricultural products accounted for 38% of total exports from ACP countries to the EC, i.e. ECU 7,3 billion, while their share was around 41% in 1975.

of the Lomé Convention; in particular it is noteworthy that in those products where the ACP preference margin is substantial — such as for bananas and pineapples — the rate of ACP export growth has been higher than that of all LDCs, and EC supplies are dominated by ACP countries. On the contrary, where the preference margin is smaller, ACP trade shares are less significant.

The experience of the application of the Stabex in the last 16 years has shown that the scheme can produce only a temporary remedy in case of short run downturns, but cannot overcome serious fluctuations in ACP countries' export earnings as the system operates within a limited budget. The recently endorsed Lomé IV agreement is valid for 10 years. It includes a range of mechanisms designed to improve the efficiency and effectiveness of the Stabex system. In particular, the budget has been raised to ECU 1,5 billion, an increase of 62% with respect to the Lomé III, and some new products have been included.

4.2.3. Other preferential agreements

Under the Generalized system of preferences, the EC accords import duty concessions for a number of agricultural products to all developing countries. Products covered by the CAP and regulated by variable levies are excluded by the EC's GSP. Nearly 100 agricultural products have duty-free entry, but many tropical products, such as raw coffee, cocoa beans, bananas and others, only benefit from a partial reduction of the import tariffs, as the EC aims to grant preferential access to its market to ACP suppliers. Preferential imports of some products, such as canned pineapple, cocoa butter, soluble coffee and certain tobaccos are restricted by quotas, but least-developed countries are totally exempt from customs duties for a number of products. GSP imports of agricultural products to the EC totalled ECU 2,1 billion in 1986.

With the exception of Albania, all the countries bordering the Mediterranean Sea have preferential trade agreements with the EC. Because most products exported by the Mediterranean countries are covered by the CAP, the agricultural arrangements consist of a system of preferential access for most but not all products. To protect EC producers of Mediterranean products the agreements also establish various safeguard measures, such as quotas, import calendars, standard rules and other non-tariff measures. The preferential arrangements mainly provide a small reduction in variable import levies and/or tariff concessions. These imply a reduction of border levies ranging between 20 and 100% and vary from country to country to cover between 80 and 90% of exports of each country. However, although Mediterranean producers benefit from preferential prices and lower levies, the producer prices in the EC remain below the levels at which the products with tariff preference can be landed in EC markets.

The EC is a net-exporter of agricultural products to the Mediterranean countries and trade with these countries accounted for 5% of total agricultural imports and 2% of total agricultural exports in 1989. A large part of the Mediterranean exports to the EC were fruit and vegetable products (59%), while imports were mainly represented by cereals (32%), dairy products (16%), sugar (11%), and meat and livestock products (8%).

4.3. Commodity focus

In 1989, EC imports of agricultural products from all developing countries amounted to around ECU 29 billion, accounting for just over half of the EC's total agricultural imports. As a group, Latin American countries accounted for 40% of EC agricultural imports from LDCs, ACP countries for a 25% share, Asian countries for 24%, and Mediterranean countries for 11%. Major LDC suppliers were Brazil (17%) and Argentina (7%). In 1989, tropical products (coffee, cocoa, bananas, tea, etc.) accounted for 45% of EC agricultural imports from developing countries, followed by wood (12%), fish (12%), and sugar (9%).

4.3.1. Tropical products

Tropical products account for more than half the agricultural exports of developing countries to the EC, i.e. ECU 15,7 billion in 1986. Five major products accounted for more than two thirds of total tropical imports, including coffee (43%), cocoa (12%), bananas (7%), tobacco (6%), and manioc (5%). LDCs are often the sole suppliers of tropical products contributing, on average, 85% of total EC imports of these products. ACP countries have a 32% share of total EC imports of tropical products and are the major exporters to the EC of cocoa (beans, paste and butter), fresh pineapple,[1] and arabic gum.

For 21 LDCs — 14 of which are ACP countries — tropical products represent more than 50% of agricultural export earnings. The export dependence rate is particularly high for some countries. For example, Uganda has an export dependence on coffee of 96%, Burundi of 85% and Rwanda of 68%.

[1] The ACP countries have a 9% tariff preference margin against GSP exporters of fresh pineapple to the EC, and supply around 96% of EC imports.

Bananas

Nearly 80% of world banana exports come from Latin America and the Caribbean, with Ecuador (18%), Costa Rica (12%), Colombia (12%), Honduras (12%), and the Philippines (11%) being the major exporters. Major importers are the USA (38%), the EC (33%) and Japan (10%).

The major suppliers of bananas to the EC are Panama, Ecuador, Martinique, Colombia and Costa Rica, with each country holding around a 11% share of the market. As a whole, the ACP countries have a 27% share of the EC market. The major ACP suppliers are St Lucia, with an 8% share, the Côte d'Ivoire (5%) and Dominica (3%).

Imports of bananas to the EC are subject to a 20% customs duty, but under the Lomé Convention, banana imports from ACP countries are duty free. However, single Member States have specific rules to regulate banana imports. Germany imports bananas from any country without duties. France imports bananas nearly exclusively from French overseas departments and from African French franc zone countries, while imports from other sources are subject to a licence system. The UK accords duty-free access to Commonwealth producers, while exports from US dollar area countries are subject to licences. Imports to Italy are limited by a global quota with preferential access granted to Somalian bananas, while Greece, Spain and Portugal are only supplied from domestic sources.

The discriminatory import restrictions have assured higher prices to EC traditional suppliers but have also led these ACP countries to be less competitive; they have higher costs than the exporting countries of the US dollar zone. With the removal of all internal trade barriers by 1993, a new banana trade regime will replace the current individual agreements. Various schemes have been proposed with the objective of ensuring that the ACP export earnings are safeguarded. Nevertheless, high cost banana producers are expected to feel growing competitive pressures in the EC market as a result of the SEM.[1]

Cocoa

Major cocoa producing countries are the Côte d'Ivoire (30%), Brazil (15%), Ghana (12%), Malaysia (10%), Nigeria (6%) and Cameroon (5%). The World Bank forecasts an increase in the world cocoa prices from the current low levels, but the prices will rise slowly, constraining the production growth and the level of new planting.

Major suppliers of cocoa beans to the EC are the Côte d'Ivoire (40%), Cameroon (14%), Ghana (8%) and Nigeria (8%). Imports from the ACP account for 84% of total cocoa beans, while within other GSP countries main suppliers are Brazil (5%), Malaysia (4%) and Indonesia (3%). Cocoa beans exported by ACP countries are imported into the EC duty-free and hence have a 3% preferential import margin over other GSP suppliers.

Coffee

Coffee is the most important agricultural commodity exported by developing countries to the EC market, accounting for 30% of developing country agricultural exports to the EC. Three countries supply almost half of EC imports, notably, Colombia (24%), Brazil (14%), and the Côte d'Ivoire (9%), while four other African ACP countries (Kenya, Zaire, Cameroon and Uganda) each account for around 4% of the total. ACP countries contribute 41% of EC imports of coffee beans and benefit from a preference margin of 4,5 points over other GSP producers.

The effects of the SEM on coffee trade to the EC will depend on the result of the tax harmonization and on the eventual extension of zero tariffs to all GSP producers. The EC consumption is projected to increase by 1,4% per annum, but the growth will be higher if the SEM results in a significant reduction in value-added taxes and excise levies on coffee. Currently, excise taxes are as high as 41% in Germany and 15% in Denmark. In both countries per capita coffee consumption is higher than the EC average.

Tobacco

Developing countries produce around 78% of world output of tobacco; China is the leading producer country (40%). In recent years, world production has expanded, mostly because of the increase of Chinese yield, while tobacco consumption in industrial countries has been reduced by increasing health worries, the limitation of smoking areas, and higher levels of taxation.

The expected harmonization of tax regimes in the SEM is likely to raise the average EC excise duties, implying a relatively sharp increase in prices in some countries and a further decrease in consumption. Imports will be reduced and export earnings of developing countries such as Brazil, Zimbabwe, Malawi and Indonesia may be expected to be adversely affected. Within the EC, CAP reform is expected

[1] Production costs range from ECU 600 per tonne for ACP bananas to ECU 450 per tonne for South American bananas (Keeling, 1991).

to lead to changes in the EC tobacco regime. A reduction in support levels in the EC is expected to reduce EC domestic production, cushioning somewhat the effect of reduced consumption on developing countries.

4.3.2. Temperate products

Products such as cereals, sugar, dairy products, and meat are produced and traded by developed countries, but some of them are also an important source of export earnings for developing countries and others rely on temperate exporters to meet their own shortfalls. Thus the reform of temperate products in the CAP will impact on both exporting and importing LDCs.

Sugar

Sugar production of developing countries contributes to around 59% of world output, and major LDC producers include India (10%), Cuba (7%), Brazil (7%), China (6%) and Mexico (4%). As a group, ACP countries account for 11% of world exports, i.e. 3 million tonnes of raw sugar.

The effects of the CAP reform proposal may have important effects on the world sugar price, even though sugar is not explicitly included in the current reform package. The EC regime for sugar limits the quantities supported through a three-tier system of quotas, with the third tier ('C' sugar) including unrestricted quantities of sugar exceeding guaranteed A and B quotas, which are exported without any direct government support. In theory, the more efficient EC producers are able to react quickly to higher world prices, producing additional C sugar and thus reducing scarcities of sugar on the world market.[1] However, as other crops are highly subsidized and because they generally operate fixed rotation systems, the flexibility of EC farmers is lower than it might be under CAP reform.

Although this is not captured in our modelling work, the proposed reduction of cereal and oilseeds support may result in an increasing C sugar production even if the A and B sugar quota support levels remain unchanged. Thus, the world price may adjust towards levels which just cover EC marginal cost levels.

In 1989, the EC produced around 16,6 million tonnes of sugar and consumed about 12,8 million tonnes; imports came mainly from ACP countries (89%) and amounted to 1,8 million tonnes, while exports totalled 5 million tonnes. Deliveries to the EC market accounted for over half the sugar exported by ACP countries, i.e. 1,6 million tonnes, 80% of which they exported under the Lomé Preferential Agreement.

The 1,3 million tonne quota of ACP sugar exports can enter the EC at landed prices comparable to EC internal support prices. As the EC production exceeds domestic consumption, the imports from ACP countries are effectively re-exported onto the world market. World prices are depressed not only by the EC sugar support system, but also by the higher incentives offered to ACP producers by guaranteed EC import prices which are well above world market levels. The result is a lower export earning for all other developing country sugar exporters and for the ACP countries' non-EC sales. ACP exporters thus benefit from the sugar protocol only to the extent that their gains from exports to the EC offset the potential gains arising from higher world prices expected from a freer market.

Beef

Developing countries provide 12% of world exports of bovine meat. Latin America accounts for around 80% of LDC exports. African countries, notably Namibia, Zimbabwe, and Botswana are also significant exporters, mainly because of preferential access to the EC market.

The EC beef market is supported by a system of market measures, such as intervention buying, variable export refunds and variable import levies, and various types of direct payments in the form of premiums for slaughter, calf premiums, and suckler cow premiums. Import quotas of beef from selected ACP countries are duty free and exempted from the payment of 90% of the EC variable import levy. Exports from ACP countries represent only 6 to 7% of EC imports of beef and 0,6% of domestic consumption. Among the developing countries, major suppliers to the EC are Argentina, Brazil, Uruguay and Zimbabwe. In recent years, Zimbabwe has exceeded its EC quota, benefiting from shortfalls in quota exports from other ACP countries.

As a result of EC beef policy, EC consumers pay a higher unit price, and, as taxpayers, subsidize exports of beef sold at lower prices on the world market. This benefits consumers in the major importing countries, such as those in North Africa and the Middle East. Since the EC is a major exporter of beef, the external effect of the CAP policy is to reduce the world price of beef and increase consumption in the rest of the world. Consequently, as an effect of the CAP reform, world prices may increase and consumption in importing LDCs decrease, while earnings from preferential exports

[1] Because the support given to the A and B quota sugar normally covers the fixed cost of production, it is profitable to produce additional C sugar when the world price only covers marginal costs (World Bank, 1990). However, there are no farmers exclusively producing C sugar for world sales.

from ACP countries may decline. The net impact will depend on the relative trade shares of the individual ACP countries, with decreased earnings from trade with the EC offset by the increase in export earnings derived from non-EC trade.

Cereals

The EC imports small quantities of cereals from developing countries (2% of agricultural imports from LDCs). Half of these imports are from Argentina and most of the remainder from Thailand and Suriname. For these countries, cereal purchases by the EC account for 40, 60 and 100% respectively of total cereal exports. Cereals account for 26% of EC agricultural exports to developing countries, and 33% of EC agricultural exports to ACP countries. Major destinations are Saudi Arabia (13% of EC cereal exports), Tunisia (11%), Egypt (8,5%) and Libya (6%).

As noted in Chapter 3, the CAP cereal regime bolsters grain production with a depressing effect on world market prices. A substantial reduction of cereal price support in the EC may reduce the cereal output, increase the domestic consumption and decrease the quantities exported. World prices of cereals will consequently rise with positive effect on developing countries as a group, but a negative effect on LDC cereal importers.

4.4. Exports of non-traditional products

Non-traditional products may be defined as commodities which are minor foods, tropical beverages, tobacco, and agricultural raw materials. Non-traditional commodities are those which historically have not been important exports such as fruit, vegetables, floricultural products and processed tropical products.

In general, trade in these non-traditional products is constrained by tariff and non-tariff barriers in the importing countries. These trade measures vary by product, season, and country of origin and destination. Trade measures include variable levies, countervailing taxes and duties, quotas, technical standards and specifications, and health restrictions. When these products compete with domestic production, they are subject to higher tariffs or quotas.

The CAP regime for horticultural products imposes *ad valorem* duties and minimum import prices on most commodities. For some fresh fruit and vegetables the duties are raised or lowered according to a seasonal calendar. The common external *ad valorem* tariff for non-traditional products averages 6 to 7% for fresh fruit and vegetables and 15 to 17% for processed horticultural products, from 17 to 24% for different categories of flowers, and 18% for processed tropical products. However, the Mediterranean countries receive various trade preferences on some horticultural and floricultural products during some periods, and tariff concessions are also accorded to ACP countries.

LDC exports of horticultural products averaged USD 9 billion during the 1983-85 period, that is 37% of world trade in these products.[1] These exports accounted for a 13% share of total agricultural exports of developing countries. In the 1985-86 period, the EC imported around ECU 5 billion of fruit and vegetable products from developing countries, with these imports accounting for two thirds of total extra-EC imports. Asia contributed 34%, Latin America 30%, and Mediterranean countries 25%, while the ACP accounted for only a 12% share.

In 1985 major export destinations for floricultural products were the EC (36%), the USA (22%), Switzerland (5%). Developing countries supplied 15% of world exports, and since then their share of the global market has grown. In 1986, the EC imported around ECU 250 million of floricultural products from developing countries, that is 62% of EC imports of these products; major suppliers were Mediterranean (Israel, Morocco and Egypt) and ACP countries, notably Kenya, Mauritius, Ethiopia and Zimbabwe.

The export prospects for LDC non-traditional products are encouraging. Firstly, the income elasticity of demand for these products (notably, fresh and processed fruit and vegetable and floricultural products) is high. Secondly, the EC imports a rising share of these products and LDCs are improving their share of this EC trade (between 1980 and 1986, LDC exports to the EC of fruits and vegetables rose 7,4% per annum, against 6,6% per annum for total EC imports of fruit and vegetables). Thirdly, this trend is expected to continue with a growing health consciousness on the part of EC consumers towards high vitamin and fibre content natural products. Finally, developing countries are expected to improve their comparative advantage in these commodities because their labour costs are cheapening relative to EC labour costs and because these products are typically labour intensive.

The reform of the CAP will not directly affect the regime for fruit and vegetables and the Commission has not proposed any modification to the current regime since the successful introduction of the stabilizer provisions which brought production and expenditure under control. The export prospects

[1] See Islam (1990).

of developing countries for these non-traditional products therefore remain relatively rosy.

4.5. Value-added of traditional products

Developing countries are the sole producers of most tropical commodities, but generally they export unprocessed or semi-processed products. Hence, LDCs often lose the value-added embedded in the sale of final products ready for consumption. For many developing countries, extension of value-added by processing activities has been constrained by limited processing capacity and various technological constraints, as well as by difficulties they encounter in the trading, marketing and distribution of processed products. Increasing competition comes not only from developed countries but also from Asian NICs, some of whom are increasing their processing capacity for major tropical products, particularly cocoa.

Processing activities to increase national value-added of traditional products provides a means to achieve development goals. It not only increases employment, incomes and export earnings, but also saves on freight costs, since further processing leads to a weight loss for many raw tropical products. Economic issues of the processing activity are examined below in the case of the cocoa industry.

The cocoa sector is illustrative of the problems facing developing countries. World cocoa output amounts on average to 2,3 million tonnes. Major cocoa producers are the Côte d'Ivoire (30%), Brazil (15%), Ghana (12%), Malaysia (10%), Nigeria (6%) and Cameroon (5%). Net export of cocoa beans and derivatives account for around 2,2 million tonnes, or 95% of production, most of the rest being consumed in the producing countries.

The historical evidence suggests that developing countries only tend to establish their own processing of cocoa beans when a large domestic market for cocoa powder and chocolate exists, as is the case in Brazil. In West Africa processing is limited to around 15% of production and only reaches the stage of cocoa butter, powder and liquor. Since the 1960s, however, producer countries have increased their processing capacity and during the 1988-89 period some of them gained a large share of domestic production (Brazil 56%, Ecuador 44%, Malaysia 20%, Cameroon 21%, Côte d'Ivoire 15%, Nigeria 8%, and Ghana 7%).

Major producer countries export beans and semi-processed products and only Brazil and other Latin American countries export chocolate, albeit in small quantities. As a group, cocoa-producing countries have increased their shares of cocoa derivatives, and between 1977 and 1988 their exports of cocoa butter and liquor doubled, while those of cocoa powder increased 30% in absolute terms. In 1987-89 cocoa producers accounted for around 69% of cocoa liquor exports (77% in 1982-83), 47% of cocoa butter exports (40%) and 35% of cocoa powder exports (42%), but less than 4% of chocolate and chocolate products (7%), which is the principal end use of cocoa.

The activity of processing from beans to semi-processed products is relatively specialized and requires a solid manufacturing base. It is subject to economic risks which typically in developing countries are judged excessive given the relatively small yield in terms of value-added; this is estimated at around 20%.[1] For these countries, competition with EC processors is increasing. In the USA, by contrast, chocolate manufacturers have begun to substitute their cocoa-bean processing operations in favour of imported processed products. They note that the greatest yield in value-added is associated with the final stage and not the intermediate stage of cocoa processing.

Processing activities of cocoa producers are also constrained by difficulties associated with storage in the tropics, particularly for chocolate, mainly because of high humidity. In spite of this, in the early 1980s the Côte d'Ivoire built modern silos to facilitate long-term storage of cocoa, and currently has an estimated 200 000 tonnes of storage quality. Cocoa producers may have a competitive advantage in the processing of cocoa liquor, but they are less competitive in the processing of less homogeneous cocoa derivatives, such as cocoa butter and, to a greater extent, cocoa powder, as quality considerations are a central determinant of powder trade.

A further difficulty derives from different nominal tariff rates in major consumer countries; tariff levies vary according to the degree of processing and value-added. Whereas other major cocoa importing countries do not impose duties on unprocessed cocoa, the EC favours the preferential ACP suppliers. Trade in cocoa products is more widely subject to tariffs. Higher tariffs are levied on sweetened cocoa powder and chocolate products to protect the local cocoa-processing industry and/or sugar support systems. In some countries, GSP imports of cocoa derivatives are subject to lower tariff duties which, however, are in part offset by import quotas.

For instance, the EC Common Customs Tariff (MFN) ranges from 3% for cocoa beans to 12% for chocolate products, but the GSP rate is some percentage points lower, varying with different cocoa derivatives, while imports from ACP countries are subject to a preferential zero tariff rate on cocoa

[1] Jouve and de Milly (1990).

and all cocoa derivatives. EFTA countries are exempted from tariffs. In the USA, the GSP tariff rate is also zero, while in Japan imports of cocoa powder are subject to a 21,5% MFN rate (10,5% for GSP), and those of chocolate to a 10% tariff (12,5% for GSP), while cocoa beans and butter are levied at zero MFN and GSP rates.

4.6. Non-tariff measures

Non-tariff measures are one of most important issues under discussion in the Uruguay Round of the GATT. Various proposals aim at negotiating reductions of these trade barriers. Currently, non-tariff measures influence at least 38% of total value of OECD countries' imports of agricultural products and the coverage of these non-tariff measures is increasing.

Non-tariff barriers (NTBs) are increasingly considered to be a more serious threat to world trade than conventional tariff barriers.[1] However, in some situations, border interventions may also increase the aggregate quantity of goods traded, or, more frequently, they may modify the allocation of the quantity traded on world markets among supplying countries, or, over time, increase the variability of commodity world prices.[2]

Generally, non-tariff barriers include all border measures that directly or indirectly limit imports. Non-tariff barriers include variable levies, minimum price systems, tariff quotas, import quotas, voluntary export constraints, and countervailing taxes and duties, and also technical specifications, such as sanitary, phytosanitary and health regulations. Quantitative restrictions, such as import quotas, and voluntary export restraints restrict imports directly, while variable import levies, minimum price requirements, and technical standards have an indirect effect on imports. Tariff quotas have both a direct and an indirect effect, consisting of the imposition of higher tariffs above a predetermined import quantity. NTMs are also used by developing countries to protect domestic producers. A common form of these trade barriers is a high import-substitution tariff combined with import quota and foreign-exchange rationing.[3]

The use of variable levies and threshold prices is a foundation of the EC common agricultural policy, and applies to important commodities such as cereals, sugar, dairy products and meat. Tariff quotas limiting imports quantitatively apply for fresh fruit and vegetables, meat, and tobacco manufactures. Import licences are also utilized to restrict the entry of processed animal and vegetable oils, preserved fruit and vegetables, and meat. Fresh fruit is subject to seasonal restrictions, while voluntary export restraint agreements apply for fruit and vegetables, sheepmeat and cereal substitutes.

Imports of live animals, meat, sugar and honey are sometimes prohibited for health and sanitary reasons. For instance, developing countries intending to export red meat (beef, for example) to the EC require a Community certification of their slaughterhouses. Also, rules on plant health, animal diseases, and human health relating to animal products apply, although the Community is more flexible about diseases and pests which cannot survive in a temperate climate.

4.7. Food security

Many less-developed regions have the potential means to feed themselves by expanding agricultural productive capacity. Nevertheless, trends in food production and consumption indicate that in the 1990s many LDCs will need larger amounts of imported food. Given the severe financial constraints facing many of these countries, external assistance remains an important means of alleviating hunger and reducing the number of malnourished people in many developing countries. Food aid is a widely-used means of providing direct assistance. The negative repercussions of this form of assistance, and especially the potential disincentive effects on local agriculture, which imply increasing dependence on imported cereals, need to be carefully evaluated.

The CAP insulates domestic prices from fluctuations in world prices, but in doing so, also contributes to world market instability.[4] Export sales of the excess between domestic production and consumption occur without reference to world balances. The destabilizing effects of the CAP on the world market and world prices have negative impacts on developing countries. In particular, the poorest farmers are highly risk adverse and have insufficient means to endure income instability, and poor consumers are vulnerable to price rises of staple foods.

[1] Whalley (1985) used the subsequent *ad valorem* tariffs and NTM tariff equivalents for agricultural products (SITC code 0 + 1) in his two general-equilibrium models of world trade. Countries' NTB tariff equivalents and *ad valorem* tariffs (in brackets) are given: EC 33,2% (4,2%), USA 43,8% (6,3%), Japan 72,1% (23,3%), Canada 49,7% (4,8%), LDCs 2% (8%). It is notable that NTM tariff equivalents are much higher than conventional tariffs in major industrialized countries but lower in developing countries.

[2] See Lloyd (1991).

[3] See Whalley (1985).

[4] Siamwalla (1990).

The effects of CAP reform on the food aid policy of the Community need to be evaluated. Currently, the EC is one of the most important food aid suppliers to developing countries. In 1990 it furnished LDCs with 1,4 million tonnes of cereals, 18 000 tonnes of milk powder, 50 000 tonnes of vegetable oil, and 15 000 tonnes of sugar and other agricultural products, with a total value of ECU 40 million. CAP reform which reduces EC prices, output and exports, and raises EC food imports, is expected to reduce the level of stocks in the EC and the willingness of the EC to provide food aid. This political economy consideration has great significance not only for developing countries, but also for the countries of Eastern Europe and the Commonwealth of Independent States.

To the extent that CAP reform occurs in parallel with reforms in other OECD countries, the commitment of the USA and other OECD countries to food aid may similarly be reduced. Reforms which lead to higher world prices may therefore be associated with a lower commitment to food aid. The issue of compensation for higher prices as a result of agricultural reform is thus important to developing countries, and especially to low income importers.[1] Various short-term compensation mechanisms have been discussed and need to be investigated further.[2] These compensation measures should assure food security during a transitional period, but not become an obstacle to competitive agricultural relations.

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[1] Nonetheless, the EC Commission refuses to acknowledge the relationship between the CAP and the Uruguay Round trade negotiations.

[2] For example, requiring a reduced import price for a fixed quota of cereals, or an above average level of tariff protection on domestic staple foods.

References

Abbott, G. C. (1989), 'The Commonwealth Sugar Agreement as a model for a New Sugar Protocol', in *Development Policy Review,* Volume 7.

Alessandrini, S. (1990), 'Systemic changes in Europe and economic implications for LDCs', *The European Journal of Development Research,* Volume 2, No 2.

Armington, P. (1969), 'A theory of demand for products distinguished by place of production', IMF staff papers, 16, 159-78.

Balassa, B. and Michalopoulos, C. (1987), 'The extent and the cost of protection in developed-developing-country trade', World Bank reprint series, No 403.

Bale, M. and Duncan R. (1983), 'Prospects for food production and consumption in developing countries', World Bank staff paper, No 596.

Borrel, B. and Yang, M. (1990), 'EC Bananarama 1992', World Bank,working paper No 523.

Brune, S. (1990), 'The EC internal market, Lomé IV and the ACP countries', *Intereconomics,* July/August.

Burniaux, J. M and van der Mensbrugghe, D. (1991), 'Trade policies in a global context: Technical specification of the RUNS model', OECD technical paper No 48.

Davenport, M. (1989), 'Imperial Preference revisited: The European Community and Tropical Products', in *Development Policy Review,* Volume 7.

Davenport, M. and Page, S. (1989), 'Regional Trading Agreements: The impact of the implementation of a single European market on developing countries', ODI/Unctad, October.

Davenport, M. and Stevens, C. (1990), 'Perspectives dans le domaine des produits tropicaux', in *Les négociations d'Uruguay et la mise en place du grand marché européen de 1992,* OPCVM.

European Commission (1991), *Agricultural situation in the Community; Report 1990.*

European Commission (1991), (1991), 'The development and future of the common agricultural policy', Commission communication to the Council and to the European Parliament, COM(91) 258 final/3.

Eurostat (1988), *Analysis of agricultural trade EC-developing countries 1970-86.*

Evans, D., Goldin, I. and van der Mensbrugghe, D. (1992), 'Trade reform and the small country assumption', in Goldin, I. and Winters, L. A., *Open economies,* Cambridge University Press.

FAO (1987), 'Impact on world food security of agricultural policies in industrialized countries', Committee on World Food Security.

Goldin, I. and Knudsen, O. (1990), (eds.) *Agricultural trade liberalization: Implications for developing countries,* OECD and World Bank.

Goldin, I. and van der Mensbrugghe, D. (1992), 'Trade liberalization: What's at stake?', OECD.

Goldin, I. and Winters, L. A. (1992), (eds.) *Open economies: Structural adjustment and agriculture,* Cambridge University Press.

International Sugar Organization, (1990), *Sugar yearbook, 1989.*

Islam, N., and Valdes, A. (1990), (eds.) *The GATT, agriculture, and the developing countries,* International Food Policy Research Institute.

Islam, N. (1990), 'Non-traditional exports of developing countries: The case of horticultural exports', in Islam and Valdes (eds.) *The GATT, agriculture, and the developing Countries',* International Food Policy Research Institute.

Jouve, P. and de Milly, H. (1990), 'Compétitivité du cacao african', Ministère de la Coopération et du Développement, Paris.

Keeling, W., (1991), 'Spirit of the Lomé Convention threatened by 1992', *Financial Times,* October 10.

Knudsen, O. (1991), 'Food security and compensation: The role of the GATT', in Islam and Valdes (eds.) *The GATT, agriculture, and the developing countries,* International Food Policy Research Institute.

Le Courrier ACP-CE (1990) 'Convention de Lomé IV'.

Lingard, J. and Hubbard, L. (1991), 'The CAP and its effects on developing countries', in Ritson, C. and Harvey, D. (eds.) *The common agricultural policy and the world economy,* CAB International.

Lloyd, P. J. (1991), 'Measuring and modelling non-tariff distortions with special reference to trade in agricultural commodities', technical paper No 40, OECD Development Centre.

Martin, W. (1991), 'Exact welfare evaluation in distorted open economies', mimeo.

Matthews, A. (1985), *The common agricultural policy and the less developed countries,* Gill and Macmillan.

McQueen, M. and Stevens, C. (1989), 'Trade preferences and Lomé IV: Non-traditional ACP exports to the EC', in *Development Policy Review,* Volume 7.

OECD (1991) *Agricultural policies, marketing and trade: Monitoring and outlook.*

Page, S. (1990), 'Why is 1992 different?', *The European Journal of Development Research,* Volume 2, No 2.

Page, S. (1991) 'Some implications of Europe 1992 for developing countries', draft prepared for OECD Development Centre.

Ravenhill, J. (1985), *Collective clientelism: The Lomé' Conventions and North-South Relations,* Columbia University Press.

Roberts, I. M. and Whilsh-Wilson, P. (1991) 'Domestic and world market effects of EC sugar policies', discussion paper No 91/1, ABARE.

Shaw, D. J. (1991), 'Food aid for Africa in the 1990s', *Food policy,* Volume 16, No 6.

Siamwalla, A. (1991), 'Agricultural trade reform, price stability, and the impact on developing countries', in Islam and Valdes (eds.) *The GATT, agriculture, and the developing countries,* International Food Policy Research Institute.

Swimbank, A. and Ritson, C. (1991), 'The CAP, customs unions and the Mediterranean countries', in Ritson, C. and Harvey, D. (eds.) *The common agricultural policy and the world economy,* CAB International.

Tsolakis, D. and Sheales, T. (1990), 'Effects of beef and dairy policies on beef supply, demand and trade in the European Community', discussion paper No 90/9, ABARE.

Tuona Mama, E. (1990), 'Bilan de la coopération commerciale CEE-ACP à la veille de l'échéance européenne de 1992', *Mondes en développement,* Tome 18, No 70.

Unctad (1990) *Commodity yearbook,* United Nations.

Unctad (1991) *Prospect for the world cocoa market until the year 2005,* United Nations.

USDA (1990) 'Estimates of producer and consumer subsidy equivalents', *Economic Research Service Statistical Bulletin* 803.

Walley, J. (1985), 'Trade Liberalization among Major World Trading Areas', The MIT Press.

World Bank, (1990), *Price prospects for major primary commodities,* Report No 814.

Yeats, A. (1981), 'Agricultural prohibitionism: An analysis of its internal economic effects and options for institutional reform', *Trade and Development* No 3.

Table A1

Sugar exports of ACP countries (1 000 tonnes)

	Towards world		Towards EC		EC quotas	EC world ratio
	1989 (1)	% (2)	1989 (3)	% (4)	(5)	(6) = (3)/(1)
Congo	13,0	0,4	13,3	0,8	10,2	1,02
Cote d'Ivoire	21,0	0,7	13,4	0,9	10,2	0,64
Ethiopia	28,6	1,0		0,0		0,00
Kenya					0,0	
Madagascar	77,8	2,6	22,2	1,4	10,8	0,29
Malawi	58,6	2,0	33,1	2,1	20,8	0,56
Mauritius	674,0	22,8	546,1	34,6	481,0	0,81
Mozambique	13,0	0,4	0,0	0,0		0,00
Swaziland	406,8	13,8	218,6	13,9	117,8	0,54
Tanzania	11,0	0,4	11,3	0,7	10,2	1,03
Uganda					0,0	
Zambia	2,1	0,1		0,0		0,00
Zimbabwe	171,7	5,8	47,0	3,0	30,2	0,27
Total African ACP	1 477,6	50,0	905,0	57,4	691,2	0,61
Barbados	55,5	1,9	43,5	2,8	50,3	0,78
Belize	83,3	2,8	46,0	2,9	40,3	0,55
Dominican Republic	521,4	17,7	13,1	0,8		0,03
Guyana	173,1	5,9	161,6	10,3	159,4	0,93
Haiti	7,0	0,2		0,0		0,00
Jamaica	135,0	4,6	143,7	9,1	118,7	1,06
St Christopher and Nevis	22,5	0,8	15,8	1,0	15,6	0,70
Trinidad and Tobago	59,0	2,0	51,6	3,3	43,8	0,87
Total Caribbean	1 056,8	35,8	475,3	30,2	428,1	0,45
Fiji	404,6	13,7	196,1	12,4	165,3	0,48
Papua New Guinea	15,1	0,5		0,0		0,00
Suriname					0,0	
Total Pacific ACP	419,7	14,2	196,1	12,4	165,3	0,47
Total ACP	2 954,1	100,0	1 576,4	100,0	1 284,6	0,53
World total	27 905,1		1 766,5			0,06
ACP share on world total		10,6		89,2		

Source: International Sugar Organization, *Sugar yearbook, 1990.*

Table A2

EC trade of agricultural products, 1989

	Imports		Exports		Net trade	
	million ECU	%	million ECU	%	million ECU	%
World total	144 375	100,0	122 816	100,0	– 21 559	100,0
Intra-EC	86 611	60,0	85 849	69,9		
Extra-EC	57 603	39,9	36 078	29,4	– 21 525	
of which:						
Industrialized countries	22 675	15,7	16 911	13,8	– 5 764	26,7
Countries with State-trade	5 681	3,9	3 816	3,1	– 1 865	8,7
Less-developed countries	29 247	20,3	15 350	12,5	– 13 897	64,5
of which:						
ACP countries	7 288	5,0	2 451	2,0	– 4 837	22,4
Mediterranean	3 081	2,1	4 334	3,5	1 253	– 5,8
Latin American	11 599	8,0	1377	1,1	– 10 222	47,4

Source: European Commission (1991), *Agricultural situation in the Community*.

Table A3

Exports of cocoa products, 1965-89 (1 000 tonnes)

	1965-70	%	1982-83	%	1987-89	%
Butter						
Cocoa producers	62,0	48,5	80,7	39,7	131,3	46,7
World total	127,8	100,0	203,4	100,0	281,4	100,0
Paste/liquor						
Cocoa producers	8,5	56,7	84,0	76,6	111,5	69,3
World total	15,0	100,0	109,7	100,0	160,8	100,0
Powder/cake						
Cocoa producers	56,3	47,3	87,2	42,1	96,0	34,9
World total	119,0	100,0	207,3	100,0	275,0	100,0
Chocolate						
Cocoa producers	2,2	0,9	44,8	6,8	35,6	3,7
World total	250,7	100,0	662,4	100,0	957,5	100,0

Source: ICCO, *Quaterly bulletin of cocoa statistics*, various years.

Common agricultural policy reform and its differential impact on Member States

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1. Introduction

1.1. Aims

Over the last decades the common agricultural policy (CAP) of the EC has been subject to proposals for reform. In 1991 this debate culminated in a plan for a fundamental reform of the CAP, launched by the EC Commissioner responsible for agriculture, Mr Ray Mac Sharry. Reasons for reform have been obvious for some time, as the EC faces serious trade conflicts with its main competitors, and the budgetary cost of agricultural protection meets increasing resistance.

The novel aspect of the reform proposal, to be referred to as the Mac Sharry reform, is that it tackles one of the major causes of these problems: output-related support. The approach taken is to move internal EC prices towards world market level, while the farmers receive direct income support as compensation for falling prices. The reform proposal has survived the negotiations among the Member States, but not without modifications. The measures currently agreed upon are far from being neutral with respect to production ('decoupled'). Still, because internal prices come closer to world market prices, it can be seen as a step towards decoupling.

Direct income support can be viewed as a temporary measure to facilitate the restructuring of agriculture but it may become of a more permanent nature, which raises the question of justification for permanent income support. Especially in times of budgetary pressure and economic recession, convincing arguments are needed to prevent erosion of such support. Of course, one may invoke traditional arguments like food security, or income distribution policies, but these arguments do not face the issue raised in economic welfare theory: that income support should sometimes be given not only to serve equity but also to foster efficiency objectives. Such reasoning will be developed in the first part of this paper.

In order to investigate in more detail the consequences of the Mac Sharry reform, theoretical reasoning must be supplemented with empirical analysis. We will use an applied general equilibrium model designed to evaluate policy changes of the CAP. In the EC agricultural model (ECAM) the Mac Sharry reform will be simulated and an assessment will be made of farmers' income, the external position of the EC, the EAGGF budget, and consumers' welfare. We will also investigate how these indicators are affected when income support is given as lump-sum transfers and when farmers do not have to enter set-aside schemes. The results depend in a crucial way on whether the compensations are given as nominally fixed amounts or indexed for inflation. Throughout this paper we assume that farmers face no, or at best partial, indexation for inflation.

1.2. Short background

The current problems of EC agriculture can be traced back to the early beginnings of CAP, but have become increasingly manifest in the 1970s and 1980s.

Since the 1980s the EC has turned into a net exporter of cereals. This is due to increased productivity in cereals production and stagnant intermediate demand. Significant changes in feedmix, with livestock increasingly fed on imported oilseeds, corn-gluten from the USA and cassava from Thailand have further stimulated cereal surpluses. In earlier days, imported coarse grains were subjected to import levies which accrued to the EC budget and could serve as a source of financing export subsidies. However, the imported grain substitutes serving as feedstuffs are not taxed when imported. Therefore, the EC's internal demand for cereals was depressed.

The EC is traditionally a large importer of fats, oils and protein feeds, and to promote domestic production of oilseeds the EC adopted a policy of subsidization. This is costly since the internal price remains low in the absence of an import levy. The developments in cereals and oilseeds sectors contributed to increased cereals exports, increased imports of cereal substitutes and higher budgetary outlays. Increased wheat exports and decreased imports of oilseeds of the EC aggravated the trade conflict with the USA, and proved to be one of the major stumbling blocks of the GATT negotiations.

As to the livestock sector, milk production was booming in the 1970s and early 1980s, due to significant productivity increases and high prices. This also led to an increased production of beef and while the introduction in 1984 of production quota on milk was successful in constraining a further growth of dairy and butter surpluses, beef production kept on growing. The resulting surpluses are very hard to dispose of commercially on the world market, so that stocks built up which are very expensive since for beef the annual storage cost tends to exceed the value of the product stored. The introduction of ewe premiums in 1982 to regulate and support the sheep sector proved to be successful in boosting not only production but also EAGGF expenditures. On this relatively small sector alone the EC spends almost ECU 1,5 billion per year.

In summary, we see that the budgetary cost, the complaints from competing exporters that the EC was dumping its surpluses on world markets and the protectionistic character of the EC through the principle of Community preferences, have generated increasing pressures for CAP reform and calls for a reduction of agricultural protection. A succession of proposals to reform the CAP passed before the EC Commission until, finally, the Mac Sharry plan was accepted in May 1992.

1.3. Structure of the paper

In this paper we will discuss the impact of this reform. The paper is organized as follows. First, in Section 2 we review welfare-theoretical arguments against price support to agriculture, with the qualification that we also discuss arguments which could justify income support. Then we assess welfare-theoretical aspects of the Mac Sharry reform. In Section 3 we postulate that empirical analysis is required and outline the three scenarios to be considered. In Section 4 we discuss how European agriculture will evolve under a continuation of present policies. This scenario serves as a benchmark for the policy runs. In Section 5 we implement and evaluate the Mac Sharry scenario, following the Commission's regulations as closely as possible. In Section 6 we modify this scenario by postulating decoupled income support. In Section 7 we summarize the results. The structure of ECAM, the model used, is described in Annex A. The procedures followed to translate the Mac Sharry plan into model terms are described in Annex B. Some additional model outcomes are presented in Annex C.

2. Welfare-theoretical aspects of the debate on CAP reform

Many economists have for a long time been opposing the CAP by pointing to the welfare cost of the support measures. In their view support to agriculture is at most justified as an income redistribution policy. It does not promote efficiency. Support should be given as lump-sum income transfer and not as a subsidy on prices. In this section, we first repeat the classical arguments against protection and then discuss several lines of theoretical investigation which lead to less radical conclusions: conditions may prevail under which support to agriculture is not only required for social equity but also for economic efficiency. Nevertheless, in general support should be given lump-sum and not through prices.

The simulation experiments to be presented in the subsequent sections incorporate only some selected mechanisms which may justify price support. The exclusion of others reflects difficulties in representing them in an empirically reliable fashion, rather than a judgment that they would be less relevant. Also, since a significant degree of support to agriculture will be maintained in all experiments, the omission of these mechanisms is probably not very serious. However, many view the current proposals as a transition measure to a far more liberalized system without transfers and in that case a discussion of the efficiency losses that could result is of relevance.

2.1. Welfare-theoretical arguments against price support to agriculture

In the absence of externalities and non-convexities in technology, the celebrated first and second welfare theorems apply: any competitive equilibrium is Pareto-efficient, any Pareto-efficient allocation[1] can be obtained in a decentralized way as a competitive equilibrium,[2] with transfers among consumers. Originally, the emphasis has been on the first theorem which shows that a competitive equilibrium possesses specific properties. Since many economists considered the competitive assumptions to be unrealistic, they did not find the first welfare theorem a very powerful tool. Over the past decade or two, attention has shifted to the second theorem, which implies that the rather uncontroversial problem of welfare maximization, restricted by assumptions on preferences and technology, can only be decentralized through prices if the agents behave competitively. In view of the generally perceived need for decentralization through markets, economists could now turn the assumptions on competitive behaviour, the realism of which they previously had a hard time defending, into powerful policy guidelines: competitive conditions should be created, if they did not exist already.

[1] Namely an allocation which cannot be improved in the sense that some redistribution of commodities exists which could improve utility for at least one consumer, leaving the others at least as well off as before. When utilities are concave and technological constraints convex and bounded, a Pareto-efficient allocation can be obtained through maximization of a weighted sum of consumer utilities subject to commodity balances and the technological constraints.

[2] In a competitive equilibrium consumers and producers take prices as given. Consumers maximize utility subject to a budget constraint. Producers maximize profits subject to their firm's technological constraint. Markets exist for all commodities and are cleared through price adjustment.

If the underlying assumptions are accepted, these theorems have the following consequences for government policy.

(a) Price fixing, say by a government, cannot be Pareto-efficient when compared with a situation without such intervention. This is the basis for the free trade arguments.

(b) Income transfers to consumers may be desirable socially, but Pareto efficiency can be maintained without them (Second Welfare Theorem) and such transfers should be given through a direct payment, not through price intervention.

(c) There is no need to support producers. Any producer who makes a loss at competitive prices should not produce, and anyone who can make a profit should be allowed to produce as much as he likes. Thus, there should be no subsidies, no production quota, no constraints on the utilization of land, etc.

(d) Producers should maximize profit. Any rule of conduct that is incompatible with profit maximization is Pareto-inefficient. Therefore, only future profits matter; losses or debt incurred in the past should not affect producer decisions.

These are strong and clear guidelines, which essentially advocate free competition and which can be seen to have exercised decisive influence on policy advice currently given by economists.

2.2. Possible justifications of support to agriculture

The common agricultural policy was designed to create price wedges between the internal market of the Community and the rest of the world. This has caused persistent criticism by economists, on welfare-theoretical grounds.

However, it should not be forgotten that the economics literature contains several arguments which at least in part counter such criticism. They all proceed along the following path: one formulates an objection against a particular assumption of the competitive model and shows that welfare theorems will break down if this assumption is relaxed. Then, one proceeds by presenting some variant of the standard competitive model that takes care of the objection and by illustrating, by means of examples, what the best policy would actually look like.

These objections will be grouped into five categories:

(i) costs of effectuating lump-sum transfers;

(ii) limited divisibility of farms;

(iii) link between farm income and labour productivity;

(iv) missing markets, for example for environmental commodities;

(v) imperfect competition and protectionism in other sectors and abroad.

2.2.1. Costs of effectuating lump-sum transfers

The second welfare theorem presupposes that all transfers can be effectuated without administrative or other costs. This may be unrealistic, due to the cost of raising taxes and redistributing the proceeds to the intended recipients.[1] It may thus happen that the welfare loss resulting from the cost of implementing transfers becomes higher than the loss due to, say price policies, in which case a price policy becomes preferable.[2] Another argument against direct transfers that is often advanced, essentially says that there are no direct transfers. Most transfers, it is argued, effectively operate like an excise tax. Income tax for example, is not on the availability of manpower (employment plus leisure) but only on employment. It thus operates like an excise tax on labour supply. However, one has to recognize that transfers exist which have the character of pure income redistribution; in particular those that are based on past events qualify.

2.2.2. Limited divisibility of farms

According to the welfare theorems, profit maximization is a must. This means not only that alternative rules of conduct, such as satisfying behaviour, are thought to produce social inefficiencies, but it also implies that producers should keep on producing as long as their profit is positive (or, at least not negative). It is particularly in the latter respect that the rule has consequences that may be significant in the context of the European agricultural policy and its reform.

Since the rule not only impacts on each farm individually, but also on the number and size of farms, we give a model of profit maximization for the agricultural sector as a whole. There is a variable number of (active) farms and farms

[1] In terms of the welfare problem, one could view this as an input cost associated with the enforcement of a deviation of welfare weights away from their (competitive equilibrium) value, for which they generate zero transfers among consumers.

[2] Price policies do not require registration of information about individual producers or consumers and are therefore relatively simple to implement.

compete for scarce resources. For, say the EC agricultural sector, this leads to:[1]

$$\max \Sigma_j n_j \pi_j(p^s, p, f_j/n_j)$$
$$f_j, n_j \geq 0$$
$$\text{such that } \Sigma_j f_j \leq \bar{f}$$
$$n_j \leq \bar{n}_j, j = 1,...,m \qquad (1)$$

where π_j is the restricted profit function of farm type j with fixed factor f_j/n_j;

$\pi_j(.)$ is taken to be homogeneous and concave, non-decreasing in factors.

f_j is the vector of factor inputs used by farms of type j

n_j is the number of farms of type j, which is set endogenously and taken to be realvalued,

p the vector of input prices,

p_s the vector of output prices,

$\bar{f}$ the given factor availability and

$\bar{n}_j$ the given upper bound on n_j

The first constraint in equation (1) is on overall factor availability, the second restricts the number of potentially active farms of the same type.

Under the standard convexity assumptions on the technology, it does not matter whether the number of firms is endogenous. The profitable firms will produce, the unprofitable ones will not, and this is as required by the welfare theorem.

This picture remains unaffected when we introduce (possibly discounted) set-up cost, $c_j(p)$ to be incurred independently of the scale of production. This leads to subtraction of the cost $n_j\ c_j(p)$ as an additional term in the objective of the programme. Higher set-up cost will lead to a smaller number of firms, i.e. to concentration, but otherwise the welfare propositions remain valid.

However, the propositions no longer hold if, in the presence of set-up costs, the indivisibility of the farm is being recognized and reflected in the integer-valuedness of n_j. Then, profit maximizing behaviour by firms may lead to an equilibrium that is Pareto-inefficient. To restore Pareto efficiency, barriers on firm entry and exit are then needed, combined with lump-sum subsidies that should cover the set-up costs.

The switches that result from the indivisibility-problem can be expected to create serious efficiency problems particularly when a price reform forces many farmers to terminate operations at the same time. Land fragmentation further aggravates the indivisibility problem: locally many farmers are sufficiently important to affect farm restructuring. Thus, welfare theory may provide support for government supported regional programmes of farm restructuring, possibly linked to some direct support. At any rate the transfer should be given lump-sum. Set-up costs only amplify the already existing distortion resulting from price support (and from compensation per hectare as given under the Mac Sharry reform). The support will accrue through higher rents on factors and distort resource allocation, inter-temporally and among sectors.

The servicing of debt incurred in the past is also an expenditure item that is unrelated to current production. It effectively operates like a set-up cost since the farmer can only avoid it by declaring bankruptcy. If this leads to the closing down of farms that would otherwise be profitable at post reform prices, some settlement is required. In principle, this is a matter of negotiation between the creditor (the bank) and the farmer but banks are not responsible for social welfare. The Mac Sharry reform seems to accept an EC responsibility in this matter and creates artificial rents on land to avoid bankruptcy (see Section 2.3 below). Welfare theory suggests that an arrangement for renegotiation of farm debt would be more appropriate.

2.2.3. Link between farm income and labour productivity

Development economists have learned to recognize poverty traps. Impoverishment at regional level will often be characterized by a deterioration of capital stocks, infrastructure and limited innovation which by itself leads to a downward spiral of depression. Keynesian theory has emphasized the importance of such mechanisms and a sudden fall in agricultural prices would definitely depress rural areas in the short term. Income support measures would counter this. However, the welfare theorems would suggest that this problem is to be cured via greater price flexibility and factor mobility. Let labour move out of the depressed areas and shift to more profitable activities.

However, such a view disregards any positive relationship between labour productivity and the consumption by the worker, as postulated in the classical tradition, where labour is a produced factor, with consumption as input. Such a

[1] The model can be viewed as a multiperiod plan; πj is firm j's capitalized profit, and all the vectors extend over time. Alternatively, it can be thought to incorporate various states of nature. The prices will then include a discounting for uncertainty. As long as markets are complete, price stabilization measures will be distortionary. One may also view equation (1) as a production plan of the full economy including the non-agricultural sector.

relation was examined in what has become known as the efficiency wage theory (see Stiglitz, 1976, Dasgupta and Ray, 1986). In European agriculture the concept is relevant as letting farm prices fall too much could hamper farm (labour) productivity, because impoverishing rural areas will become backward areas without innovation, skill accumulation and capacity to take entrepreneurial risks. Thus, according to the efficiency wage theory, it is not only true that consumption is high because income is high, the converse relation also holds. More specifically, when the farmer has to give up a significant part of his income, say for taxes or for servicing of past debt, his consumption may reach some critical level below which Pareto efficiency is lost. Then, all could gain by giving an income supplement (say a tax-waiver or subsidized education) which would permit the farmer to improve his labour productivity.

2.2.4. Missing markets, for example, for environmental commodities

So far, we have only considered profit evaluated at market prices and disregarded positive externalities, such as the maintenance of valuable landscapes, and the environment. Clearly, such outputs may appear in the social welfare problem but for those no markets exist which would permit decentralized allocation through prices. Thus, a central authority may have to step in to reward production and this can provide a justification for a transfer to farmers. However, when the mere existence of the farm generates the landscape, the transfer should not be linked to output.

While this point seems widely recognized, and appears to possess the capacity of generating support of transfers to agriculture, it is somewhat illusory because as long as there is no market for environmental services, it is extremely difficult to obtain an appropriate valuation for them. The earlier lobby for higher agricultural prices can easily become a green lobby for higher environmental prices, this time without any foreign competitors. At any rate it is not at all clear that the farmers own the landscape just because they own the land and even the concept of the quality of landscape is hard to define as it depends on the possibility of access. Also, any payment for production of environmental amenities calls for a penalization for pollution (a payment for the use of natural resources like groundwater not owned by the farmer).

It may be noted that the introduction of production quotas and limitations on waste disposal and other licences creates new production factors, each carrying a shadow price. Making such licences tradable among farmers improves market completeness, and thus yields higher revenue (and higher production efficiency) but nevertheless, any such licence restricts welfare and may significantly distort investment allocations. It attributes value to essentially unproductive assets, creates collaterals and may thus lead to a restructuring in favour of producers with large initial assets to the detriment of more efficient producers. It also leads to excessive outflow of revenue from agriculture in relation to inheritance and outmigration.

Markets will be missing in the financial sphere as well (the so-called market incompleteness, see for example Magill and Shafer, 1991). This means that the credit and insurance transactions are constrained because there is an insufficient number and variety of financial instruments to cope with future uncertainty and inefficient allocations can come about (recall that in Subsection 2.2.1 we discussed constraints within period transactions) and price intervention may be the best one can do.

Thus, when markets are missing, price liberalization can create a false illusion of increased efficiency, with less farmers and higher value-added per farmer as biased indicators. The ideal solution is obviously to make the set of markets complete but when this is not possible, tax, subsidy and price stabilization instruments may be called for.

2.2.5. Imperfect competition and protectionism in other sectors and abroad

The farm lobby has often advocated support to agriculture as a second-best policy to rebalance relative prices with respect to monopolistic non-agricultural sectors, particularly the input-supplying and output-processing sectors which link agriculture to the rest of the economy (this has also led to the creation of agricultural cooperatives). Such second-best arguments can be misleading: even in the ideal case where agricultural price support would raise relative prices to competitive values, one would expect the supposedly monopolistic part of the economy to react with further price increases: the result will remain distorted. The same holds on the international market. Introducing protectionism as a defence against protectionism abroad is usually a poor defence.

It is not only international trade that should be liberalized.[1] In the absence of domestic policy adjustments, trade liberalization may have perverse effects, as it may bring relative

[1] Here we will not elaborate on the inverse development by which patents and licensing introduce new forms of transnational protectionism (by firms rather than by countries). Also, the issue of liberalization of labour-markets is increasingly brought up. The welfare theorems argue that, as all price interventions should be reduced, wages should be made flexible and free migration allowed for.

domestic prices further away from relative international prices. Since the Uruguay Round can at most lead to a partial reduction in protection worldwide, there is little welfare theory can say on the welfare gains to be expected. Moreover, even with a general reduction of distortions, welfare gains could only be expected if the gainers compensated the losers through transfers; at the international level this is unlikely to happen on a large scale.

It is clear that the objections against a pure free-trade position, mentioned above for EC agriculture, may apply in other countries and other sectors as well. Developing countries hardly have the administrative capacity to distribute income via lump-sum transfers and several market imperfections can be expected to prevail there even more than in the EC. Then, when it is not possible to mobilize sufficient lump-sum transfers, a price policy may be the best governments can do.

2.2.6. Conclusion

All the objections mentioned make it untenable to base an extreme free-trade position on welfare theory. However, we have also discussed the difficulty of implementing policies that are in full accordance with welfare-theoretical principles. The approach followed by many policy analysts is to elevate the principle of free trade to a moral status and to condemn any deviation from this principle. This greatly simplifies the discussion and the implementation, since it permits a partial, even a market-by-market approach. The underlying motivation could be that crimes like theft are also punished on a case-by-case basis, though this is unfair as long as some thieves go unpunished. At any rate, such a policy can only remain credible if reforms are simultaneously executed within a short time span and in most markets. Since in the EC this is not likely to happen, a more differentiated policy package will be needed to reform EC agriculture. The Mac Sharry reform implements a highly differentiated package, the efficiency properties of which, need further investigation.

2.3. Welfare aspects of CAP reform proposals

2.3.1. The Mac Sharry reform

In this section the main elements of the Mac Sharry reform will be assessed in welfare-theoretical terms. A more detailed and a numerical assessment is postponed until Section 5.

In a nutshell, the Mac Sharry reform amounts to a reduction of the intra-EC prices as faced by the demand side of the market. Producers are being compensated for this in a rather complex way: they receive a fixed amount per hectare (or per animal) rather than per unit of output produced and should leave a certain percentage of their land fallow.[1] This percentage depends on the area of the crop planted in the past (before 1991); for this fallow land farmers receive a separate compensation. Fallow land should remain part of the crop rotation, so that the farmer is not at liberty to purchase marginal land somewhere and leave it idle to fulfil the requirement.

To assess the welfare aspect of such a scheme, we must represent it in formal terms, and for this it is necessary to specify the agricultural profit function in some more detail than was done in (1) above, separating yield (y_{kj}) from crop area (and number of animal heads) (a_{kj}) where $k = 1,...,n$ denotes the crop/animal type and $j = 1,...,m$ the farm type. Land is only one of several factor inputs. Other factor inputs will be denoted by the vector v_{kj}. At given prices and for given levels of factor inputs, farmers are assumed to maximize their net revenue per hectare. This is represented through a net revenue function $r_{kj}(p^s,p,v_{kj})$, where p^s is output price and p the input price vector. The derivative of r_{kj} with respect to output prices generates yield $y_{kj}(p^s,p,v_{kj})$; $c_j(p)$ is again the set-up cost.

Furthermore, imperfect substitution between crops, including rotation constraints appear through a (convex, increasing) transformation function constraint:

$$G_j(a_{1j},...,a_{nj}) \leq 0$$

Finally, quota restriction on outputs, say, for milk, can be represented as $y_{kj}\, a_{kj} \leq kj$. The possibly inter-temporal sectoral net revenue maximization problem may now be written (prior to any reform):

$$\max \Sigma_j n_j[\Sigma_k a_{kj} r_{kj}(p^s,p,v_{kj}) - c_j(p)]$$
$$a_{kj},n_j,f_j,v_{kj} \geq 0$$

such that

$$\begin{aligned}
&\text{transformation constraint:} && G_j(a_{1j},...,a_{nj}) \leq 0, j = 1,...,m \\
&\text{quota:} && y_{kj}(p^s,p,v_{kj})n_j a_{kj} \leq \bar{q}_{kj} \\
&\text{factor availability:} && \Sigma n_j \Sigma a_{kj} v_{kj} \beta_{kh} \leq \bar{V}_h \\
&\text{land/animal constraint(s):} && \Sigma_j n_j \Sigma_k a_{kj} \delta_{kl} \leq \bar{A}_l \\
&\text{constraints on entry:} && n_j \leq \bar{n}_j \\
&\text{for given } \beta_{kh},\delta_{kl},\bar{A}_l,\bar{n}_j,p^s,p,q_{kj},\bar{V}_h
\end{aligned} \qquad (2)$$

[1] Giving a fixed amount per hectare maintains fixed differences among crop net revenues. To keep allocations unchanged one would have to maintain fixed ratios of net revenues.

The Mac Sharry reform can now be implemented in the above programme by the following steps.

(i) Price reduction: reduce output and input prices for agricultural products (shift from p^s, p to $p^{s'}$, p').

(ii) Compensation: introduce a compensation per hectare cultivated (or animal) ϱ_{kj} (including a compensation for set-aside).

(iii) Set-aside: include the set-aside requirement σ_{kj}, in the land constraint

$$\Sigma_{kj}\Sigma_k a_{kj}(1 + \sigma_{kj})\,\delta_{kl} \leq {}_l$$

(iv) Base-year bound: limit the maximum area/number of animals under the scheme (area/number of animals under the scheme should not exceed base-year levels).

The reform has consequences for the agricultural producer, the consumer and the EC budget. Here, we only discuss the impact in the pure model, without externalities and market incompleteness for the simple reason that when these are present, little can be said generally on the consequences of the reforms. An assessment of the reform under more specific assumptions requires numerical calculations that will be reported on below.

2.3.2. Impact of the Mac Sharry reform

After the reform the programme reads:

$$\max \Sigma_j n_j[\Sigma_k a_{kj} r_{kj}(p^{s'},p',v_{kj}) + \tilde{a}_{kj}\varrho_{kj} - c_j(p')]$$

$$a_{kj},\tilde{a}_{kj},n_j,v_{kj} \geq 0$$

such that

$$\begin{aligned}
&\text{transformation constraint:} && G_j(a_{1j},\ldots,a_{nj}) \leq 0, j = 1,\ldots,m \\
&\text{quota:} && y_{kj}(p^{s'},p',v_{kj})n_j a_{kj} \leq \bar{q}_{kj} \qquad (3)\\
&\text{factor availability:} && \Sigma_j n_j \Sigma_k a_{kj} v_{kj} \beta_{kh} \leq \bar{V}_h \\
&\text{land/animal constraint(s):} && \Sigma_j n_j \Sigma_k (a_{kj} + \sigma_{kj} a_{hj})\delta_{kl} \leq \bar{A}_l \\
&\text{constraints on entry:} && n_j \leq \bar{n}_j \\
&\text{for given } \beta_{kh},\delta_{kl},\varrho_{kj,kj},\bar{A}_l,\bar{n}_j,p^{s'},p',\bar{V}_h,
\end{aligned}$$

The variable $_{kj}$ is the area (number of heads) brought under the Mac Sharry scheme of compensation (excluding the set-aside). Thus, the reform can be seen to alter both the objective and the constraints of the programme; the impact of the various measures on allocations may be summarized as follows.

(i) Reduction of agricultural output and input prices

For crops, only the reduction in p^s matters as agricultural inputs are limited. Net revenue per hectare will fall. Whether yields and input requirements will fall significantly, depends on the elasticities, but *ceteris paribus* a rise is not to be expected.[1] For animals, the feed-cost will be reduced as well as the output price, so that the direction of change in r_{kj} is generally unclear, especially for pork and poultry, where p^s is not directly set by policy.

(ii) Compensation

The compensation per hectare (pkj) will affect land allocation. However, this effect may be modest because the compensation was designed to maintain approximately fixed differences between net revenues (had the ratios been kept fixed rather than the differences, the optimal allocations would not have been altered at all). The compensation serves as an instrument for allocating more subsidies to small farms. It will also maintain the existing rents on agricultural land. This is distortionary in principle. However, any drastic cutting in the rent on land could greatly affect the asset value and thus the collaterals available for borrowing. This in turn would cause a serious debt crisis. One might argue that this should be overcome in the way discussed earlier, i.e. by government supported debt relief operations but these are costly and can hardly be performed in an equitable way as the most indebted farms would have to receive most aid.

(iii) Set-aside

The set-aside rate (σ_{kj}) also works in favour of small farms. It obviously lays resources idle.

(iv) Base-year bound

The maximum area and the maximum number of animals eligible under the scheme, by contrast favours farmers who operated large areas in the initial year.[2]

Thus, the proposed reform is certainly distortionary on the farm side: it is designed to affect production and farm structures. It maintains production quota on milk, creates a

[1] Still, v_{hj} may change also, so that a rise cannot be excluded (see also what will be referred to as slippage in Annex B).

[2] The rules that prevail when ownership of land changes have not been published as yet. Here we assume that the rights are non-transferable (e.g. firm specific).

new one on sheep, generates pure (i.e. unproductive) rents on land via the eligibility constraint and it reduces production efficiency via set-aside. It also maintains rent on agricultural land, and it uses a subsidy on land to keep small farms in operation (i.e. to pay for scale-independent input ($c_j(p')$), thus restricting adjustments in n_j. All these are distortionary measures that affect inter-temporal resource allocation.

On the positive side, one may mention that the valuation of net revenue becomes less distorted. The extent to which this improves allocations largely depends, as mentioned earlier, on the elasticity of yields with respect to prices. If these are small (and there is evidence on that count) the gain will be limited.

Although it is not possible to draw strong conclusions from these considerations, it may have become clear that improvements in production efficiency will depend on numerical values. On purely theoretical grounds the gain on the production side is not obvious. A policy that restricts supply may have environmental benefits or may function as part of a cartel-deal with other exporters, but it does not easily qualify as improving producer efficiency, nor does the creation of pure rents.

In studying the impact of the Mac Sharry reform on the consumer two types of consumers must be distinguished: farmers and non-farmers. Non-farmers gain in principle from the reform. Their income changes little and food prices drop. This is particularly beneficial for the poor segments of the population who spend relatively more on food. Farmers' utility may decrease because for them the fall in consumer prices may not offset a fall in income.

It can be expected that the EC budget expenditures will rise, especially in the short-term due to the compensation payments. The export subsidies (refunds) will drop because the internal prices are lower, but this will be insufficient to offset the former increase because the previously implicit subsidization by the consumer must also be paid from the budget. In the longer term, substitution effects on the producer side can be expected to limit this increase. The difference is more pronounced if we assume that technical progress will be reduced.

After the reform, yields are possibly lower but even if they are not, or grow less than before, subsidies are given on a per hectare/animal basis with an upper bound on eligibility and these bounds do not grow.

2.4. Alternative schemes

Although the Mac Sharry reform has recently received much attention, it seems unlikely that this would be the last CAP reform. Many variants can be developed and each can be called a plan. Some plans will focus on distributional aspects and create farm-specific licences (and rents). Their critics will propose to make licences tradable. These will, in turn, be attacked for raising the unproductive rents. The alternative of creating schemes of decoupled (lump-sum) transfers will be argued against because of their budgetary costs and the dependency it creates. One is then easily tempted to propose full liberalization but, as we have seen, this may create inefficiencies. The discussion has hopefully made clear that from a welfare theoretic perspective, the following scheme would be called for:

(i) reduce export refunds and import levies;

(ii) relax producer quotas and other sources of pure rents and reduce subsidies to producers or consumers;

(iii) provide lump-sum transfers to farms in so far as this is required to cope with the mechanisms discussed in Section 2.2 and only recur to price intervention when nothing else works.

3. The scenarios

3.1. The need for scenario simulation

Theoretical models like the one in Section 2.3 may yield some valuable insights, due to their generality and capacity to describe the complex process of restructuring the agricultural sector. But since the assumptions underlying the competitive model are not satisfied, as we have seen in Section 2.2, the normative approach must be supplemented with a descriptive component. Reforms should do more than invoke general principles, they should improve the prevailing situation. Hence a scenario analysis should be conducted using a simulation model to assess specific proposals. The EC agricultural model (ECAM) has been designed to do just that: it is able to analyse and compare CAP reforms. ECAM is an applied general equilibrium model for nine Member States of the EC, that follows the overall methodology set out in Fischer et al. (1988). ECAM provides a comprehensive description of the economy using

general equilibrium principles, so that welfare theoretical conclusions can be drawn. A short description of ECAM can be found in Annex A.

3.2. Historical validation

ECAM has been validated over the period 1982-92. Model outcomes over this period, the so-called base-run have been compared with historical data, as far as available. Only nominal prices have been used in this data set, so ECAM runs with current prices until 1992. A time-consuming process of calibration, checking and updating estimations, assumptions and data preceded the running of the scenarios in order to let ECAM represent the major mechanisms of European agriculture in an adequate way. The picture of EC agriculture that results is bound to be a global one for a number of reasons, of which we mention three. First, ECAM does not explain yield fluctuations that are due to weather conditions. Second, EC policy is the outcome of a complex set of rules. Of course, the basic principles have been incorporated explicitly, but the model does not display every detail of this complex set of regulations, and even so, European policy does not always adhere to the strict bookkeeping rules. Third, available statistics are not always consistent, and ECAM does occasionally use commodity aggregates which do not appear as such in the statistics.

3.3. Reference run assumptions

After historical simulation over the period 1982-92 a benchmark scenario has been formulated that shows the future evolution of EC agriculture under business-as-usual assumptions. It runs over the period 1992-2002 and is called the reference run. It is driven by a set of exogenous assumptions which must be decided upon. The most important issues here relate to the extrapolation of world market prices and the continuation of present policies.

With respect to world market prices we take the view that the evolution in the 1980s has been an atypical one. World market prices of agricultural products have fallen much faster than their long-term trend of 1 to 1.5% (Grilli and Yang, 1988), and internal EC prices have increased compared to the world market, in spite of the stabilizer for cereals. So, a plausible assumption is to restore this imbalance somewhat: world market prices are assumed to fall very modestly, while internal prices fall at a faster rate. We do not assume that world market prices are constant, since it is unlikely that productivity increases over the next 10 years will all accrue to agriculture. For transparency only the decrease in world market prices in the reference scenario is set at a uniform 0,5% for all commodities. World market prices in the policy scenarios are different, due to the new position of the EC on the world market. In order to determine the order of magnitude of this change, we have used outcomes from the MISS model which has endogenous world market prices (see Guyomard and Mahé, 1992). The results are summarized in Table 1.

The second basic issue is how to represent the continuation of present policies. The real price decreases for most products, especially cereals, can be continued in the future. It means that internal EC prices move gradually towards world market level. The results are summarized in Table 2. Other policy issues are set as follows. Production quotas are extended until the end of the simulation period, but may expand if the EC tends to become an importer. Producer subsidies have been volatile over the base-run period, with a tendency to increase in nominal terms for most products. In order to prevent shifts in relative producer prices we let them decrease at the same rate as the intervention prices. Finally, exogenous variables must be set over the simulation period. Yield increases of crops and livestock are lower than historical trends to reflect the impact of the lower prices, especially for cereals. Outflow of agricultural land is also on trend.

3.4. The policy scenarios

Two policy scenarios will be considered in this study:

(i) the Mac Sharry run: a quick price reform with income compensation tied to production and with additional production constraints, as agreed upon by the Council in May 1992;

(ii) a decoupled Mac Sharry run: a quick price reform as in the Mac Sharry scenario but with decoupled income support. Following the arguments of Section 2, income support is given through lump-sum transfers, rather than linking subsidies to acreage or livestock numbers. The voluntary set-aside scheme will be frozen at 1992 levels. In addition, it is assumed that the rate of land outflow increases somewhat, since non-agricultural use of land becomes more attractive.

Table 1

World market prices in real terms (ecu/kg)

	1992	1993	1996	1999	2002	Rate (%) 1992-2002
Reference scenario						
Wheat	9,59	9,54	9,40	9,26	9,12	– 0,50
Coarse grains	8,71	8,66	8,53	8,41	8,28	– 0,50
Rice	21,97	21,86	21,54	21,22	20,90	– 0,50
Sugar	28,34	28,20	27,78	27,36	26,95	– 0,50
Fats, oils	32,70	32,53	32,05	31,57	31,10	– 0,50
Protein feed	37,54	37,35	36,80	36,25	35,71	– 0,50
Carbohydrates	8,16	8,12	8,00	7,88	7,76	– 0,50
Butter	01,01	200,01	197,02	194,08	191,19	– 0,50
Dairy	43,23	43,02	42,38	41,74	41,12	– 0,50
Bovine meat	163,48	162,66	160,24	157,84	155,49	– 0,50
Ovine meat	158,23	157,44	55,09	152,78	150,50	– 0,50
Pork	292,75	291,29	286,94	282,66	278,44	– 0,50
Poultry, eggs	1 042,47	1 037,26	1 021,78	1 006,53	991,51	– 0,50
Non-agriculture	151,20	151,20	151,20	151,20	151,20	0,00
Tradable (index, 1982 = 100)						
Mac Sharry scenario						
Wheat	9,59	9,87	10,42	10,27	10,11	+ 0,54
Coarse grains	8,71	8,97	9,47	9,32	9,19	+ 0,54
Rice	21,97	21,86	21,54	21,22	20,90	– 0,50
Sugar	28,34	28,20	27,78	27,36	26,95	– 0,50
Fats, oils	32,70	32,53	32,05	31,57	31,10	– 0,50
Protein feed	37,54	36,41	34,09	33,58	33,08	– 1,26
Carbohydrates	8,16	7,92	7,41	7,30	7,19	– 1,26
Butter	201,01	202,02	203,02	199,99	197,01	– 0,20
Dairy	43,23	43,36	43,41	42,76	42,12	– 0,26
Bovine meat	163,48	165,12	167,59	165,09	162,63	– 0,05
Ovine meat	158,23	158,71	158,86	156,49	154,16	– 0,26
Pork	292,75	291,29	286,94	282,66	278,44	– 0,50
Poultry, eggs	1 042,47	1 037,26	1 021,78	1 006,53	991,51	– 0,50
Non-agriculture	151,20	151,20	151,20	151,20	151,20	0,00
Tradable (index, 1982 = 100)						
Decoupled Mac Sharry scenario						
Wheat	9,59	9,77	10,09	9,94	9,79	+ 0,21
Coarse grains	8,71	8,87	9,17	9,03	8,89	+ 0,21
Rice	21,97	21,86	21,54	21,22	20,90	– 0,50
Sugar	28,34	28,20	27,78	27,36	26,95	– 0,50
Fats, oils	32,70	32,53	32,05	31,57	31,10	– 0,20
Protein feed	37,54	36,41	34,16	33,85	33,55	– 1,12
Carbohydrates	8,16	7,96	7,53	7,42	7,31	– 1,10
Butter	201,01	201,62	201,81	198,80	195,83	– 0,26
Dairy	43,23	43,36	43,41	42,76	42,12	– 0,26
Bovine meat	163,48	165,12	167,59	165,09	162,63	– 0,05
Ovine meat	158,23	158,71	158,86	156,49	154,16	– 0,26
Pork	292,75	291,29	286,94	282,66	278,44	– 0,50
Poultry, eggs	1 042,47	1 037,26	1 021,78	1 006,53	991,51	– 0,50
Non-agriculture	151,20	151,20	151,20	151,20	151,20	0,00
Tradable (index, 1982 = 100)						

Source: ECAM.

Table 2

Intervention prices in real terms (ecu/100 kg)

	1992	1993	1996	1999	2002	Rate (%) 1992-2002
Reference scenario						
Wheat	16,54	16,04	14,64	13,36	12,19	– 3,00
Coarse grains	16,01	15,53	14,18	12,94	11,81	– 3,00
Sugar	53,01	52,48	50,92	49,41	47,94	– 1,00
Butter	292,78	288,39	275,60	263,39	251,71	– 1,50
Dairy	15,38	15,14	14,47	13,83	13,22	– 1,50
Bovine meat	343,00	334,43	309,66	287,29	277,10	– 2,11
Ovine meat	278,72	271,75	251,88	233,45	216,38	– 2,50
Mac Sharry scenario						
Wheat	16,54	13,29	9,74	8,89	8,11	– 6,88
Coarse grains	16,01	13,00	9,74	8,89	8,11	– 6,58
Sugar	53,01	52,48	50,92	49,41	47,95	– 1,00
Butter	292,78	276,90	250,04	238,96	228,37	– 2,45
Dairy	15,38	14,91	13,82	13,21	12,62	– 1,95
Bovine meat	343,00	316,07	289,21	286,70	284,24	– 1,86
Ovine meat	278,72	263,60	229,88	213,06	197,48	– 3,39
Decoupled Mac Sharry scenario						
Wheat	16,54	13,29	9,74	8,89	8,11	– 6,88
Coarse grains	16,01	13,00	9,74	8,89	8,11	– 6,58
Sugar	53,01	52,48	50,92	49,41	47,95	– 1,00
Butter	292,78	276,90	250,04	238,96	228,37	– 2,45
Dairy	15,38	14,91	13,82	13,21	12,62	– 1,95
Bovine meat	343,00	316,07	294,79	292,29	289,82	– 1,67
Ovine meat	278,72	263,60	229,88	213,06	197,48	– 3,39

Sources: ECAM, outcomes from the reference run and reform scenarios.

The reform scenarios will be introduced in 1993 and follow the phasing in 1994 and 1995 as proposed by the Commission. In order to facilitate comparison among scenarios, they are executed in real terms. Still, to take account of the ecu inflation prevalent in the EUR 9, intervention prices and compensatory amounts have been depreciated by 3% per year over the period 1993-95. From 1996 onwards the reference run assumptions apply. For cereals this implies a reduction in intervention price and producer subsidy of 3% per year. Hence for an ecu inflation of 3% this assumption is in accordance with the regulation in the Mac Sharry reform which states that after 1995 intervention prices and compensations will be fixed in nominal terms.

3.5. Price assumptions

It must be noted that the evolution of intervention prices may be affected by the assumptions on the world market prices, in the following way. In ECAM the intervention price plus processing and transportation margins deliver the so-called border price. Subtracting the world market price from the border price gives the export refund. The border price may hit the world market price in the course of the simulation period. In this case the world market price serves as a lower bound. Prices in ECAM are such that this happens for bovine meat and coarse grains (see Section 5.3, Table 13).

Together with the producer subsidies the assumptions on intervention and world market prices are the basic ingredients from which producer prices at farm-gate level follow. The producer prices are computed in the model through various commodity mappings, and since in the Mac Sharry reform, compensations are fixed per hectare, the producer prices decrease with yield. The fallow compensation is also part of the price. From this ECAM computes the producer prices as in Table 3.

Table 3

EUR 9 producer prices at farm-gate level (annual growth rates 1992-2002)

(%)

	Reference	Mac Sharry	Decoupled Mac Sharry
Wheat	- 2,4	- 2,4	- 5,5
Coarse grains	- 2,6	- 2,0	- 4,9
Sugar beet	- 1,1	- 1,4	- 2,0
Oilseeds	- 2,8	- 2,7	- 5,9
Consumable potatoes	- 0,2	- 0,2	- 0,4
Milk	- 1,0	- 1,2	- 1,2
Eggs	- 2,6	- 3,0	- 3,2
Cattle	- 1,9	- 1,3	- 1,7
Sheep, goats	- 1,9	- 2,2	- 4,3
Pigs	- 2,9	- 3,3	- 3,8
Poultry	- 3,0	- 3,2	- 3,7

Source: ECAM, outcomes from the reference run and reform scenarios.

4. Outcomes of the reference run

4.1. A continuation of existing policies

Fear of increasing international trade conflicts and budget problems have laid the basis of the recent acceptance of the Mac Sharry reform proposals. Earlier reforms could, until now, not solve these problems. Since 1988, the year in which the earlier reform measures became effective, EAGGF expenditures have still risen considerably. In addition, wedges between internal EC prices and prices on the world market have, on the whole, steadily widened.

According to many policy makers a continuation of existing policies would not solve the trade and budget problems in the future either (European Commission, 1991). Others go even further and believe that the reforms of the 1980s have exacerbated the problems (see for example, Koester and Cramon-Taubadel, 1992, p. 152). This view as well as the conviction that the current GATT round called for a 'step' by the EC, made acceptance of the Mac Sharry reform less painful.

In this section the validity of this view will be investigated more closely. The central question to be answered is: what might have happened with EC agriculture, in terms of production, trade position, EAGGF budget, farm incomes, etc., if the agricultural policies of the late 1980s had been continued until the beginning of the next century. The answer to this question is at the same time the benchmark and the point of reference, for the evaluation of the Mac Sharry reform in Section 5 and of the decoupled Mac Sharry reform in Section 6.

4.2. Reference run: production, consumption and external trade

Production

Continuation of the present policy will, according to ECAM, result in a continued inrease in production. Table 4 summarizes the model outcomes for a selected number of nine commodities. To put the figures into perspective, growth rates for the same commodities in the period 1982-92 (the base period) are also given.

Table 4

Average yearly production growth-rates for selected commodities, EUR 9

(%)

	Base run 1982-92	Reference run 1992-2002
Wheat	2,9	2,0
Coarse grains	- 0,2	0,9
Sugarbeet	1,2	0,1
Oilseeds	11,4	2,0
Consumable potatoes	- 0,6	1,2
Dairy	- 0,4	0,3
Eggs	1,1	0,5
Bovine meat	0,4	2,1
Sheep and goatmeat	3,7	2,3
Pigmeat	2,0	1,7
Poultrymeat	3,3	2,3

Source: ECAM

Because farm-gate prices for most products decrease at roughly the same speed, shifts in the pattern of production are only marginal. Mainly due to a 'freezing' of relative profitability, the spectacular rise in oilseed production comes to an end in the 1990s. Yield developments are an important determinant of production growth. In the base run (1982-92) wheat and coarse grains yields increase by 2,6 and 1,9% respectively. Continuation of these trends would lead to very high levels of cereal yields in 2002 in several countries, which are very high particularly in view of the price reduction. Therefore, in the reference scenario (1992-2002) these numbers have been lowered to 1,4 and 1,3%, respectively.

The presence of milk quota effectively constrains an expansion of the dairy sector. Moreover, as milk production per cow keeps rising, less dairy cows are needed for producing the quota. The resulting excess production capacity in the animal sector is used for an increase of the number of sheep and cattle. The effect of excess capacity in the livestock sector becomes especially manifest after 1996. Until that time the cattle production in Denmark, France and the Netherlands is still at 1992 levels. Thereafter the EC production grows at 2,4% per year.

Consumption and intermediate demand

The demand for agricultural products is characterized by low price and income elasticities. Combined with a stable population, this, at best, results in a marginal increase of overall consumer demand, even under a regime of falling (real) prices and moderate economic growth. Although model outcomes are in line with this general picture, growth differences among products are still remarkable. Consumption of wine and butter decreases somewhat, while consumer demand for vegetable oils and for non-bovine meat increases at more than the average rate.

As to intermediate demand, the growth rates of demand for cereals and cereal substitutes by the animal sector are of main importance. Within the feedmix a substantial shift from cereals to substitutes has taken place in the last decades. The reference run does not indicate a continuation of this development. On the contrary, intermediate demand for cereals increases faster than supply, while demand for substitutes declines. An explanation of this phenomenon relates, above all, to the change in relative prices. Due to the assumed price policies, feedgrain intervention prices decrease by 3% per year. World market prices of substitutes on the other hand show an average yearly decline of only 0,5%.

External trade

Through the increase in internal demand for feedgrains, cereals surpluses will, according to the reference run, reach a peak in 1996 and then decline to about 25 million tonnes in 2002 (see Table 5). France is the country with the largest surplus, with over three times the net export of the UK. Other countries in the EUR 9 are net importers of cereals in 2002. This outcome is caused partly by the assumed yield development (see above). The picture for other traditional surplus products is less dramatic. Due to the quota regulations and slight increases in internal demand, surpluses of sugar and dairy products show a decrease. Exports of bovine meat on the other hand amount to 900 000 tonnes in the beginning of next century, from a mere 200 000 tonnes in 1993. Thus, from an international trade perspective, Table 5 suggests that a continuation of the present policies will result in an intensification of trade conflicts with respect to bovine meat and a continuation of the conflicts with respect to cereals.

Table 5

External trade of EUR 9: net imports (+) and net exports (–)

(million tonnes)

	1982	1991	1996	2002
Wheat	– 9,6	– 15,4	– 22,0	– 21,2
Coarse grains	3,2	– 10,2	– 7,5	– 3,6
Sugar	– 4,0	– 3,9	– 3,2	– 2,2
Fats and oils	5,1	3,2	4,1	5,1
Protein feeds	11,1	11,7	10,7	9,1
Carbohydrates	21,0	22,5	22,7	22,5
Butter	– 0,3	– 0,1	– 0,1	– 0,2
Other dairy	– 10,0	– 3,6	– 1,2	– 1,2
Bovine meat	0,1	– 0,1	– 0,3	– 0,9

Source: ECAM.

For two reasons this conclusion has to be qualified. First, a trade conflict will only arise if there is unfair competition. To what extent the latter is the case will be investigated in the next section. Secondly, it can safely be expected that both the grain market and the bovine meat market will grow structurally in the years to come. To put the EC surplus figures into perspective: world cereal and bovine meat production amounted to about 1 950 million and 50 million tonnes respectively in 1990 (with world exports for cereals and beef of 120 and 4 million tonnes, respectively).

4.3. Prices and EC budget

Prices

Trade conflicts have their origin in (alleged) unfair competition. Table 6 shows how in the simulations the ratios of the subsidized internal prices (the border prices) and the world market prices change over time. In general, internal prices move closer to external prices. Under the scenario assumptions this will not come as a surprise.

Together with the volume figures of Table 5, the ratios give an indication of the extent to which continuation of the current policies will result in an intensification of trade conflicts. It appears that only with respect to cereals a

deepening of the current trade conflict is to be expected. The results of Table 6 (and also of tables 13 and 22) should be interpreted with some care, since rates of protection are imputed accounts which conceal green rates, processing margins and the like. They should be seen as indicative measures only.

Table 6

Ratio of internal border prices and world prices[1]

	1991	2002
Wheat	2,74	1,97
Coarse grains	1,91	1,47
Sugar	1,87	1,78
Butter	1,56	1,71
Other dairy	1,27	1,35
Bovine meat	1,26	1,00

[1] The difference between the two prices is the refund.

Source: ECAM.

EAGGF expenditures

The budgetary consequences of a continuation of the policies of the late 1980s and the early 1990s are far less dramatic than generally assumed. As Table 7 shows, ECAM calculates an average increase in EAGGF outlays of slightly less than 0,3% per year (in real terms). At first sight this may look counter-intuitive. However, given the scenario assumptions the optimistic outcomes can be easily understood. The combination of quota arrangements and (small) increases in demand effectively curb expenditures in the dairy and sugar sectors. In a number of other sectors the budget effect of production growth is more than compensated by the effect of the assumed price drops ranging from 2 to 3% per year. The realism of this restrictive price policy over such a long period is, of course, debatable.[1]

[1] See also Section 4.5.

Table 7

EAGGF outlays, EUR 12

	Outlays in 2002 in million 1992-2002 ECU	Average yearly growth rates	
		1982/92[1]	1992/2002[2]
Export refunds	5 300	3,17	– 1,94
Producer subsidies	6 500	13,97	– 1,39
Consumer subsidies	1 591	3,74	– 0,06
Input subsidies	2 831	3,15	– 0,31
Interest plus storage costs[3]	4 467	10,30	3,25
Other EAGGF-Guarantee	11 846	23,62	2,00
Total EAGGF-Guarantee	32 535	10,29	0,28

[1] In nominal ECU.
[2] In real ECU.
[3] Including stock devaluation.

Source: ECAM.

In relative terms, the outlay item 'interests and storage costs' appears to be the fastest grower. In absolute terms 'other EAGGF Guarantee'[2] is responsible for the most important increase. The rise in interest and storage costs is caused by the rapid growth of bovine meat surpluses at the end of the simulation period and the fact that storage of bovine meat is costly.

4.4. Value-added and employment

Real value-added at EUR 9 level declines at 0,9% per year which is less than in the period 1982-92 (Table 8). Except for the Netherlands the decrease in real prices is not compensated by the combined effect of volume expansion and technical progress. In the Netherlands the horticultural sector induces a net positive growth in real value-added. The reductions in real value-added should not be interpreted as corresponding reductions in income. Value-added is only a very rough indicator for farm income as depreciation, rent, interest, wages paid to employees are, among others, part of it. Moreover, income from non-agricultural activities is not included in value-added either. Agricultural households receive substantial amounts of income from outside agriculture (Eurostat, 1992).

[2] The item 'other EAGGF-Guarantee' comprises payments to Greece, Spain, Portugal and the former GDR, being the Member States not covered in ECAM. Data are from the annual reports on EAGGF.

Table 8

Agricultural value-added and employment

	Average yearly change in			
	real value-added		employment	
	1982-92	1992-2002	1982-92	1992-2002
Belgium, Luxembourg	– 2,41	– 1,03	– 1,76	– 2,24
Denmark	– 0,85	– 0,17	– 2,93	– 3,36
France	– 4,20	– 1,75	– 3,58	– 4,04
West Germany	– 2,70	– 1,72	– 1,32	– 1,62
Ireland	– 1,06	– 0,59	– 3,99	– 3,65
Italy	– 1,56	– 0,08	– 3,52	– 2,80
Netherlands	– 0,17	0,55	– 0,71	– 0,86
United Kingdom	– 3,16	– 1,93	– 1,54	– 1,94
EUR 9	– 2,48	– 0,90	– 2,76	– 2,62

Source: ECAM.

Agriculture is characterized by a steady outflow of labour. Consequently, the available overall income has to be shared among an ever smaller number of people. As the table shows there exists a weak negative relation between labour migration and changes in value-added. The skewed age distribution of farmers, with a large contribution of old farmers, is the dominant factor in changes in employment.

4.5. The future of EC agriculture under the present policy regime

The agricultural reform of 1992 was mainly motivated by the fear of a budget explosion and international trade conflicts. Do the ECAM outcomes justify this fear? To a large extent the question must be answered in the negative. With respect to the budget this point hardly needs any further explanation. An average yearly increase of less than 0,3% is definitely far from a budgetary explosion. The increase remains far below the spending guideline of 1988 according to which the total increase in guarantee expenditures should not exceed 74% of Community GNP growth. With respect to international trade problems the picture is more mixed, but the situation is certainly not dramatic either. For important products like wheat, coarse grains and bovine meat, surpluses may increase, but the internal prices show a clear tendency to move toward world market levels.

If the picture under a continuation of the current policy is so rosy, why, one could ask, was recent history, under the same policy, so gloomy? Why, despite the automatic stabilizers, were both the budgetary and the international trade problems aggravated? Would ECAM *ex ante* not also have sketched an excessively optimistic picture? The answer to the last question is negative, and we claim that the budgetary and trade problems of the recent years are less structural than is often assumed. Running ECAM from the mid-1980s until 1992 shows that since 1989 incidents have gravely exacerbated the actual problems. The unification of Germany as well as 'mad cow disease' created problems on the bovine market. The world market prices for many agricultural products have fallen to all-time low levels. Moreover the US dollar exchange rate has continuously fallen *vis-à-vis* the ecu since 1985. Taken together, we think, these developments have undermined the effects of the stabilizer policies.

Accepting the incidental character of the developments in the recent years, one could still reject the outcomes of the reference scenario because of its assumptions. A continuation of the current policy for the next 10 years may seem implausible because of its negative effects on farm incomes. Moreover, one could argue that, as a consequence of growing cereal and bovine meat surpluses, the world market prices of these products would decrease more than is assumed.

In order to investigate the relevance of this criticism an alternative reference scenario has been run. In this alternative it is assumed that intervention prices for cereals and bovine meat decrease by 1,5% per year instead of 3%, and further that world market prices for these products show a yearly drop of 1,5% instead of 0,5%. Some interesting outcomes of this alternative are summarized in Table 9. The assumptions underlying the versions of the two runs do not entirely match, so the numbers in Table 9 must be interpreted with some care.

Given the discussion so far, the outcomes need little explanation. The budget situation is negatively affected, albeit that the ceiling of 'the spending guideline' is still not exceeded. Relative to the reference run cereal surpluses increase, as do the ratios between internal border prices and world market prices. On the other hand, the growth of real value-added indicates higher agricultural incomes. All in all, the general picture does not change fundamentally under these alternative assumptions.

Table 9

An alternative assumption on prices: some outcomes

	Reference run	Alternative run
EAGGF outlays (constant 1992 ecu)		
Average growth-rate EUR 12[1]	0,28	1,14
Level in million ECU, 2002	32 535	36 617
Net exports, million tonnes, 2002		
Wheat	21,2	33,5
Coarse grains	3,6	5,4
Bovine meat	0,9	0,9
Price ratio internal/external, 2002		
Wheat	1,97	2,37
Coarse grains	1,47	2,96
Bovine meat	1,00	1,23
Real agricultural value-added		
Average growth rate[1]	– 0,90	– 0,36

[1] Period 1992-2002.
Source: ECAM.

5. Consequences of the Mac Sharry reform

5.1. Summary of the reform

The Mac Sharry reform for the common agricultural policy modifies existing market regulations and extends current measures in the field of social and structural policy. We will not assess the consequences of the latter. The simulated policy package refers to the modifications affected by market intervention only.

Market regulations are set to change for cereals, oilseeds, tobacco, milk, beef and sheepmeat. In a nutshell, these changes amount to the following. For some important commodities price guarantees are reduced considerably (see Table 2). Thereby protection against outside competition is diminished, but the system of variable levies and refunds at the Community border continues to remain in place. Policy measures are simultaneously taken that aim at directly constraining or reducing production. Farmers are compensated for the loss of income by product-specific subsidies. The total value of these subsidies is constrained by the amounts that would be payable in some historical reference year. The reform regulations suggest that the subsidies are nominally fixed, but may be adjusted when circumstances demand. Here it is assumed that the compensations will be nominally fixed and that the inflation rate will be 3%. In model terms this means that compensations decrease by 3% per year.

Arable crops

There is no doubt that the reform proposal is most drastic for cereals. After a transition period the target price for cereals is to be reduced by ECU 50 in 1995 to ECU 110 per tonne, measured in green ecus which are used here throughout. The system of coresponsibility levies is abandoned and compensations may be given on a per hectare basis. The amounts of compensation per hectare are obtained by multiplication of the average regional yield in tonnes per hectare with the reduction of the target price. Farmers producing oilseeds, fodder maize and protein crops are also eligible for compensation. Compensation for oilseeds depends on the ratio of the regional yield for cereals with respect to the average yield of cereals in the EC. For fodder maize and protein feed, compensations may be given which are the same as those for cereals. Fodder maize areas are only eligible for compensation if they are not simultaneously used to cover beef premium applications. Also for non-consumable potatoes a compensation scheme is envisaged to enable the continuation of potato starch production.

To become eligible for compensation farmers are required to set aside 15% of their total basic area. This is the average acreage allocated to cereals, oilseeds, fodder maize and protein crops in the period 1989-91. Furthermore it is assumed that the voluntary set-aside may be counted as part of the basic area. For the set-aside area under the Mac Sharry plan farmers receive the same compensation as for the area under cereals. Small producers, i.e. farmers producing at most 92 tonnes of cereals, are exempted from the obligation to set aside some of their land. If the area that farmers submit for compensation exceeds the regional basic area the compensations per hectare are diminished proportionally.

A drastic fall in prices as in the Mac Sharry reform is likely to cause a decrease in yields. There does not seem to exist much agreement about the magnitude of this effect, but a reduction in crop yields of 4%, to be applied only in 1993, seems plausible. The decrease in yields holds for wheat, coarse grains, oilseeds, protein crops, pasture grass and fodder maize. For the crops with reduced yields, current input requirements (fertilizer, pesticides) are reduced by approximately 8%. In Denmark, Germany, Ireland and the UK the reduction factor in the input requirements for pasture grass is still higher, by about one tenth. The voluntary

five-year set-aside schemes are supposed to be phased out in two years after 1993, and will be replaced by the mandatory set-aside scheme for large producers.

For tobacco production, quotas for individual producers are introduced, their sum total being less than current EC quotas. Only production within the quota is subsidized. Market intervention and export refunds are abandoned.

Animal products

Production quotas for milk are to be reduced by 2%. For a period of 10 years a compensation is paid of ECU 5 per 100 kg quota reduction. The coresponsibility levy is abolished. Because of lower feeding costs due to reduced prices for feed grains, price guarantees are reduced by 5%, but for butter only.

The intervention price for beef is to be reduced by 15% by the year 1995, again because of lower feeding costs. After a transitional period, farmers may, in 1996, apply for premiums for bulls and suckler cows up to a stocking rate of 2 livestock units per hectare of fodder area. In computing the stocking rate dairy cows and eligible ewes are to be taken into account too. Small producers whose total herd is less than 15 livestock units are exempted from the stocking rate requirement. Bull premiums amount to ECU 90 per head and may be given twice during the animal's life (at the ages of 10 and 22 months) up to headage limits of 90 animals per farm. Suckler cows may receive a premium of ECU 120 each year. Because extensive cattle farms profit less from reduced grains prices, these farms may receive an extra extensification premium of ECU 30 per animal. Farms are called extensive if the stocking rate of eligible animals (plus dairy cows and eligible ewes) does not exceed 1,4 livestock units per hectare. If farmers' applications for beef premiums exceed the amounts payable in a reference year to be chosen from the period 1990-92, the compensations per eligible animal are to be reduced proportionally. Finally, in order to constrain growing beef production a destruction premium is given for male calves from dairy herds. This premium is ECU 100 per calf.

The price fall in beef is also assumed to trigger an extensification effect. A yield reduction of 2% is assumed, with approximately 4% input reduction.

In order to curb the rapid rise in outlays on sheep, a ceiling is put on the amount of subsidies that individual producers can receive. The maximum number of ewes for which a premium is payable is derived from flocks present in one of the years 1989-91. There is a headage limit of 500 ewes per farm (1 000 in less-favoured areas); eligible ewes exceeding this limit will only receive half the ewe premium.

In the Mac Sharry reform the granting of compensations for price reductions is conditional upon specific circumstances at individual farms. Because ECAM contains aggregate farms only and regional or structural details within Member States are not explicitly represented in the model, the compensatory amounts had to be derived from sources external to the model. In Annex B it is explained how these amounts were arrived at and how the Mac Sharry reform has been translated into rules that match ECAM's specification. Here it is stressed that the compensatory amounts after 1995 only change because they fall by the same rate as the intervention or domestic prices of the products to which they apply. They do not react upon possible future changes in the structure of EC agriculture.

5.2. Mac Sharry run: EC production, EC demand and external trade

Production

Under the Mac Sharry reform production will be affected, depending on how production will be curtailed. Three instruments are deployed to constrain (the growth of) production: the set-aside obligation for basic arable crops, production quotas and quotas on the amounts of subsidies payable to the crop and beef producing sectors. The development of supply is also influenced by the reduced intervention prices and the accompanying compensations.

According to ECAM the rate of growth in cereals production will be less than half the growth rate in the reference run (Table 10). The difference in production in 2002 is 16 million tonnes or a little less than 10%. Oilseed production is also less, about 14% in 2002. Part of the decrease in cereal and oilseed production is caused by the set-aside obligation and the constraint on arable land. The assumed reduction of physical yields contributed to this. According to ECAM 2,9 million hectares of land will be set aside in the EUR 9 under the Mac Sharry scenario (Table 11). The difference with the reference run is less than this amount, however, as it is assumed in the reference run that current contracts under the voluntary set-aside scheme will be continued, whereas they will not be renewable under the Mac Sharry reform. The basic area in 1992 (including the voluntary set-aside) is about 34 million ha. In 2002, the basic area, now including the mandatory set-aside for large producers, is still 34 million ha. So, the constraint on the extension of the basic area holds, assuming that farmers are allowed to count the

pre-Mac Sharry voluntary set-aside as basic acreage. The current regulations suggest that this is indeed the case.

Table 10

Average growth per year of the volume of production for selected commodities over the period 1992-2002 in the EUR 9

(%)

Product	Reference	Mac Sharry
Wheat	2,0	0,7
Coarse grains	0,9	0,4
Sugar beet	0,1	0,1
Oilseeds	2,0	0,6
Consumable potatoes	1,2	1,8
Dairy	0,3	0,3
Eggs	0,5	1,2
Bovine meat	2,1	2,2
Sheep and goatmeat	2,3	0,2
Pigmeat	1,7	1,8
Poultrymeat	2,3	2,3

Source: ECAM.

Table 11

Crop areas for selected commodities and livestock in 1992, 1996 and 2002 in the EUR 9

Product	Reference			Mac Sharry	
	1992	1996	2002	1996	2002
	Area in million ha				
Wheat	12,5	13,1	13,3	12,3	12,3
Coarse grains	11,6	11,7	11,1	11,1	10,9
Sugar beet	1,7	1,6	1,5	1,6	1,5
Oilseeds	3,8	3,8	4,1	3,5	3,6
Consumable potatoes	0,8	0,8	0,8	0,8	0,8
Grass and other roughage	50,3	48,9	47,3	48,8	47,3
Set-aside	2,1	1,2	1,2	2,9	2,9
Total area	89,3	87,6	85,8	87,6	85,8
	Livestock in million animals				
Dairy cows	21	20	19	20	19
Laying hens	275	272	272	279	293
Cattle	52	54	59	54	62
Sheep and goats	63	67	73	61	58
Pigs	85	89	94	90	95
Poultry	559	585	623	593	626

Source: ECAM.

The Mac Sharry policy continues to constrain milk production and introduces a quota for the flock of sheep. In the short term the milk quotas are reduced but in the longer term some room for expansion is created again through an increase of EC demand. In spite of the imposition of quotas, sheepmeat increases somewhat because of the assumed improvement of yields by almost 1% per year. Beef production increases more than in the reference run. This happens in almost all Member States (except Belgium and Denmark), and becomes especially manifest after 1996. Cattle production is the only outlet for the livestock capacity, whereas milk production is under tightening quotas and pork/poultry production is constrained by internal EC demand. In addition, low prices for pigs and poultry favour beef production.

Consumption and intermediate demand

One would expect, following the reduction of price guarantees for cereals, butter and beef, a larger increase (or a smaller decrease) of the consumption of these products than in the reference run, and ECAM confirms this expectation. The differences are generally rather limited due to the low price elasticities of consumer demand.

Because intermediate demand is much more price elastic than consumer demand, shifts in the sector's own demand are more pronounced. The usage of cereals especially increases. This can be explained partly by the small increase of intensive livestock production, but the substitution of grain substitutes for feed grains appears to be the most important cause. Intermediate usage of grains increases until the year 2002 by about 28 million tonnes. Over the period 1992-2002 the share of feed grains in total compound feeds increases by 13% to 68%. The reduction of cereals protection therefore clearly rehabilitates the position of grains in the compound feed package.

External trade

The Mac Sharry reform contributes to an alleviation of trade disputes with third countries about the EC's exports of cereals. In 1996 net exports of cereals are already 30 million tonnes less than in the reference run. A combination of various effects explains the vanishing of the cereals exports: the set-aside obligation, the strong increase of intermediate demand, and the extensification effect in 1993. The export position of the EC also depends on the assumed yield increases for wheat and coarse grains (see Section 4.2).

Table 12

Net imports (+) and exports (–) in external trade of EUR 9 in 1992, 1996 and 2002

(million tonnes)

Product	Reference			Mac Sharry	
	1992	1996	2002	1996	2002
Wheat	– 16,6	– 22,0	– 21,2	– 1,4	0,0
Coarse grains	– 9,2	– 7,5	– 3,6	2,2	2,7
Sugar	– 3,7	– 3,2	– 2,2	– 3,2	– 2,2
Fats and oils	3,5	4,1	5,1	4,5	5,6
Protein feed	11,8	10,7	9,1	8,4	7,8
Carbohydrates	23,1	22,7	22,5	17,7	18,8
Butter	– 0,1	– 0,1	– 0,2	0,1	0,0
Other dairy	– 3,1	– 1,2	– 1,2	– 0,3	– 1,3
Bovine meat	– 0,1	– 0,3	– 0,9	0,2	– 1,0
Ovine meat	0,1	0,1	0,2	0,2	0,4

Source: ECAM.

Compared with the reference run, imports of grains substitutes are almost 20% smaller in 2002. For the commodities not mentioned thus far, the differences in net trade flows are relatively minor. Sheepmeat imports from third countries are doubled. This is caused by the quota on sheep.

5.3. Mac Sharry run: prices and EC budget

Prices

Both in the reference run and in the Mac Sharry scenario the protection at the EC's border, as measured by the ratio of internal border prices and world market prices, decreases with time. Under the Mac Sharry reform cereals protection decreases much faster than in the reference run. Initially, this also holds for beef protection. At the end of the simulation period border prices for bovine meat will equal world market price levels in both scenarios.

Table 13

Ratio of border prices and world market prices in 1992, 1996 and 2002

Product	Reference			Mac Sharry	
	1992	1996	2002	1996	2002
Wheat	2,33	2,17	1,97	1,49	1,38
Coarse grains	1,88	1,70	1,47	1,07	1,00
Sugar	1,87	1,83	1,78	1,83	1,78
Butter	1,83	1,78	1,71	1,61	1,54
Other dairy	1,33	1,34	1,35	1,29	1,30
Bovine meat	1,35	1,18	1,00	1,00	1,00

Source: ECAM.

EAGGF outlays

Of the outlays of EAGGF Guarantee Section, only the refunds on exports decrease significantly. This is shown in Table 14. In the reference run real outlays on refunds have already decreased by 1,9% per year on average over the period 1992-2002; for the Mac Sharry reform a real decrease in refunds of 8,5% is observed over this period.

Table 14

EAGGF-Guarantee outlays EUR 12; levels in 1996 and 2002 and average growth (per year) over the period 1992-2002

(%)

Outlays	Outlays in million ECU (1992)				Growth rate	
	Reference		Mac Sharry		Reference	Mac Sharry
	1996	2002	1996	2002		
Export refunds	6 389	5 300	2 684	2 655	– 1,9	– 8,5
Producer subsidies	6 506	6 500	15 636	14 438	– 1,4	6,8
Consumer subsidies	1 571	1 591	1 567	1 593	– 0,1	– 0,1
Input subsidies	2 819	2 831	2 798	2 787	– 0,3	– 0,5
Interest and storage cost	3 834	4 467	1 738	3 987	3,3	2,1
Other EAGGF-Guarantee	10 519	11 846	11 634	13 102	2,0	3,0
Total EAGGF-Guarantee	31 680	32 535	36 075	8 627	0,3	2,0

Source: ECAM.

Against the decrease of refund outlays stands the very drastic increase of producer subsidies due to the compensations per hectare and per animal. Consumer and input subsidies are almost the same in both scenarios. Almost ECU 0,5 billion is saved in 2002 on intervention costs; these savings are the net result of lower outlays on cereals (about ECU 750 million less) and butter (about ECU 100 million less) and higher intervention costs for beef (about ECU 350 million more). The significant increase of outlays on other EAGGF-Guarantee is especially due to the increase of producer subsidies in the Member States not covered by ECAM. Total EAGGF-Guarantee outlays for the EUR 12 are more than ECU 6 billion higher in 2002 than in the reference run. The growth of these outlays, 2,0% per year, is about the same order of magnitude as the spending guideline. Therefore, ECAM's simulation results suggest that it may be possible under the Mac Sharry reform to satisfy the spending guideline of 1988. This result depends on the assumption that intervention prices and compensations are nominally fixed and that 3% inflation has been assumed. Of course, the budgetary outlays will be higher if farmers receive fully indexed compensation. In previous runs, where the full indexation assumption was implemented (and higher cereals yields were assumed), the additional budget costs under Mac Sharry rose to ECU 10 billion.

The increase of budgetary outlays under the Mac Sharry reform is of course not unexpected. If income support is decoupled from price support, the amount of support becomes visible on the EC budget; consumers no longer pay the support indirectly through high food prices but directly through higher taxes which finance the EC budget.

5.4. Mac Sharry run: value-added and employment

Table 15 shows the development of real value-added and employment in agriculture. On average for the EUR 9 these indicators develop more favourably than in the reference run. The rise in value-added can entirely be attributed to cattle, pigs, poultry and laying hens. The crop sector is faced with lower net revenues. In Annex C more detailed information per production sector is tabled. We observe a decrease of 3,5% for cereals, oilseeds and consumable potatoes and an increase of 7,5% in the livestock sector.

Table 15

Average growth of real value-added and employment in agriculture over the period 1992-2002 in the Member States of EUR 9

(% per year)

Member State	Agricultural value-added		Agricultural employment	
	Reference	Mac Sharry	Reference	Mac Sharry
Belgium, Luxembourg	– 1,0	– 0,2	– 2,2	– 2,2
Denmark	– 0,2	– 0,1	– 3,4	– 3,4
France	– 1,8	– 1,1	– 4,0	– 4,0
Germany	– 1,7	– 1,1	– 1,6	– 1,6
Ireland	– 0,6	0,7	– 3,7	– 3,5
Italy	– 0,1	0,1	– 2,8	– 2,8
The Netherlands	0,6	0,8	– 0,9	– 0,9
United Kingdom	– 1,9	– 1,3	– 1,9	– 2,0
EUR 9	– 0,9	– 0,5	– 2,6	– 2,6

Source: ECAM.

5.5. Mac Sharry run: consequences for economic welfare

Applied general equilibrium models like ECAM enable the user to analyse the consequences of policy proposals with respect to economic welfare. Table 16 shows the computed differences in economic welfare between the reference scenario and the Mac Sharry reform. To compute the economic welfare in 2002, realized consumer utilities for this year in both scenarios have been expressed in expenditures at 1992 prices. The table shows a difference in economic welfare of about ECU 8 billion for the EUR 9 in favour of the Mac Sharry reform. However, against this welfare gain for consumers there is a decreased indebtedness of third countries because the surplus on the EC trade balance has diminished with more than ECU 2 billion. If the reduction in the surplus is subtracted from the welfare gain for consumers, there still remains an increase in total welfare of about ECU 5,7 billion. This gain seems relatively small as it amounts to only 0,23% of equivalent consumer expenditure in the EUR 9.

5.6. EC agriculture and the Mac Sharry reform

ECAM's simulation results show that under the Mac Sharry system the development of agricultural incomes is, like the reference run, again rather stable with a shift from value-

added generated in the crop sector to that in the livestock sector. Under the Mac Sharry reform real budgetary outlays will develop at the higher pace of 2,0% per year and exports to the world market vanish for cereals but not for beef.

Table 16

Equivalent consumer expenditure in 2002 at 1992 prices in the Member States of EUR 9

(billion ECU)

Member State	Reference	Mac Sharry	Difference
Belgium, Luxembourg	91,9	92,2	0,3
Denmark	49,7	49,9	0,2
France	582,8	584,9	2,1
Germany	660,0	661,6	1,6
Ireland	17,9	18,2	0,3
Italy	340,1	341,2	1,1
The Netherlands	129,3	129,8	0,5
United Kingdom	553,4	555,0	1,6
EUR 9	2 424,9	2 432,8	7,9
Surplus EC trade balance	28,2	26,0	– 2,2
of which: agriculture	– 30,5	– 31,5	– 1,0
non-agriculture	58,7	57,5	– 1,2

Source: ECAM.

While price distortions are reduced, the regulation introduces quotas on sheep and rents on cereals, oilseeds, protein crops, fodder maize and cattle. These rents favour existing farmers, but create an additional financial burden for young farmers. On the other hand, as was noted in Section 2.3, the restriction of agricultural supply may have environmental benefits.

At the time when the Mac Sharry plan was still a proposal to the EC Council, an assessment of its impact was also made. The level of the premiums was different, full indexation was assumed, and more importantly, no base-year acreage constraint nor upper bound on total cattle premiums was imposed. Budget outlays would increase under expanding (cereals) acreage and cattle stocks, as indeed happened. In the adopted plan this is no longer the case. The increase of EAGGF-Guarantee compared to the reference run is much lower in the present plan compared to earlier plan. The main reason is the issue of indexation. The fact that fodder maize acreage is now eligible for compensation and that the cattle premiums have increased considerably is compensated by a reduction of ECU 5 per tonne in the cereals compensation compared to the earlier interpretation of the plan.

6. Consequences of the decoupled Mac Sharry scenario

6.1. The need for decoupling

Although in the Mac Sharry reform price distortions in the markets for cereals, dairy and beef diminish, the reform introduces new distortions as well. First, the regulations affect individual farms differently; the set-aside obligation depends on circumstances at the individual farm and the larger farms are at a disadvantage compared to smaller producers. Secondly, an extra quota is introduced for sheep and existing quota for tobacco and milk are made more severe. The rights that can be derived from these quotas constitute pure rents, i.e. non-productive investments that will increase the indebtedness of new generations of farmers and will keep existing farmers in business longer.

Moreover, the non-agricultural sector will demand its share through inheritance and migration out of agriculture if the rents are capitalized in property rights. This will increase the indebtedness of new generations of farmers even further. As discussed in more detail in Subsection 2.3.2, these distortions will, in the longer term, decrease allocative efficiency of production factors in the agricultural sector.

On the other hand it may be noted that a complete decoupling of income support from price guarantees or product-specific compensations will cause a decrease in the price of land, eroding the value of the most important collateral that farmers have. Farmers might then not be able to meet their financial obligations and the restructuring of agriculture would be accompanied with bankruptcies and liquidations. The remedy for this is an improvement of facilities to settle the debts of the agricultural sector.

6.2. Regional funds to implement direct income support

Here we will discuss a decoupled variant of the Mac Sharry reform wherein direct income support is given. It would seem impractical to manage the implementation of such a scheme centrally, not only because of the obvious length of the lines of communication but also for budgetary reasons. In spite of tight budgeting, the exact level and time pattern of expenditures will prove hard to predict. Then there are two possibilities. Either one fixes an absolute level of (yearly or cumulated) outlays that may not be exceeded. This will lead to unfair conditions because those who have already received subsidies, thanks, say, to an efficient accountant,

will receive full compensation while those with less efficient accounting receive nothing. Alternatively, if the budget allocation is soft, it can be exceeded and lead to unpredictable and fluctuating outlays.

In Folmer and Keyzer (1988) we have proposed the introduction of regionalized funds that would implement the support scheme. Again employing ECAM we have elaborated the following arrangement. The Commission commits itself to pay a fixed annuity to each regional fund over a period of 15 years. The commitment is the initial wealth of the fund against which it can borrow on the capital market so as to finance its expenditure in the early years. These expenditures are likely to exceed the receipts in the initial years due to the initial shock. In later years there may be a period when the receipts exceed the outlays, so that the fund can repay its loan and even engage in lending. It all depends on the expenditure pattern and the development of the rate of interest whether the fund can keep on spending for the whole duration of 15 years or even beyond. In the ECAM simulations, the funds distribute lump-sum transfers, support set-asides and invest outside agriculture in order to promote labour outflow from agriculture.

Regional funds would typically meet the requirements of the subsidiarity principle. Farmers could be given the opportunity to participate in decisions of 'their' fund, without a need for distant officials to manage the fund. More importantly, there would no longer be a premium on quick spending and the Commission's budgetary outlay would be constant.

6.3. The decoupled Mac Sharry scenario

The lump-sum transfers as advocated by standard welfare theory will be implemented in a decoupled scenario, referred to as the decoupled Mac Sharry scenario. Lump-sum transfers are given to farmers, while abolishing all consumer and producer subsidies as well as the input subsidies of the 'Mac Sharry' commodities. For intervention prices the price reform of the Mac Sharry plan is maintained throughout, as well as the milk and sheep quotas. Two points need further specification: the level of the income support and the impact on production. The premium is dealt with as follows, following a procedure designed by De Veer (1992) based upon the pre-reform situation: farmers in the Netherlands receive transfers of approximately ECU 300 per hectare from the EC budget. In the scenario this amount, with a reduction and differentiation over Member States,[1] is transferred to farmers. Farmers receive these subsidies even if they leave agriculture. The transfers are terminated if the farmer dies and are not transferred to a new entrant. In ECAM, farmers' decisions to leave the agricultural sector depend on the ratio between agricultural and non-agricultural income. In this respect we note that, in order to reflect decoupling, the lump-sum transfers are not added to agricultural income. So, additional labour outflow is to be expected. Also additional outflow of arable land can be expected, since the transfers are not linked to hectares of land but to farmers themselves. This outflow is assumed to be moderate, see Table 17. On the other hand, the voluntary set-aside scheme of the reference run is maintained and frozen at the 1992 level.

Table 17

Land availability in Member States of the EUR 9 (1 000 ha)

	1993	1996	1999	2002	Rate (%) 1992-2002
Reference and Mac Sharry scenario					
Belgium, Luxembourg	1,502	1,483	1,463	1,443	- 0,44
Denmark	2,675	2,627	2,578	2,530	- 0,62
France	30,628	30,284	29,939	29,594	- 0,38
Germany	11,633	11,501	11,369	11,237	- 0,38
Ireland	5,676	5,679	5,682	5,684	+ 0,02
Italy	16,740	16,419	16,227	16,041	- 0,49
The Netherlands	1,969	1,950	1,921	1,893	- 0,43
United Kingdom	18,116	17,964	17,812	17,661	- 0,28
EUR 9	88,939	87,906	86,992	86,083	- 0,36
Decoupled Mac Sharry scenario					
Belgium, Luxembourg	1,501	1,469	1,446	1,423	- 0,53
Denmark	2,673	2,601	2,547	2,492	- 0,70
France	30,592	29,985	29,530	29,075	- 0,51
Germany	11,619	11,387	11,213	11,039	- 0,51
Ireland	5,670	5,649	5,634	5,618	- 0,09
Italy	16,710	16,217	15,971	15,741	-0,61
The Netherlands	1,968	1,935	1,902	1,868	- 0,50
United Kingdom	18,096	17,812	17,600	17,387	- 0,40
EUR 9	88,828	87,056	85,842	84,644	- 0,48

Source: ECAM.

Levels of crop yields are reduced by 6% in 1993 in the decoupled Mac Sharry run, compared to the reference run. The decrease in yields holds for wheat, coarse grains, oilseeds, protein crops, pasture grass and fodder maize. Reduction for input requirements is about 12%, with an additional input reduction for pasture grass in Denmark, Germany, Ireland and the UK. A smaller yield reduction of 2% is applied to non-dairy cattle, in order to reflect extensification.

[1] All countries receive compensation for all crops multiplied by a factor that takes into account their ratio to the Dutch net revenues in 1990 (and Italian net revenues in case a crop does not occur in the Netherlands, like, for example, olives) The factor is .95 + .9 * ((r_k(C)/r_k(NL)) - 1), where r_k(C) is the net revenue for crop k in Member State C. Note that the formula applies to the Netherlands as well, so Dutch farmers receive .95 * 300 = ecu 285 per hectare.

6.4. Decoupled run: EC production, EC demand and external trade

Production

Under a decoupled run cropping patterns may be quite different, since net revenues change significantly. Net revenues change through the vanishing of product-specific support and the assumption of the decrease in yields of cereals and oilseeds in 1993 (the yield increase of wheat and cereals over the period 1992-2002 falls to 0,9 and 1% per year, respectively). It turns out that the net revenues per hectare of cereals and oilseeds both decline by approximately 6% a year. Hence, these relative net revenues which drive the allocation vary only little leaving relative acreages between cereals and oilseeds more or less stable. Some fluctuations occur, however, because the net revenues under decoupling are at a much lower level so that the allocation is much more responsive. Net revenues per hectare of the main competitive crops (sugar beet, potatoes, pasture grass) decline as well and limit shifts of the crop allocation. Because the shadowprice of green fodder changes with the aggregated compound feed price (see Annex B), so that a fall in cereals price does not automatically lead to sharp decline in its acreage. The resulting growth in production and acreages/stocks is given in Tables 18 and 19.

Table 18

Average annual growth of the EUR 9 volume of production for selected commodities over the period 1992-2002

(% per year)

Product	Reference	Mac Sharry	Decoupled
Wheat	2,0	0,7	1,7
Coarse grains	0,9	0,4	0,3
Sugar beet	0,1	0,1	0,1
Oilseeds	2,0	0,6	1,5
Consumable potatoes	1,2	1,8	1,8
Dairy	0,3	0,3	0,4
Eggs	0,5	1,2	0,8
Bovine meat	2,1	2,2	2,3
Sheep and goatmeat	2,3	0,2	– 0,4
Pigmeat	1,7	1,8	1,9
Poultrymeat	2,3	2,3	2,4

Source: ECAM.

Table 19

Crop areas for selected commodities and livestock in 1992, 1996 and 2002 in the EUR 9

Product	Reference			Mac Sharry		Decoupled	
	1992	1996	2002	1996	2002	1996	2002
				Area in mln ha			
Wheat	12,5	13,1	13,3	12,3	12,3	13,2	13,7
Coarse grains	11,6	11,7	11,1	11,1	10,9	11,4	11,1
Sugar beet	1,7	1,6	1,5	1,6	1,5	1,6	1,5
Oilseeds	3,8	3,8	4,1	3,5	3,6	4,7	4,1
Consumable potatoes	0,8	0,8	0,8	0,8	0,8	0,8	0,8
Grass and other roughage	50,3	48,9	47,3	48,8	47,3	47,8	45,8
Set-aside	2,1	1,2	1,2	2,9	2,9	1,2	1,2
Total area	89,3	87,6	85,8	87,6	85,8	87,1	84,6
				Livestock in mln animals			
Dairy cows	21	20	19	20	19	20	19
Laying hens	275	272	272	279	293	276	280
Cattle	52	54	59	54	62	54	62
Sheep and goats	63	67	73	61	58	60	55
Pigs	85	89	94	90	95	91	96
Poultry	559	585	623	593	626	598	631

Source: ECAM.

Livestock production does not appear to be very sensitive to the mode of compensation (decoupled or not). Sheep and milk quotas are imposed in both runs, while the production of pigs, poultry and eggs is constrained by EC demand. Only the beef sector can expand, and it does at the same rate as under the Mac Sharry scenario (see Section 5.2).

Consumption and intermediate demand

As in the Mac Sharry scenario, the fall in market prices of cereals, dairy products and bovine meat leads to an increase in consumer demand. Also the effects on intermediate demand are quite similar to those of the Mac Sharry scenario. Compared to the Mac Sharry reform the intermediate demand of cereals increases slightly in absolute levels (3 million tonnes in 2002), but decreases in relative terms (from 77 to 75% of production). Utilization of green fodder falls because of a decreased supply of 1,5 million ha of grass and other roughage land.

Table 20

Feed utilization in the EUR 9

	Reference run	Mac Sharry	Decoupled Mac Sharry
Growth rates 1992-2002 (% per year)			
Wheat	2,74	4,54	4,68
Coarse grains	1,10	1,60	1,85
Protein feeds	– 1,32	– 2,51	– 2,48
Carbohydrates	– 0,53	– 1,77	– 1,69
Green fodder	0,35	0,09	– 1,19
Total feed	0,50	0,51	– 0,06
Levels in 2002 (giga-megajoules)			
Compound feed	1 672	1 730	1 759
Cereals	1 045	1 175	1 201
Cereals substitutes	566	494	497
Green fodder	1 950	1 897	646
Total feed	3 622	3 627	3405

Source: ECAM.

Table 21

Net imports (+) and exports (–) in external trade of EUR 9 in 1992, 1996 and 2002

(million tonnes)

Product	Reference			Mac Sharry		Decoupled	
	1992	1996	2002	1996	2002	1996	2002
Wheat	– 16,6	– 22,0	– 21,2	– 1,4	0,0	– 5,3	– 9,3
Coarse grains	– 9,2	– 7,5	– 3,6	2,2	2,7	3,2	5,9
Sugar	– 3,7	– 3,2	– 2,2	– 3,2	– 2,2	– 3,2	– 2,3
Fats and oils	3,5	4,1	5,1	4,5	5,6	3,4	4,9
Protein feed	11,8	10,7	9,1	8,4	7,8	8,2	7,6
Carbohydrates	23,1	22,7	22,5	17,7	18,8	19,3	19,4
Butter	– 0,1	– 0,1	– 0,2	0,1	0,0	0,1	– 0,0
Other dairy	– 3,1	– 1,2	– 1,2	– 0,3	– 1,3	– 0,1	– 0,5
Bovine meat	– 0.1	– 0.3	– 0.9	0.2	– 1.0	0.0	– 1.1

Source: ECAM.

Production of cereals is lower and intermediate demand in the decoupled run is higher than in the reference run, leading to a reduced export position on the world market. The reduction of the cereals surpluses is smaller than under the Mac Sharry scenario, since, net of set-aside, more land for agricultural cultivation is available and no basic area restriction is imposed. Still, the decoupled scenario does contribute significantly to the solution of the trade dispute with the US concerning cereals, in part because yields are lower due to extensification. Livestock exports are quite close to those under Mac Sharry, since the production patterns of the policy scenarios are also quite similar. Dairy exports turn out to decrease somewhat, which depends on the fact of how milk quotas expand when the EC reaches self-sufficiency.

Table 22

Ratio of internal border prices and world market prices in 1992, 1996 and 2002

Product	Reference			Mac Sharry		Decoupled	
	1992	1996	2002	1996	2002	1996	2002
Wheat	2,33	2,17	1,97	1,49	1,38	1,58	1,47
Coarse grains	1,88	1,70	1,47	1,07	1,00	1,10	1,00
Sugar	1,87	1,83	1,78	1,83	1,78	1,83	1,78
Butter	1,83	1,78	1,71	1,61	1,54	1,62	1,56
Other dairy	1,33	1,34	1,35	1,29	1,30	1,31	1,33
Bovine meat	1,35	1,18	1,00	1,00	1,00	1,00	1,00

Source: ECAM.

6.5. Decoupled run: prices and EC budget

Prices

The Mac Sharry run and its decoupled counterpart share the same intervention price assumptions, but the world market prices differ for some products. So, protection rates may differ. Note that the EC towards the end of the period can claim that beef exports are not subsidized.

EAGGF outlays

As specified in the scenario description, the producer and consumer subsidies are abolished, as well as the input subsidies of the 'Mac Sharry' commodities. The subsidies are replaced by direct transfers to Member States which are part of the item 'other EAGGF-Guarantee' in Table 23. The compensatory payments amount to ECU 16,5 billion in 1996 and decrease to ECU 15 billion in 2002 (Table 24), since it is assumed that income support to farmers decreases at the death rate of old farmers (see Section 6.3). This assumption ensures that the EAGGF-Guarantee obeys the spending guideline comfortably.

Table 23

EAGGF-Guarantee outlays EUR 12; levels in 2002 and average growth rates in % per year over the period 1992-2002

Outlays	Outlays in million ECU in 2002			Growth rate		
	Reference	Mac Sharry	Decoupled	Reference	Mac Sharry	Decoupled
Export refunds	5 300	2 655	3 234	– 1,9	– 8,5	– 6,7
Producer subsidies	6 500	14 438	– 15	– 1,4	6,8	—
Consumer subsidies	1 591	1 593	—	– 0,1	– 0,1	—
Input subsidies	2 831	2 787	1 579	– 0,3	– 0,5	– 6,0
Interest and storage cost	4 467	3 987	4 602	3,3	2,1	3,5
Other EAGGF-Guarantee	11 846	13 102	26 178	2,0	3,0	9,6
Total EAGGF-Guarantee	32 535	38 627	35 578	0,3	2,0	1,2

Source: ECAM.

Table 24

Direct payments to farmers

(million ECU)

Decoupled Mac Sharry scenario	1983	1996	1999	2002
Belgium, Luxembourg	210	282	271	258
Denmark	666	881	835	785
France	3 828	5 119	4 878	4 612
Germany	1 913	2 577	2 477	2 368
Ireland	369	497	478	456
Italy	3 077	4 109	3 921	3 722
The Netherlands	390	531	515	499
United Kingdom	1 900	2 540	2 430	2 314
EUR 9	12 354	16 538	15 804	15 017

Source: ECAM.

6.6. Decoupled run: value-added and employment

Table 25 shows the development of real value-added and employment in agriculture. In decoupled scenarios value-added includes the direct payments. As under Mac Sharry the farmers are better-off than in the reference scenario. The gains in the decoupled scenario are higher, since the (endogenous) prices of poultry and pigs of the decoupled run are only slightly lower that in the Mac Sharry reform, and the direct payments are more than sufficient to compensate for that. Differences between countries occur because of the nature of the transfer-allocation rule (see Footnote 14). Differences among crops and livestock sectors occur also. The consequences for the major agricultural activities under the present policy scenarios are summarized in Annex C.

Table 25

Average growth of real value-added and employment in agriculture over the period 1992-2002 in the Member States of EUR 9

(% per year)

	Agricultural value-added			Agricultural population		
	Reference	Mac Sharry	Decoupled	Reference	Mac Sharry	Decoupled
Belgium, Luxembourg	– 1,0	– 0,2	0,1	– 2,2	– 2,2	– 2,3
Denmark	– 0,2	– 0,1	1,0	– 3,4	– 3,4	– 3,7
France	– 1,8	– 1,1	– 0,7	– 4.0	– 4.0	– 4,7
Germany	– 1,7	– 1,1	– 0,1	– 1,6	– 1,6	– 1,7
Ireland	– 0,6	0,7	1,2	– 3,7	– 3,5	– 3,9
Italy	– 0,1	0,1	0,5	– 2,8	– 2,8	– 3,0
The Netherlands	0,6	0,8	0,8	– 0,9	– 0,9	– 0,9
United Kingdom	– 1,9	– 1,3	– 0,7	– 1,9	– 2,0	– 2,3
EUR 9	– 0,9	– 0,5	0,1	– 2,6	– 2,6	– 2,9

Source: ECAM.

Employment falls more in the decoupled run than in the Mac Sharry run: the direct payments are not added to agricultural income when the farmers' decisions to migrate are computed. Notice that value-added is a poor indicator for income. A limitation is that the costs of restructuring the agricultural sector under labour migration are not explicitly considered in the model.

6.7. Decoupled run: consequences for economic welfare

Table 26 shows the difference in economic welfare between the three runs. The net welfare gains was ECU 5,7 billion under Mac Sharry (Section 5.5), and this amount increases

to ECU 6,8 billion in the decoupled run. Still, this is not spectacular as it amounts to ECU 25 per EC consumer, but it confirms the theoretical result that lump-sum income support is superior to price support.

Table 26

Equivalent consumer expenditure in 2002 at 1991 prices in the Member States of EUR 9

(billion ECU)

Member State	Reference	Mac Sharry	Decoupled	Reference Mac Sharry	Reference Decoupled
Belgium, Luxembourg	91,9	92,2	92,3	0,3	0,4
Denmark	49,7	49,9	50,2	0,2	**0,5**
France	582,8	584,9	585,7	2,1	**3,9**
Germany	660,0	661,6	663,2	1,6	**3,2**
Ireland	17,9	18,2	18,3	0,3	**0,4**
Italy	340,1	341,2	341,9	1,1	**1,8**
The Netherlands	129,3	129,8	129,8	0,5	**0,5**
United Kingdom	553,4	555,0	555,6	1,6	**2,2**
EUR 9	2 424,9	2 432,8	2 437,1	7,9	**12,2**
Surplus EC trade balance	**28,2**	26,0	22,8	− 2,2	− 5,4
of which: agriculture	− 30,5	− 31,5	− 31,1	− 1,0	− 0,6
non-agriculture	58,7	57,5	53,9	− 1,2	− 4,8

Source: ECAM.

6.8. EC agriculture and the decoupled Mac Sharry scenario

The main conclusion of the comparison between the policy reforms is that the decoupled scenario is superior to the actual Mac Sharry reform. Even the export position of the EC with respect to wheat is no reason for concern. It is substantially reduced and has the tendency to decrease further. There are other gains as well. The EC saves almost ECU 3 billion. There is no need to check and monitor whether farmers stick to their fallow obligations and report the correct stockage and headage rates. The agricultural sector faces more competitive prices and seems better able to cope with the restructuring process. Per capita value-added increases when compensation is decoupled, while even the consumers obtain a marginal gain.

The decoupled reform will affect the price of land. Because the price of land depends on the discounted expected net revenues to be obtained from it, and since the transfers are linked to the farmer and not to his land, a substantial decline in the price of land might be expected. This implies a decline in the value of the farmer's assets and hence his collateral. It is not clear whether the proposed level of income support is high enough to prevent a debt crisis. The effects are likely to be mixed over countries, since the indebtedness of the agricultural sector varies largely between Member States (see Folmer, 1989). Finally, we note that the implementation of a decoupled reform depends on whether direct payments to farmers are a feasible policy instrument. Since there are over 5 million farms in the EUR 9 alone, this is a major task.

7. Conclusions

The scenarios do not lead to straight rejection or approval of the reforms. We summarize the major consequences for the relevant actors:

(i) farmers;

(ii) consumers;

(iii) third countries;

(iv) the Commission;

(v) the Member States.

(i) Farmers

Under the Mac Sharry reform real value-added in agriculture is higher than under the reference run, even if the compensations are nominally fixed and farmers are at best partially

indexed for inflation. The higher value-added can be contributed wholly to the livestock sector, whereas the crop sector will lose. Since a significant portion of farm income will consist of explicit transfers, eventual government budget cuts might severely affect farmers.

The decoupled scenario shows that direct income support permits maintaining farmers' incomes at higher levels than the Mac Sharry reform. Of course, this depends on the level of transfers, but in the present set-up the price package of the Mac Sharry reform can be introduced with less EAGGF expenditures.

Under the Mac Sharry reform, farmers will face more constraints, both in agriculture (like quotas, set-aside) and in bureaucracy, relating to conditions which must be satisfied to remain eligible for support. The distortionary character of these agricultural constraints has been emphasized and will hamper the allocation of factors, the reconstruction of the sector and investments. Moreover, the implementation of this policy is a heavy task and very demanding for the administrative system, apart from its vulnerability to fraud. These objections hold less for the decoupled scenario, but there remains the need to identify the farmers eligible for income support and the administrative procedures to transfer the support. This can be decentralized via regional funds.

(ii) Consumers

Consumers profit from lower prices. In both reform scenarios they will consume more food for less money. This is definitely an advantage, especially for the low-income groups, but a qualification is in order. Higher food intake does not always lead to a healthier diet, since the consumption of fat appears to increase. Under the Mac Sharry reform especially taxpayers will have to pay for a considerable increase of the EC budget through higher VAT transfers. On balance, consumers' welfare increases somewhat. The increases are approximately ECU 20 and 25 per capita per year in the standard and decoupled Mac Sharry scenarios, respectively.

(iii) Third countries

Third countries have different characteristics. Therefore the effects will differ greatly among individual countries. At present, the most important trade issue is the EC export position on the world market relative to that of the USA. The Mac Sharry reform will lead to a vanishing of cereal exports by the EC. The introduction of a base-year reference acreage for cereals will prevent sustained surpluses after the reform. Yield increases are likely to continue, and so an upward pressure on production remains, but in the medium term this is just about offset by the larger intermediate use as feed. ECAM provides further evidence that only combined and continued measures of promoting set-asides, reducing intervention prices to world market levels and slowing down productivity are sufficient to constrain the growth of cereals production. The effects on the other competitors are relatively minor. The rebalancing effect of the Mac Sharry reform will hurt exporters of cereals substitutes (notably in Thailand, Brazil and the USA). The rebalancing effect is already present in the reference scenario.

The decoupled scenario does not allow for any mandatory set-aside scheme, nor does it introduce a base-year reference acreage or stocks. It does assume additional land outflow and a larger extensification effect than in the Mac Sharry reform. Together with the decline of cereals prices, ECAM generates a lower cereals production level than in the reference run, whereas the EC remains a small exporter.

It must be emphasized that the nature of protection of the EC market does not change under the proposed reforms: the system of variable levies and export refunds remains in place. To most third countries, lack of access to the EC market remains as before. When we adopt a broader view and see the EC as a trading bloc in the international economy, then the reform scenarios appear rather inward-looking. Although the paper has no remit to deal with global economic problems, we wish to point out larger problems than the agricultural budgetary problem of the EC and its trade conflict over wheat with the USA. The present reform scenarios do not contribute to an opening of the EC for third countries, until the EC internal prices reach the world market prices and stay at that level. Also it is evident that the present system of compensations cannot be sustained when new entrants, say from the former Eastern Bloc, join the EC. This calls for a fundamental discussion on access of third countries to the EC market which then may deal simultaneously with the access of processed agricultural products. Access of these products is even more restricted than for agricultural products, much to the detriment of developing countries.

(iv) The Commission

ECAM does not assess the implementation problems of the reform. It can be argued, however, that the complexity of the mapping of the reform into model terms already reflects

the complexity of implementation. Budgetary outlays develop unfavourably under the reforms and especially under the Mac Sharry reform. The system of production-tied compensations turns out to shift the EAGGF-Guarantee to a higher level, close to the spending guideline. After full introduction of the reform, in 1996, the producer subsidies cannot grow. In that respect the system of base-year reference acreages and reference premiums amounts appears to work well.

The decoupled compensation scheme turns out to be less costly, but it must be noted that the transfers are assumed to decrease at the rate of death of the agricultural labour force.

(v) Member States

Comparing the reference scenario with the Mac Sharry reform, we see that agricultural real value-added develops favourably at EUR 9 level. Developments in the crop sector are negative. The present compensation scheme does not prevent net revenues for cereals and oilseeds to fall. In the livestock sector effects are more positive. Cattle premiums in France, Ireland and the UK are well above EC average, net revenues increase and output is boosted. Another reason is the development of the pig and poultry sector. Here production follows EC demand and is to be divided among the Member States. The developments in profitability in these sectors determine which Member States are able to enlarge their share. This process turns out to be rather sensitive and delivers different results under slightly different assumptions. Which countries gain and which lose is not clear beforehand and all one can do is to assess the outcomes. We observe that pig and poultry farmers in France lose under the Mac Sharry reform, whereas in the other countries they gain.

When we look at equivalent compensated income, we see that the consumers gain through the substitution process by which they can purchase goods at less-distorted prices. Differences arise due to different food consumption expenditures as part of total consumption. In Denmark, France, Italy and especially Ireland the consumer welfare gain in the decoupled scenario is above the EC average.

The cartel as an alternative

It may be difficult to maintain the support payments over a sustained period. If indeed the budgetary cost and the discontent of competing exporters are the main pressures for change, the EC may eventually opt for a policy that is diametrically opposed to liberalization: it may enter cartel agreements. Internally, this can be implemented by shifting control and budgetary costs of the CAP to farmers' organizations. These would assume the payment of the export subsidies, the producer subsidies, the storage costs and all other subsidies on agriculture. They are able to do so, provided the consumer is willing to pay a sufficiently high price. In an earlier paper (see Folmer and Keyzer, 1989) we have used the ECAM model to show that this would allow the farmers to maintain their income at current levels without imposing excessive additional burdens on the consumer. The only role the EC would have to perform in this producer-cartel would be to maintain import barriers and to permit the levy of an excise tax on agricultural production needed to finance the scheme. In a sense, this would amount to a generalized application of the regime that currently prevails for sugar.

Once such a CAP-cartel were established, it could reach agreement with competing exporters, including the USA, to maintain each exporter's market share within acceptable boundaries. This would lead to higher world prices and thus to willingness on the part of EC producers to reduce their output via set-asides for cereals and oilseeds and producer quotas for other crops. One would arrive at an OPEC-like exporter-cartel (but considerably smaller). As usual, such a cartel is likely to fall apart quite soon, because at higher world prices some exporters may find it profitable to leave the cartel or to export beyond their quota. Still, the CAP-cartel could survive longer, especially with an expanded EC, since it could always use the international market as a dumping ground for excess production.

Although such cartel agreements may even be promoted by the GATT parties to reach peace on the agricultural front, they remain prime examples of imperfect competition. In Section 2 the welfare arguments against such arrangements were discussed extensively and we shall not repeat those here.

Concluding remarks

We have seen that theoretically a decoupling scheme is superior to a cartel arrangement that has to introduce excise taxes and higher import levies. We have also seen that it is superior to the Mac Sharry reform, both welfare-theoretically and in a simulation model like ECAM. Is this then, within the scope of the paper, the best way to go? It would be premature to claim this. Apart from the fact that the ECAM simulations have their limitations and can only provide some

indication of the relative merits of the various plans, there remains the point that it is uncertain by how much, the price of land will fall in a decoupled scenario, or whether there will be additional land outflows (as argued by De Veer, 1992), and how the cost of restructuring the agricultural sector affects the assets of farmers.

However, as explained earlier, the possible imperfections on the markets for credit to agriculture can hardly justify a support to agriculture that does not only subsidize income but also farmers' wealth. Imperfections on the capital markets and adjustment costs of reform have to be dealt with for what they are. Adjustment costs may call for debt relief and the problems on the capital market may suggest that targeted credit facilities be developed. Moreover, the main arguments for maintaining direct income support given in Section 2.2 still stand: there may be indivisibilities, set-up costs, and the argument that efficiency requires farm incomes to remain above critical levels. Thus, welfare theory may give farmers some consolation after all.

Annex A

An outline of ECAM

ECAM is a recursively dynamic, applied general equilibrium (AGE) model. It follows the approach to AGE-modelling with inequality constraints and price rigidities described in Fischer et al. (see Section 2). Further details on ECAM are given in Folmer et al. (1989). Here we only list characteristic features of this model.

ECAM describes the intra-EC market clearing at given international prices and policy interventions. It covers the EC, excluding Greece, Portugal and Spain, and distinguishes 19 agricultural commodities, one nontradable, national, non-agricultural and one tradable, non-agricultural commodity. It operates at national level with a consumer demand and an agricultural supply module as basic elements, the parameters of which have been obtained via time series estimation.

(a) Consumer demand follows expenditure minimization according to a two-level demand system: at the lower level a linear expenditure system (LES) with trends on commitments for food demand, at the upper level an aid system for food, beverages and tobacco and non-food.

(b) Agricultural supply is modelled via a one-period, revenue maximizing non-linear programme with a land constraint, a livestock-feed energy constraint and a livestock operating-capacity constraint. Milk quotas are imposed as the upper bound on milk supplies. The constraint set is completed with commodity balances including a green fodder balance. Yields of crops and animals follow exogenously specified trends which reflect technical progress. Non-linearity enters via production and transformation functions, which because of the decomposable structure of the programme, can be dealt with via separate cost and revenue functions. Details can be found in Keyzer (1989 a, b).

For livestock ECAM distinguishes the following elements:

(i) energy requirements per animal are extrapolated according to observed trends which imply a falling requirement per unit of output and, for milk stock a rising requirement per animal;

(ii) a cost function for feed concentrates is specified per energy unit, by livestock type. This function is separable into committed (Leontief) costs and variable (Cobb-Douglas) costs. The coefficients of the committed part are subject to a time trend which reflects the introduction of carbohydrates and protein feed compounds as substitute for feedgrains. These compounds are treated as a separate feed category. By taking derivatives of this cost function with respect to prices of the concentrates the input demand per energy unit is obtained;

(iii) a system of green fodder allocation functions over animals is estimated which reflect limited substitutability of green fodder across animals and between green fodder and concentrates;

(iv) a given operating capacity in livestock production is allocated to livestock types according to a transformation function. This is implemented dually, via a net revenue function in which the net revenues are calculated by valuation of input and outputs at shadow prices. Thus, the milk quotas reduce net revenue of dairy cattle and induce on-farm use of milk as feedstuff which substitutes for concentrates.

For crops a transformation function is used to allocate land. This is again implemented via a revenue function with econometrically estimated parameters for all crops except pastures, fodder maize and other roughage. There, due to lack of data, substitution parameters had to be obtained via calibration.

(c) Resources. The resource availabilities of labour, land and operating capacity are adjusted prior to (i.e. recursively on) the non-linear programme.

Labour is adjusted as follows:

(i) Population is split into:

young agriculture (0-55);

old agriculture (55 +);

non-agriculture;

each with its own labour participation rate.

(ii) Based on national, aggregate demographic projections a natural growth rate is imposed on each of these categories and using the own participation rate for each of them, a potential labour supply is calculated.

(iii) For old agriculture this is already assumed to be the actual labour supply but for young agriculture there is a migration possibility to non-agriculture, depending on the disparity in income per worker prevailing between the two sectors. The migration functions were obtained by pooled time series cross section estimation.

Land is put on a trend, to reflect urbanization and abandonment of land.

Operating capacity follows from an econometrically estimated investment module. This module maximizes operating surplus, defined as net revenue minus capital costs, subject to an aggregate transformation function with land, labour and capital stock as inputs and aggregate crop and livestock production as joint outputs, where the aggregation weights are obtained from the non-linear programme of agricultural supply. The functional form is decreasing returns CES for capital and labour per hectare and constant returns CES for outputs per hectare. Through the assumption that crop output (excluding green fodder) is obtaining its operating capacity on a priority basis, marginal adjustment of operating capacity works via livestock. However, if crops become less profitable than livestock, the non-linear programme will allocate more land to green fodder at the same time freeing operating capacity for livestock and affecting net revenues, so that this priority is not absolute. Apart from flexibility constraints which are imposed to limit adjustments from one year to the next, one could characterize this specification as neoclassical. The necessity of settling for a somewhat *ad hoc* nature of the resource adjustments components in this class of empirically based model can basically be found in the treatment of time. The process of savings and investments is not modelled in a way which ensures intertemporal efficiency. Moreover, time series are relatively short, so econometric estimation may not be capable of producing a long-run production frontier.

(d) Non-agricultural supply. Tradable non-agricultural production is treated as an exogenous variable. Nontradable non-agricultural production (mainly construction and services) is endogenously produced under constant returns to scale with fixed mark-up rate over variable costs.

Agricultural production appears on the market with a time lag of one year and tradable non-agricultural production is kept exogenous so that only non-tradable production adjusts when an equilibrium solution to the model is being computed.

(e) Exchange component. We now turn to the problem of obtaining an equilibrium solution for the EC economy in a given year. This problem is solved in the model's exchange component.

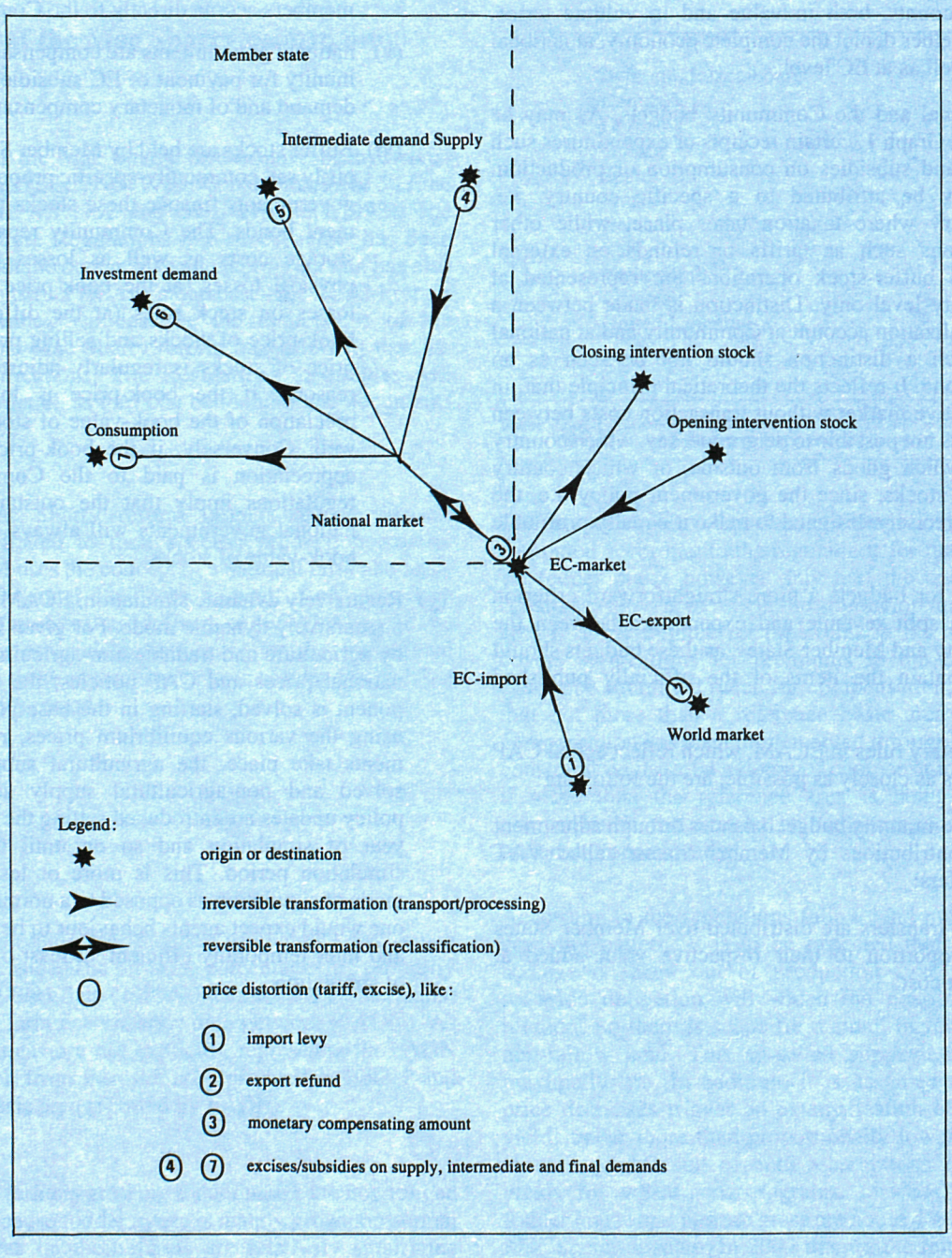
In Graph 1 the physical flows for a commodity are shown with the price distortions which may possibly occur along each of them. The nodes in the flow diagram represent sources and destinations of flows and the arrows indicate the direction of the flows. For each flow some transportation and processing services are required. For flows occurring within Member States these services are supposed to be provided by the non-tradables. The tradable non-agricultural commodity covers processing and transportation requirements needed to bring commodities to and from EC market level. With one exception these processes are irreversible in the sense that they always require some input whatever the direction of the flow. The exception is the composition mapping which was introduced to account for differences between Member States in the relative level of commodity processing: if a commodity is less-processed at national level than at EC level, some input of the tradable non-agricultural good is added in bringing this commodity to EC level; conversely, if the commodity is reclassified back to the national level, this input is produced.

Equilibrium is established through an iterative process at EC market level. On the EC market the sellers of production compete with traders with the outside world and possibly the public stock authorities to satisfy total EC demand. EC clearing prices adjust until EC commodity balances are cleared and national consumers are at maximum utility. During the adjustment process the feed demand structure adjusts to achieve cost minimization but the livestock numbers are kept fixed.

Once equilibrium is established at EC market level the following price relations must hold. For exported commodities the clearing price must be equal to the border price for exports minus the value of processing demand for exports, where the border price for exports is defined as the trade-price for exports plus subsidies or refunds. Similarly, if a commodity is imported the clearing price must equal the border price for imports (see the trade price for imports plus tariffs or levies) plus the value of the processing requirement for imports. When there are obligatory or committed imports and/or exports, both price relations must hold. Committed imports and exports have been introduced into the base-run for some commodities, for example, butter, as a reflection of the fact that trade in these commodities is largely an (exogenous) government affair. For these commodities price is adjusted until EC demand equals (fixed) domestic availability. Finally, in circumstances of autarky the clearing price is either determined by the intervention price (or the price at which public stock authorities are willing to sell) or through price adjustment until total EC demand equals (fixed) supply.

Once EC clearing prices for tradables are known, they can be converted to national clearing prices by adding national tariffs (MCAs) and subtracting the value of possible composition differences. Then national clearing prices for non-tradables can be determined as mark-up over variable production costs. From national clearing

GRAPH 1: **Physical flow of a marketable commodity in ECAM**



prices we may arrive at national producer, intermediate input and final demand prices.

When an equilibrium solution for the model is obtained, all information is available to print detailed and integrated accounts, both in value and in volume terms, which together depict the complete economy, at national level as well as at EC level.

(f) The national and the Community budgets. As may be seen from Graph 1, certain receipts or expenditures such as taxes and subsidies on consumption or production, can easily be attributed to a specific country, i.e. the country where taxation takes place, while other interventions such as tariffs or refunds on external trade and buffer-stock operations are represented at Community level only. Distinction is made between a supply-utilization account at Community and at national level. Such a distinction should not be seen as an arbitrary one. It reflects the theoretical principle that, in a competitive market without transaction costs between agents, it is not possible to determine, say, which country imports which goods from outside, or which country builds up stocks, since the government policy, i.e. the CAP, is precisely designed to make it equally profitable for all.

However, for budgets a more straightforward criterion applies to split revenue and expenditure between the Community and Member States, as these budgets should simply contain the items of the officially published budgets.

The budgetary rules in ECAM, which reflect actual CAP regulations as closely as possible, are the following:

(i) the Community budget balances through adjustment of contributions by Member States, called VAT transfers;

(ii) these transfers are distributed over Member States in proportion to their respective value-added at factor cost;

(iii) the national governments may incur a budget-deficit which is financed through private and/or foreign savings;

(iv) levies, tariffs and refunds on trade with non-members accrue directly to the Community;

(v) national governments are compensated by the Community for payment of EC subsidies on supply and demand and of monetary compensatory amounts;

(vi) Buffer stocks are held by Member States in exogenously set, commodity-specific proportions. National governments finance these stocks through government bonds. The Community repays interest and storage costs as well as losses on stock, both physical losses (at the book-price of stocks) and losses on stock sales (at the difference between book-price of stocks and selling price). The book-price of stocks is regularly adjusted for political reasons; if the book-price is lowered the depreciation of the book-value of stocks is repaid as well. Conversely, if the book-price is raised the appreciation is paid to the Community. These regulations imply that the outstanding loans by national governments will always be equal to the book-value of stocks.

(g) Recursively dynamic simulation. ECAM is solved under a recursively dynamic mode. For given levels of supply by agriculture and tradable non-agriculture, given international prices and CAP policies, the exchange component is solved, starting in the base-year 1982. Then, using the various equilibrium prices, resource adjustments take place, the agricultural supply decision is solved and non-agricultural supply adjusts. Finally, policy updates are introduced setting the stage for a next year of simulation and so on until the end of the simulation period. This is more or less a descriptive mode of simulation as opposed to a normative one where one would expect agents behaviour to be time consistent and inter temporally efficient, at least over the horizon of simulation.

Annex B

Translation of the Mac Sharry reform into model terms

The contents of the Mac Sharry reform have been derived from Regulations (EEC) Nos 1765/92 and 2066/92 of 30 June 1992 (OJ L 181, 1.7.1992 and OJ L 215, 30.7.1992). The translation of these Regulations into model terms has been documented with the data management program that has also been used to construct ECAM's database (see ECAM report 21). In this Annex we describe the main steps of the translation of the Mac Sharry reform into a format that fits ECAM's classifications. The Regulations themselves will not be given in detail, as they can be found in the documents referred to above.

Under the Mac Sharry reform farmers receive income compensation linked to their specific production pattern. Because ECAM uses the concept of a national farm and lacks structural and regional detail, the amount of compensation given for commodities as defined in ECAM had to be computed from other data sources. After the transitional period 1993-95 these amounts have been assumed to be fixed for the remaining period.

Crops

Data on farm structure are required to compute how much land will be set aside. The set-aside percentages are primarily based upon 1990/91 data (1989/90 data for the Netherlands) from the EC's farm accountancy data network (FADN). As fodder maize areas are not explicitly represented in FADN they were taken from Eurostat crop production 1992-1 and added to the basic area reported by FADN.

Assuming that farmers growing fodder maize are not obliged to set aside (because fodder maize is mainly grown on animal farms and areas on these farms are relatively small) the set-aside regulations for cereals, fodder maize, oilseeds and protein crops amount to the percentages to be set aside as shown in Table B1.

Table B1

Set-aside area as a percentage of basic area in the Member States of EUR 12

Belgium, Luxembourg	5,6
Denmark	11,4
Germany	7,0
Greece	2,2
Spain	9,4
France	10,4
Ireland	8,6
Italy	4,1
Netherlands	3,7
Portugal	3,8
United Kingdom	14,7
EUR 12	8,9

Source: Own computations based upon data from FADN 1990/91 (1989/90 for the Netherlands) and Eurostat crop production 1992-1.

The compensations that farmers receive per hectare are computed according to the regulations for the crops at hand. To fodder maize however only half the compensation for cereals was given, to reflect the stipulation that fodder maize area is either eligible for premiums in the arable sector or covers applications for premiums in the beef sector but cannot be submitted twice for compensation. The constraint that not more than a reference basic area is eligible for compensation has been implemented through imposition of a constraint on the total amount of compensations payable, i.e. if more than the reference area is being submitted for compensation the amount of compensation per hectare is lowered proportionally.

According to the regulations fallow land must rotate in the cropping pattern. It is to be expected that less-productive acreage is taken out of production first. Moreover, the set-aside obligation will widen the possibilities for crop rotation. So there is scope for a small increase in yields on non-fallow land. This so-called slippage effect is set at maximally 2%. In addition, it is assumed that the drastic price decreases trigger an extensification effect (i.e. lower yields under more than proportionally lower use of current inputs). As a result of both assumptions EUR 9 average yields for wheat, coarse grains, oilseeds, protein crops, fodder maize and pasture grass are about 4% lower under the Mac Sharry scenario in 2002 than in the reference run. The growth rates of the yields are more or less the same in both scenarios though. Treatment of the crop sector is completed by abolishing the coresponsibility levy for cereals and by the

introduction of subsidies for durum wheat, non-consumable potatoes and tobacco in line with the regulations.

Livestock

Under the Mac Sharry reform premiums will be given to suckler cows and male bovines at the ages of 10 and 22 months. The compensations depend on the stocking rate and on headage limits for male animals, which have been obtained from 1990/91 FADN data. Eligible percentages of national herds of suckler cows, male bovines between 1 and 2 years old and male bovines older than 2 years were computed, both for the general premiums and for the additional premiums for extensive animal farms. For the Netherlands these percentages have been calculated from the May census 1990, because Dutch data for 1990/91 were not included in FADN. Table B 2 displays the premiums per head of non-dairy cattle after full implementation of the reform.

Two additional transfers are made to the cattle sector: compensation for the reduction of milk quota of 2% and a destruction premium for calves from dairy herds (by assumption for 500 000 calves). As for crops, it is assumed that introduction of the price reform implies an extensification effect. Yields of non-dairy cattle have been lowered by 2%.

Ewe premiums are linked to the reference flock of 1990. Present ewe premiums have been reduced somewhat because only a maximum number of ewes per farm are eligible for premium.

Finally, it should be noted that in the Mac Sharry scenario too it is assumed that milk and sugar quota will be relaxed if the EC tends to become a net importer of the product at hand.

Table B2

Premiums in green ECU per head of non-dairy cattle in the Member States of EUR 12 after the transitional period

Belgium, Luxembourg	22
Denmark	12
Germany	22
Greece	18
Spain	35
France	43
Ireland	54
Italy	27
Netherlands	3
Portugal	46
United Kingdom	40
EUR 12	33

Source: Own computations based upon data from FADN 1990/91 and Dutch May census 1990.

Annex C

Table C1

Net revenues of major crops and livestock sectors in 2002 of the Member States of EUR 9

(million ECU)

Member State	Reference	Mac Sharry	Decoupled	Reference	Mac Sharry	Decoupled
	Wheat			Coarse grains		
Belgium, Luxembourg	262	228	191	65	75	19
Denmark	505	412	328	722	691	579
Germany	1 931	1 659	1 221	1 681	1 768	1 125
France	3 692	3 393	2 126	1 772	2 029	913
Ireland	85	31	41	74	90	15
Italy	2 223	2 253	1 340	1 600	1 794	1 270
The Netherlands	102	89	54	50	53	26
United Kingdom	2 377	1 995	1 419	916	989	477
EUR 9	11 176	10 059	6 719	6 879	7 489	4 423
	Oilseeds			Consumable potatoes		
Belgium, Luxembourg	13	9	4	167	172	172
Denmark	579	551	359	42	43	45
Germany	451	444	207	366	390	373
France	2 157	1 768	1 228	498	544	645
Ireland	1	0	0	94	96	123
Italy	1 245	1 088	851	611	704	638
The Netherlands	24	22	20	531	521	510
United Kingdom	721	690	521	1 210	1 305	1 178
EUR 9	5 190	4 571	3 188	3 520	3 775	3 684
	Dairy cows			Other cattle		
Belgium, Luxembourg	464	489	495	1 734	1 859	1 932
Denmark	928	950	990	809	819	850
Germany	4 441	4 420	4 651	4 940	5 662	5 799
France	5 753	5 844	5 827	4 862	6 353	5 526
Ireland	1 145	1 143	1 143	1 182	1 514	1 318
Italy	3 121	3 231	3 256	4 924	5 200	5 184
The Netherlands	1 867	1 965	1 990	2 299	2 485	2 632
United Kingdom	2 860	3 187	3 206	1 922	2 592	2 294
EUR 9	20 579	21 228	21 558	22 673	26 485	25 537
	Sheep and goats			Pigs, poultry and eggs		
Belgium, Luxembourg	60	55	49	378	467	375
Denmark	5	5	4	1 847	1 941	1 855
Germany	241	165	146	3 421	3 696	3 564
France	843	768	567	5 373	4 553	5 257
Ireland	316	267	134	286	317	304
Italy	1 079	841	706	3 396	3 863	3 574
The Netherlands	512	390	373	1 255	1 414	1 105
United Kingdom	1 510	1 202	724	1 984	2 178	1 946
EUR 9	4 566	3 693	2 701	17 939	19 312	17 979

References

Dasgupta, P. and Ray, D. (1986), 'Inequality as determinant of malnutrition and unemployment: theory', in *The Economic Journal,* Volume 96, pp. 1011-34.

De Veer, J. (1992), 'Prices, income, sustainability and land use' paper presented at the Conference 'Towards sustainable and competitive agriculture in Europe', Rotterdam, 22-24 June 1992.

European Commission (1991), 'The development and future of the common agricultural policy', COM(91) 258 final, Brussels.

Eurostat (1992), *Rapid reports.*

Fischer, G., Frohberg, K., Keyzer, M. A. and Parikh K. S. (1988), *Linked national models. A tool for international policy analysis,* Kluwer Pub. Dordrecht.

Folmer, C. and Keyzer, M. A. (1988), 'Recoupling and decoupling agricultural policies in the EC', SOW-VU research Report 88-03.

Folmer, C. et al. (1989), 'Modelling alternative common agricultural policies' in *Agricultural sectoral modelling,* Bauer, S. and Henrichsmeyer, W. (eds), VAUK Kiel KG.

Folmer, C. (1989), 'Capital and investment in EC agriculture: part 1: the data' Central Planning Bureau, The Hague, report IV/89/18.

Grilli, E. R. and Yang, M. C. (1988), 'Primary commodities, manufactured goods prices, and the terms of trade of developing countries: what the long run shows', *World Bank Economic Review* 2, pp. 1-47.

Guyomard, H. and Mahé, L. P. (1992), 'CAP reform and EC-US agricultural trade relations', INRA-ENSA, Rennes.

Keyzer, M. A. (1989a), 'On the specification and parameter estimation of a decomposed, mixed primal-dual model of agricultural supply', SOW-VU research memorandum 89-01.

Keyzer, M. A. (1989b), 'Note on the valuation of green fodder in ECAM', SOW-VU working paper 89-05R2.

Keyzer, M. A., Folmer, C., Merbis, M. D., Stolwijk, H. Veenendaal, P. (1990), 'The CAP at crossroads: free trade or producer cartel?' SOW-VU research memorandum 90-05.

Keyzer, M. A. (1991), 'Do non convexities in production justify subsidies?' SOW-VU working paper 91-04.

Koester, U. and von Cramon-Taubadel, S. (1992), 'EC agricultural reform *ad infinitum*', *Intereconomics,* Volume 27, July/August 1992.

Magill, M. J. P. and Shafer, W. J. (1991), 'Incomplete Markets' in *The Handbook of Mathematical Economics,* Volume IV, Hildenbrand, W. and Sonnenschein, H. (eds), Amsterdam.

Stiglitz, J. (1976), 'The efficiency wage hypothesis, surplus labour and the distribution of income in LDCs', *Oxford Economic Papers,* Volume 28, pp. 185-207.

Tyers, R. and Anderson, K. (1986), 'Distortions in world food markets: a quantitative assessment', Background paper for the World Bank's World Development Report 1986, mimeo.

Consequences of the proposed common agricultural policy reform for the southern part of the European Community

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1. Introduction

The European Community's (EC) common agricultural policy (CAP), which has been characterized as the cornerstone of the whole EC, has been a focus of controversy and reform attempts for a long time. Historically, the protective structure of the CAP has roots that date to the agricultural policies of some major EC Member States, such as France and Germany, in the 19th century. Successive enlargement of the EC from its six founding members led to the original protection, accorded mainly to temperate crop and livestock products, being extended to agricultural production areas previously little protected, and to new products coming under the umbrella of the CAP, as producers of these products demanded similar treatment to producers of the early CAP products. The result has been a superstructure of protection, much larger than that afforded in any other economic sector in the EC, that is absorbing about 65% of the total EC budget, and has a host of other undesirable consequences that have been the focus of controversy as well as several studies.

Koester (1991) has provided a useful taxonomy of the impacts of protective agricultural policies, such as the CAP. Direct effects include severe budgets and administrative costs and increased consumer expenditure. Indirect effects include those internal to the agricultural sector, such as intensification of factor use with unwanted environmental effects, maldistribution of income, creation of barriers to entry as farms become more capital-intensive, and addiction of producers to subsidies, and those external to the agricultural sector, such as implicit taxation of the non-agricultural sectors and loss of international competitiveness, increased instability in world agricultural markets, and overall lower world prices with lower incomes for EC trade-partner producers.

The impact in several of these categories is substantial. For instance, it has been shown that every US dollar transferred to EC producers costs about USD 1,9 to EC consumers, which is a highly inefficient way of affecting income transfers (Winters, 1987). The average producer subsidy equivalent (PSE) for the main CAP-supported products, namely the proportional increase in farm incomes from production of the relevant product due to the CAP policies, has been estimated by the OECD for 1986-88 at between 25 and 76%, while the corresponding consumer subsidy equivalents (CSEs) for the same products, range from – 24 to –71% (OECD, 1990). The impact on the non-agricultural sectors of the EC is severe. It has been estimated that since 1973 CAP support has lowered EC manufacturing exports by 4%, increased manufacturing imports by 5%, lowered manufacturing output by 1,5%, and cost the Community around 1 million jobs (Stoeckel, 1985). The world average prices for wheat, coarse grains, dairy products, sugar and ruminant meats are estimated to have been depressed by amounts as high as 32% (see the studies cited in Sarris, 1991), while 33 to 75% of world price instability for several of these products has been attributed to EC policies (Tyers and Anderson, 1986).

The CAP with its espoused objective of aiding small farmers and keeping labour from leaving agriculture has failed on both counts. About 25% of the largest agricultural producers in the Community receive about 70 to 75% of all CAP-induced support, and the high level of support has tended to be capitalized in land values, and has induced capital rather than labour-intensive agricultural production technology.

Given all the above undesirable effects, one would expect significant pressures from within and outside the EC for reforms. In practice, however, the pressures for reform from within the EC over the past 10 years have arisen mostly because of budgetary limits, while the pressures from other affected countries, mainly the USA, Canada, Australia, and other exporters of temperate agricultural products have not resulted in much change. The recent stalemate in the GATT trade talks over agricultural liberalization issues, however, has prompted a renewed attempt at CAP reform, reflected in the recent proposals by Ray Mac Sharry, former EC Commissioner responsible for agriculture (European Commission, 1991).

The purpose of this paper is to reflect upon, and examine in a broad sense, the consequences of this new set of CAP reform proposals for the southern part of the Community. While there is no unique definition of which regions constitute the southern part of the Community, in terms of agricultural structure there are major differences between the southern, mostly Mediterranean part of the Community, and the rest. For instance, farms in Greece, Italy (especially the southern part), Portugal and Spain on average exhibit smaller sizes, lower labour productivity, and higher shares of Mediterranean products compared with farms in the north. Furthermore, agricultural employment constitutes a much larger share of total employment in these countries, compared with those of the north. For the purposes of this paper, and to facilitate the statistical work, the southern regions of the EC will be considered as consisting of those in the four Mediterranean countries mentioned above.

The principal aim of the Mac Sharry proposals seems to be to change the type of CAP support in the cereals, oilseeds and protein crop sectors from one based on subsidies related to the volume of production to one based on direct subsidies to producers. It appears that this is designed to meet the EC trade-partner pressures. On the other hand, the proposals

concerning policy changes in the tobacco, milk, beef, and sheepmeat sectors, while aiming at limiting the overall level of support through tightening production quotas and decreasing some prices, do not propose any drastic changes in the rules governing intervention. The overall envisaged reduction of price support is accompanied by ample compensation to affected farmers.

In the sequel, the aim will be to discuss both agricultural- and non-agricultural-related consequences, mostly from a structural perspective. Given the differences in farm structure between north and south, as well as within each country, this emphasis seems justified. Section 2 presents some general structural information, emphasizing the differences between the northern EC countries and the four southern ones. Section 3 discusses the CAP reform proposals, again emphasizing the differential impacts on the northern and southern EC countries. Section 4 discusses explicit and implicit financial transfers between north and south due to the proposals and makes estimates of the magnitude of net financial gains for each group of countries. It also discusses the net transfer to agricultural producers-cum-consumers using Greece as an example. Section 5 discusses the management aspects of the proposed reforms and, finally, Section 6 summarizes the conclusions.

2. Farm structure and CAP support

The purpose of this section is to discuss structural issues within the agricultural sector of the EC, from a north-south perspective, and to analyse the pattern of CAP support, with a view to exploring whether the reform proposals are bound to have distributional consequences different to those existing already.

The first issue concerns size and technology differences between farms in the north and the south. Table 1 presents some relevant structural statistics for the EUR 12 and north and south aggregates.

In 1987, in the northern countries of the EC there were 2 467 600 farms, while in the countries of the south there were 6 126 100. In terms of average area and standard gross margin (SGM — a measure of gross farm value-added at constant prices), average farms in the north were substantially larger. The average utilized agricultural area (UAA) and SGM per farm in the north in 1987 were about four times those of the average southern farm. However, note that within each size class, the average SGM per farm is no different between the north and south. In fact, in the largest size class, the southern farms appear to be larger than the northern farms. Clearly the difference between the average farm sizes in the north and south of the EC is due to the different distributions of farms among the size classes. For instance, in the north only 35% of the farms have an SGM below 6 ESU (European size units, one of which is equal to ECU 1 100 of SGM at 1982 prices), while in the south 78,2% of all the farms are in that size class.

Notice, however, that in the south a much smaller proportion of the holders' or their families' times (40,7 and 56,4% respectively) is allocated on average to farm work compared with that in the north (70,3 and 79,7% respectively). This is due to the fact that in smaller farms the holder and his family allocate small portions of their time to farming. This holds true in both the south and the north, albeit the shares are usually lower in the south. Since the south has many smaller farms, the result obtains.

Column 6 gives the average annual work units (1 AWU is equivalent to a year's worth of adult work) per farm in the different size classes. What is revealed is first that the south is more labour-intensive in all size classes, albeit when weighted by the number of farms in each size class, the northern farms employ more labour per farm than in the south. The other observation is that larger farms employ more labour in both north and south, but, except for the very largest farms in both regions, the amount of labour employed does not rise very rapidly with farm size. For instance, while the ratio between the average SGM in the 12 to 16 ESU size class and the smallest one is about 15, the ratio between the amounts of labour utilized is about 3.

In column 8 of Table 1, the SGM per annual work unit (AWU — a measure of a full-time employer) utilized on the farm (both family and hired) is shown for the different size classes. The results suggest first that within each size class this measure is slightly larger in the north (between 8 and 25%). Second, it is quite obvious that larger farms in both the north and the south exhibit substantially larger SGM per AWU than smaller ones. This is due to the fact that larger farms are generally much more capital-intensive than smaller ones, irrespective of location (namely north or south).

About 47% of all farms in the south grow cereals, and 19,5% own bovine animals, compared with 58,3 and 59,1%, respectively, in the north. Notice, however, that within each size class the average areas grown to cereals by cereal-growing farms are not much different between north and south, while, in general, the number of bovine animals per bovine-animal-owning farm is larger in the north, except for the largest size class.

Table 1

Structural features of EUR 12 and north-south farms, according to economic size distributions for 1987

Economic size (ESU)	Number of farms	UAA/ farm (ha)	SGM farm (ESU)	Percent of holders' labour utilized	Percent of all family labour utilized	AWU/ farm	UAA/ AWU	SGM/ AWU	Percent of farms with cereals	Average cerael area per cereal-growing farm	Percent of total UAA of class in cereals	Percent of farms with bovine animals	Average number of bovine animals per bovine farm
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
						EUR 12							
0-2	3 415,1	2,28	0,91	25,3	36,2	0,46	4,99	2,00	34,89	1,15	17,61	12,46	3,45
2-4	1 463,6	4,88	2,88	44,1	58,5	0,85	5,76	3,39	51,78	2,38	25,27	29,26	6,95
4-6	780,9	7,70	4,91	54,8	68,6	1,08	7,16	4,57	55,21	3,81	27,32	36,41	10,85
6-8	485,2	10,85	6,94	62,9	75,4	1,24	8,75	5,60	60,43	5,04	28,09	42,23	14,69
8-12	606,8	14,98	9,84	69,5	80,5	1,39	10,81	7,10	63,32	7,04	29,76	46,00	20,32
12-16	369,4	20,36	13,90	77,1	85,8	1,54	13,18	9,00	66,87	9,15	30,06	51,76	28,60
16-40	966,8	32,46	25,44	86,6	92,2	1,85	17,57	13,77	69,85	14,03	30,18	59,34	52,37
40-100	409,8	62,41	59,49	92,1	95,7	2,53	24,69	23,53	67,69	30,90	33,51	55,66	101,78
> 100	96,1	161,30	194,26	85,5	92,4	6,26	25,76	31,03	67,01	95,07	39,50	36,42	224,65
All	8 593,7	13,41	10,85	49,0	63,3	1,06	12,70	10,28	50,29	8,20	30,73	30,84	31,24
						South							
0-2	2 980,3	1,81	0,91	24,7	36,1	0,46	3,93	1,98	36,10	1,15	23,03	9,93	2,28
2-4	1 211,0	4,27	2,86	43,5	58,9	0,87	4,89	3,28	52,72	2,41	29,73	23,95	4,75
4-6	596,5	6,79	4,90	54,2	69,1	1,13	6,03	4,35	55,31	3,92	31,97	28,99	7,79
6-8	340,9	9,78	6,91	62,1	75,8	1,31	7,46	5,27	60,40	5,34	32,99	32,36	10,57
8-12	376,7	13,61	9,77	66,5	79,6	1,46	9,29	6,67	61,56	7,91	35,78	32,47	14,58
12-16	188,6	18,95	13,78	70,6	82,6	1,63	11,63	8,46	65,27	10,98	37,81	33,09	20,12
16-40	317,5	30,52	23,92	73,6	85,4	2,03	15,01	11,77	64,50	17,74	37,49	32,38	35,10
40-100	85,6	69,66	59,19	74,8	87,8	3,21	21,72	18,46	66,12	35,61	33,80	33,18	86,45
> 100	29,0	176,01	203,67	69,5	84,5	7,43	23,67	27,40	61,38	87,69	30,58	27,93	328,75
All	6 126,1	7,74	5,93	40,7	56,4	0,90	8,56	6,55	47,08	5,40	32,84	19,47	13,69
						North							
0-2	434,8	5,50	0,93	29,8	37,0	0,44	12,59	2,14	26,61	1,11	5,39	29,83	6,12
2-4	252,6	7,82	2,94	46,7	56,4	0,73	10,77	4,05	47,27	2,25	13,59	54,75	11,57
4-6	184,4	10,65	4,97	56,8	66,8	0,91	11,65	5,44	54,88	3,44	17,74	60,41	15,59
6-8	144,3	13,37	7,00	64,8	74,2	1,07	12,52	6,56	60,50	4,33	19,61	65,56	19,50
8-12	230,1	17,23	9,94	74,4	82,3	1,26	13,70	7,91	66,19	5,72	21,98	68,14	24,79
12-16	180,8	21,82	14,03	83,8	89,5	1,46	14,99	9,64	68,53	7,34	23,04	71,24	32,71
16-40	649,3	33,41	26,18	93,0	95,8	1,76	19,02	14,90	72,46	12,41	26,92	72,52	56,14
40-100	324,2	60,50	59,56	96,9	98,3	2,35	25,75	25,35	68,11	29,69	33,42	61,60	103,96
> 100	67,1	154,94	190,20	92,9	96,2	5,75	26,93	33,05	69,45	97,88	43,87	40,09	193,31
All	2 467,6	27,51	23,09	70,3	79,7	1,43	19,19	16,11	58,26	13,81	29,26	59,05	45,62

ESU: European size unit; UAA: utilized agricultural area; SGM: standard gross margin; AWU: annual work unit.

Source: Computed from European Commission, Eurostat, *Farm structure, 1987 survey: main results.*

The above results illustrate first that cereal producers constitute a large proportion of the farmers in all the EC countries. Second, the beef and dairy sector is relatively much more important in the north than in the south. Third, although the south of the EC is characterized by many more small producers, they also spend a smaller proportion of their time in farm work, compared with northern farmers. Finally, it is shown that the value-added generated per AWU is not much different within each size class between the north and the south of the EC, although there is wide difference between large and small farms. This difference between large and small farms is compounded by the age structure of farmers. Owners of the smallest farms are on average 7 to 10 years older than owners of the largest farms, with the average age diminishing monotonically from smaller to larger farms.

Despite the large number of cereal producers in the EC, fewer than 10% of all farmers specialize in cereals (defined as having more than 75% of their SGM from cereals). The proportions are 6,3% in the north and 9,2% in the south. Farmers, on the other hand, that specialize in dairying, cattle rearing and fattening, or both, constitute 33% of all northern farmers, but only 5 to 6% of southern farmers.

It is seen above that the large numbers of very small farms in the southern countries of the EC employ very little labour and generate little income. In an annual survey, the European Commission concentrates on the so-called commercial farms, namely those that by some criterion generate significant production. The farm accountancy data network (FADN), which covers about half the EC producers but in terms of volume of production much larger shares of total production of most products (typically 85 to 95%), has generated information which can provide further insights into the structure of the commercial farms in the EC. The boundary lines for classifying a farm as a commercial one differ among Member States, generally being lower for the poorer countries of the south (for Portugal, the boundary is 1 ESU; for Greece, Italy, Spain and Ireland, it is 2 ESU; and for the other EC countries, it ranges from 4 to 16 ESU). Table 2 illustrates some general characteristics of FADN farms for EUR 12, and the northern and the southern parts of the Community. It can be seen that commercial farms in the north are larger, have more area, more livestock and more capital, in general, compared with farms in the south. However, they employ only slightly more labour compared with farms in the south. They are thus more capital-intensive compared with farms in the south, and particularly so in terms of non-land capital per AWU. Farms in the north are also more variable input-intensive (as measured by the ratio of the value of intermediate inputs to total gross value of production). Notice, however, that average family farm income (FFI) per family work unit (FWU) is not that much lower in the south than in the north. Comparing, in fact, the average FFI per FWU to the GNP per capita for the two regions, it can be seen that southern commercial farmers are relatively better off than northern farmers, relative to the average income in the corresponding region.

Table 2

Structural characteristics of commercial farms in EUR 12, and the northern and southern countries of the European Community (1986/87)

	EUR 12	North	South
Number of commercial farms (1 000)	3 984,1	1 500,9	2 843,2
Average size (ESU)	21,5	38,5	11,3
Average UAA (ha)	24,2	39,5	14,9
AWU per farm	1,57	1,67	1,52
Number of livestock units	22,4	47,4	7,3
Input intensity	0,51	0,55	0,42
Ratio of farm family income (FFI) per family work unit (FWU) to GNP/capita	0,57	0,60	0,67
Fixed capital per farm (1 000 ECU)	120,3	190,0	78,1
Land capital per farm (1 000 ECU)	73,3	98,5	58,0
Other fixed capital per farm (1 000 ECU)	47,0	91,5	20,0
Fixed capital per AWU (1 000 ECU/AWU)	76,6	111,7	51,7
Land capital per AWU (1 000 ECU/AWU)	46,7	57,1	38,6
Other fixed capital per AWU (1 000 ECU/AWU)	29,9	54,8	13,1
Net worth per farm (1 000 ECU)	126,8	178,3	95,7
Family farm income (FFI) per family work unit (ECU/FWU)	7 741,0	9 452,0	6 578,0

Source: Computed from European Commission. *Economic results of agricultural holdings*, FADN No 5. 1986/87.

Table 3 contrasts the structural characteristics of northern and southern FADN farms according to size distribution. Albeit on average, farms in the south have fewer resources, such as land and capital, it is interesting to note that within each size class farms in the south seem to have a structure which is not much different to that in the north. For instance, while the amount of labour utilized per farm, both family and total, is higher in the south for every size class, the

difference is not large. For the smaller size classes, the farm net value-added per AWU and fixed capital per AWU are larger in the south than those of the northern farms, while the opposite holds for the larger size classes. The last column of Table 3 gives the input intensities of different farm size classes in the south and in the north. In all farm size classes, the southern farms utilize less intermediate inputs compared with the farms of the north. However, note that while in the south larger farms are more input-intensive than small ones, the opposite holds for the commercial farms of the north. Most interestingly note that within each size class the family farm income per family work unit is higher in the south than in the north. Clearly, then, it appears that the problems of southern EC agriculture are not of inadequate income per farm or inadequate capital per farm, but simply of larger numbers of small farms relative to the north. This, in turn, might be due, on the one hand, to land constraints coupled with the history of land-tenure systems, as well as to the overall lower level of development and hence lower overall level of capital.

Table 3

Structural characteristics of northern and southern commercial farms according to economic size

Economic size (ESU)	Number of farms	Average size (ESU)	AWU/ farm	FWU/ farm	UAA/ farm (ha)	Farm net value-added per AWU (1 000 ECU)	FFI/ FMV (1 000 ECU)	Net worth (1 000 ECU)	Fixed capital/ AWU (1 000 ECU)	Non-land capital per AWU	Intermediate input intensity (percent of final value)
					EUR 12						
All farms	3 984 051	21,6	1,57	1,32	24,18	9,43	7,73	126,8	77,7	50,3	0,52
< 4	943 992	3,2	1,14	1,05	6,70	3,37	3,24	45,0	33,9	16,8	0,39
4-8	817 293	6,4	1,33	1,20	11,20	4,64	4,44	68,2	43,5	23,1	0,41
8-16	817 765	12,6	1,49	1,35	18,90	6,21	5,50	100,2	60,1	37,7	0,49
16-40	935 310	29,1	1,75	1,50	33,50	11,13	9,28	165,3	90,6	65,9	0,53
40-100	399 901	64,9	2,25	1,61	59,70	18,21	15,54	298,2	135,4	97,8	0,55
> 100	69 790	202,5	5,01	1,75	146,00	23,60	31,77	733,4	146,9	86,2	0,52
					South						
All farms	2 483 156	11,25	1,51	1,28	14,91	6,66	6,53	95,7	53,6	29,9	0,42
< 4	906 050	3,16	1,14	1,05	6,23	3,43	3,30	44,3	33,5	16,9	0,38
4-8	741 693	6,34	1,37	1,22	10,01	4,77	4,65	66,4	41,1	22,1	0,39
8-16	483 926	12,26	1,64	1,43	17,21	6,71	6,59	106,9	53,9	31,0	0,41
16-40	265 280	26,41	2,19	1,70	33,59	10,12	10,74	198,1	73,4	43,9	0,43
40-100	70 426	64,47	3,33	2,03	73,77	14,86	18,57	444,3	105,8	66,5	0,47
> 100	15 781	183,83	6,01	2,46	95,97	20,08	35,40	806,3	99,5	71,6	0,49
					North						
All farms	11 500 895	38,59	1,68	1,37	39,52	13,56	9,59	178,3	111,8	80,6	0,56
< 4	37 942	4,19	1,04	0,99	17,89	1,98	1,88	63,2	44,4	14,5	0,64
4-8	75 600	7,03	0,99	1,01	22,91	2,89	1,92	86,5	75,2	37,6	0,66
8-16	333 893	13,09	1,28	1,23	21,35	5,29	3,64	90,4	71,7	50,3	0,60
16-40	670 030	30,16	1,57	1,42	33,46	11,68	8,60	152,3	100,2	78,0	0,57
40-100	329 475	64,99	2,02	1,52	56,69	19,40	14,68	267,0	145,7	108,9	0,57
> 100	54 009	207,96	4,72	1,54	160,62	24,91	30,08	712,1	165,2	91,7	0,53

Source: Computed from European Commission, *Economic results of agricultural holdings*, FADN No 5, 1986/87.

The next issue concerns the distributional pattern of CAP support, namely the degree to which current CAP policies impinge differently on large and small farms, as well as different countries and products. A detailed analysis of this for EUR 10 countries, and using 1984/85 and 1985/86 FADN results, has been done by Brown (1989). Tables 4 and 5 reproduce some of the results from that analysis which are relevant to the discussion here. Table 4 shows that the CAP tends to increase gross farm revenue by 8 to 30%, but in terms of net farm revenue the increase is much larger, up to 91% for dairying, and 77% for cereals. It is interesting to note from the bottom part of the table that although the nominal range of protection (proxied by the CAP gains as a percentage of gross farm value) is the same between northern and southern countries, the effective CAP protection (proxied by the proportion of CAP benefits in net farm value-added) is larger for countries of the north, compared with southern EC countries. This is because, as illustrated in Table 2, the purchased input intensity is much higher in the north compared with the south, and hence a given rate of nominal EC protection results in higher rates of effective protection for northern farmers.

Table 4

Magnitude of average CAP benefits: 1984/85 and 1985/86

	CAP gains as a percent of farm gross value of production	CAP gains as a percent of farm net value added
	Farm type	
Cereals	28	77
General cropping	28	66
Horticultural	15	37
Vineyards	29	54
Fruit/olives	27	44
Dairying	30	91
Drystock	28	74
Pigs/poultry	8	34
Mixed	22	76
	Range of farm benefits over farm types	
Belgium, Luxembourg	13-31	31-75
Denmark	3-23	10-92
France	27-35	54-101
Germany	5-32	25-143
Ireland	34-35	74-107
Netherlands	8-37	21-107
United Kingdom	23-34	78-109
Greece	17-26	33-46
Italy	14-37	34-64
EUR 10	8-30	34-91

Source: Brown (1989, p. 32).

Table 5 illustrates the regressive nature of CAP benefits. Benefits per farm are proportional to the size of farm for all farm types. This, of course, is to be expected, as CAP benefits are proportional to the volume of production. If we take the 1986/87 standard size (in 1982 ecu) as a measure of the average size of the farm, then it appears from the bottom of the table that the nominal rate of CAP protection is somewhat higher for smaller farms. It must be noted that the range of benefits for each farm type and each size class is not much different among the different countries and the north versus the south. However, as was illustrated in Table 3, the input intensity is larger in the northern for every size class. This implies that in every size class the effective protection is larger for farms of the north.

Note, also, that the amount of family labour per farm does not vary much by farm size, and as illustrated in Table 3, the family farm income per family work unit is progressively larger on larger farms. The fact that the CAP confers large absolute benefits on larger farms then implies that richer farmers are benefiting in an absolute sense much more than poorer ones. It can be estimated from Table 5 that 11,2% of commercial farmers, namely those in the top two size classes capture 43,9% of all CAP benefits that accrue to all commercial farmers, while the top three size classes that constitute 35% of commercial farmers capture 78% of the benefits. If we included the smaller farmers in the calculus, the skewness of the benefits would be much more extreme. Clearly this is at odds with social equity.

3. The CAP reform proposals in the context of north, south and farm structure

Given the discussion of farm structure in the previous section, the Mac Sharry proposals can be examined from the viewpoint of their overall and distributional considerations. The major shift in the institutional mechanisms of the proposals lies in the cereals, oilseeds and protein (COP) crops sector. The idea there is to reduce the levels of overall price support to levels close to those of the world market, and to compensate farmers by amounts equal to the price reduction per ton but tied to the area under COP crops according to historical yields. Land set-aside — up to 15% of the area under COP crops — will also be compensated by the same amounts. Clearly, this is intended to reduce intensification of COP production, and hence lower yields and production.

Table 5

Range of average CAP benefits by size classes and farm types for EUR 10 countries for 1984/85 and 1985/86 (ECU/farm)

	Economic size (ESU)								
	2-4	4-6	6-8	8-12	12-16	16-40	40-100	> 100	All
Average size (1986/87) (ECU in 1982 values)	3 520	5 401	7 634	10 824	15 290	27 984	65 439	213 686	23 760
Cereals	1 418	(2 278)[2]	(3 087)	(5 085)	(6 803)	14 454	36 715	76 418	12 455
General cropping	2 011	3 030	3 706	4 873	6 543	13 001	29 907	87 109	9 884
Horticultural	(3 173)	(3 582)	(4 297)	(5 986)	(8 042)	10 809	16 088	32 022	13 402
Vineyards	2 310	(3 285)	(4 542)	(5 670)	(8 215)	13 057	26 910	n/a	9 029
Fruit/olives	2 272	2 857	3 515	4 392	(5 609)	9 978	(23 236)	(47 655)	4 867
Dairying	(1 557)	(2 565)	(3 751)	5 900	8 677	18 407	42 239	96 211	19 340
Drystock	1 857	2 938	(3 864)	5 170	7 285	14 337	31 615	(71 221)	10 143
Pigs/poultry	n/a	n/a	n/a	n/a	n/a	8 938	17 983	(57 478)	13 792
Mixed	1 799	2 457	(3 140)	4 609	6 893	14 555	30 330	97 756	13 294
All types	1 962	2 857	3 582	5 085	7 084	14 300	30 739	72 188	
Benefits as percent of average size	55,7	52,9	46,9	47,0	46,3	51,1	47,0	33,8	

[1] The south is composed of Greece and Italy.
[2] Figures in parentheses refer to categories that account for less than 1% of the number of farms and 1% of the value of agricultural production of FADN farms in each country.
n/a Not available.
Source: Brown (1989, pp. 67, 69, 71) and Table 1 earlier.

However, it is shown in the Annex that for most farmers the profit per unit total area in cereals (cultivated and set-aside) will be larger under the new regime compared with the current system of support, no matter how much the target price is reduced. The reason is that the compensation is too large and more than makes up for the reduction in price and yield. This result holds for all except the very largest farmers, who constitute a mere 2% of all EC producers (see the Annex).

If the profit per unit area under the new regime is larger than under the current system of support, then there will be no incentive for farmers to reduce the area cultivated for cereals and, on the contrary, there will be an incentive to increase it. This is supposedly prevented under the Mac Sharry proposals by limiting the amount of compensation to the area currently cultivated. However, it turns out that this is not sufficient to prevent farmers from expanding their COP area. It is shown in the Annex that the profit per unit total area (whether compensated or not) is still larger than current profit within certain cultivated area ranges larger than current ones. This result holds for small and medium-sized farmers but not the very largest ones. Hence, the incentive will be to increase further area cultivated to COP products.

Given the incentive to increase areas under COP crops, it is not clear that COP production will be reduced as espoused by the plan despite the envisaged yield declines. Given that the mechanism of external protection of cereals is not altered under the reforms, an increase in COP production by the EC will lead to more cereal exports and declines in world prices, a development that will lead to increases in EC expenditure for export refunds. This is a financial cost that has not been computed in the current Commission proposals.

These undesirable prospects are clearly a result of the generous compensation proposals envisaged. As is noted above, the modulation plan (i.e. the graduated limits of the compensation) will touch only the very largest producers — approximately 2% of all producers.

A much more equitable compensation policy, that would not have the undesirable consequences alluded to above, would be to limit the total compensation paid to a limit (related to the area under COP production or any other easily ascertained measure). For instance, the definition of 'small producers' given in the proposals could be used to set these limits. Incidentally, under the definition of small producer adopted in the proposal (i.e. with an annual production of not more

than 92 tons of cereals), almost all producers, except the very largest, producers are covered. Since cereal yields are higher in the north compared with the south of the EC (5,79 tons/ha on average in the north versus 3,12 t/ha in the south in 1989), a small producer in the north will be one with less than about 16 ha of cereals, while in the south it will be one with less than 30 ha. From the data in Table 1, this covers almost all farmers in both the north and south except those in the two largest size classes. Hence, even limiting compensation, this criterion would include almost all cereal farmers. In order for the policy to really have the effect of limiting production, the compensation limit should be set at much lower levels and/or the compensation amount per unit area should be reduced.

Taking this argument even further, it could be argued that compensation should be uniform irrespective of volume produced or area planted within certain broad size classes, delineated by past volumes marketed or past cereal areas. This would simplify the administrative burden, which as seen below is considerable, and also would be much more equitable.

The reform proposals concerning milk do not fundamentally change the existing system. They tighten somewhat the existing quotas, exempting, however, small and medium-sized producers. This will leave unaffected almost all producers in the south, who in any case account for only 17% of total EC cow-milk production. The proposed price reductions envisaged for milk, are small when the production cost savings due to the reduction in feed costs are taken into account. In any case, compensation is to be paid to producers with less than 40 cows, which includes almost all except the very largest farms in both the north and the south.

The envisaged reforms in the beef sector are similar to those in the milk sector. While price cuts of 5% (after accounting for the reduction in feeding costs) are visualized, the premiums on bovine animals will increase. Again this will leave almost all farmers in the south unaffected, and will affect slightly only the largest northern producers, who account for 80% of ovine animals.

The reform areas where the southern regions of the EC might be disproportionally affected are those concerning tobacco and sheepmeat. In the area of tobacco, where 91% of production is located in the four southern EC countries, for the first time a quota system is introduced that envisages a level of 340 000 tons, about 15% below current levels of production. The premiums currently paid for the different varieties will be streamlined (i.e. grouped by larger variety categories) and will not be paid for production above quota.

It appears that a quota system broadly similar to that of milk is being instituted. There is no mention in the proposals of whether the premium for the production under quota will increase, or not. If it increases then producers' income might not be affected by much, otherwise it will decline.

For sheepmeat, where 56% of production is located in the southern countries of the EC, the basic mechanism of current support involves a sheep premium. The reform proposals envisage limits to the number of ewes eligible for this premium, based on the producers' reference flock in 1990. No premiums will be paid for flocks above certain limits, which are again large enough to encompass all except the very largest producers.

It is interesting to contrast the compensation mechanisms for tobacco and sheep with those envisaged for beef. In the latter case, the price reductions will be compensated by increases in the premiums, while in the former, the institution of quotas will not be accompanied, at least as envisaged in the proposals, by compensating increases in the premiums. Clearly, this appears to discriminate against the producers of the south.

The last part of the proposals concerns structural adaptation and agri-environmental action. Concerning the environmental part, it appears that it is aimed largely at farmers who use intensive cultivation methods. As pointed out earlier, these are mostly the northern farmers. The plans on afforestation will also influence mostly the northern farmers, as farm sizes in the south are generally small, and hence not easily available for afforestation.

Finally, the early-retirement scheme will have a disproportionally positive effect in the south, where, as already mentioned earlier, the average age of small farmers is much higher than that of large farmers. Of the 4,6 million EUR 12 farmers aged 55 and above (who in turn comprise 54% of all EUR 12 farmers), 77% live in the four southern EC countries and comprise 58% of all southern EC farmers. Given the disproportionate concentration of older farmers in the south, the scheme is bound to be more beneficial there.

The early-retirement scheme will be costly if implemented in full. Based on the envisaged fixed-plus variable (on the basis of area) the amount of retirement benefits, the annual amount of total benefits if all farmers aged 55 and above were retired, is about ECU 24,5 billion, which is large compared with the total CAP expenditure of about ECU 31 billion in 1991. If all farms that belong to the retirees are withdrawn from production, the potential savings on CAP costs is of the order of ECU 6,5 billion (found by multiplying the total CAP cost of ECU 31 billion (1991) by the fraction

of all land farmed by the retirees in total EUR 12 farmed land, which is about 21%). Hence the maximum net cost of this part of the plan is in the region of ECU 18 billion annually, still a significant amount, a large part of which would go to the southern EC countries. Given, however, the weak pension systems of these countries, coupled with the mounting social security and pension costs in their national budgets, this scheme could potentially be the most beneficial one to the southern from a social, equity, as well as macroeconomic perspective.

It appears, nevertheless, that the amount which the European Commission is budgeting for this aspect of the proposals is much less than the maximum estimated above. On page 38 of the proposals, the joint cost of the environment and early-retirement scheme is estimated at only ECU 1,8 billion annually. Even if the retirement scheme takes up the bulk of this, it is still much lower than what was estimated above. Clearly then, it appears that it is not the intention of the European Commission to make the system compulsory for farmers above 55 years of age.

The reason might not be unrelated to the large contribution envisaged by affected Member States. It appears from the last page of the proposals that almost half of the contributions to the early-retirement schemes is to be paid by Member States. Given the weak budgetary positions of most southern Member States, this will effectively limit both participation as well as total EC costs.

4. Equity and implicit taxation issues from the CAP reform proposals

There are two new major thrusts to the Mac Sharry reform proposals. On the one hand, the reductions in price support, mainly in the cereals sector, are coupled with direct compensatory payments. Hence, the idea is that the burden of CAP support should shift from the consumer to the general taxpayer. The second major thrust is the significant increase in the management capacity required to run the new programme, as quantitative controls are expanded, and compensatory payments are linked to producer-specific criteria (e.g. area planted to cereals and flock size in sheep). In this section, the first issue is discussed.

The CAP budget increase required for the proposals, as indicated in the Annex to the Mac Sharry proposals, comes basically from the compensatory payments to cereal, milk and beef producers, where the overall cost will increase. The overall cost in the tobacco and sheepmeat sectors will decline. It has already been mentioned that the compensatory payments in cereals, milk and beef will benefit mostly the northern producers, who are on average richer than those in the south.

Increases in overall EC budget cost come from proportional increases in Member States' contributions according to their level of GNP. Hence, increases in the cost of the CAP will have to come from increased Member State contributions. The eight northern EC Member States currently produce 74% of EUR 12 GNP. Therefore, the bulk of the early contributions will come from them and the bulk of the benefits will also go to them.

It turns out, however, that in a net sense the reform proposals amount to a transfer from the south to the north. Table 6 presents some calculations based on the simple assumption that the CAP financial benefits in each sector will accrue to each Member State in proportion to its production share in total EUR 12 production of the product. It is also assumed that the increased EAGGF cost will be financed in proportion to the 1989 total GNP by northern and southern countries. It is evident from the table that although countries in the south end up paying a significant part of the increased EAGGF budget (26%), they get little or negative financial benefits from the increased CAP cost for contributions to farmers. Overall, it appears that the CAP reform proposals entail a net cumulative resource transfer from the countries of the southern EC to those of the northern EC, over the five-year period 1993-97, of about ECU 1,5 billion.

The assumption that the financial benefits of the CAP reforms accruing to producers in each country are proportional to the country's share in total production is an oversimplification, given that the Mac Sharry proposals involve a modulation plan according to which there are limits to the compensation benefits. These limits will have a redistributive effect from the largest producers (who will not get full compensation) to the smallest ones (who will get full compensation).

Since a disproportionate share of large producers is in the northern EC countries, the calculations of financial benefits, indicated in Table 6, exaggerate the benefits to the north. Given, however, that the bulk of the losses of the south come from the sheepmeat and tobacco sectors (where there is little compensation envisaged), and that the bulk of financial benefit to the north comes from milk (a mostly northern product), the bias should be small. In any case, the revised Mac Sharry proposals approved by the Council of Ministers by the time of revision of this paper (July 1992) have substantially weakened the modulation plan. Hence, the bias in the calculations of Table 6 is bound to be very small.

Table 6

Budgetary benefits and costs in the north and south from CAP reform

(million ECU)

	Share of EUR 12 production occurring in the north	Net financial cost of CAP reform proposals					
		1993	1994	1995	1996	1997	Total 1993-97
Cereals	0,72	– 688	– 668	702	743	201	290
Milk	0,83	240	894	1 400	1 480	1 367	5 381
Beefmeat	0,76	53	81	180	365	365	1 044
Sheepmeat	0,60	– 119	– 168	– 210	– 216	– 220	– 933
Tobacco	0,09	– 86	– 236	– 326	– 404	– 404	– 1 456
Net EAGGF cost[1]		– 550	– 47	1 746	1 968	1 309	4 426
CAP reform financial benefits to farmers[2]							
accruing to: north		–335	201	1 649	1 875	1 388	4 778
south		– 215	– 248	97	93	– 79	– 352
Budget cost[3]							
incurred by: north		– 407	– 35	1 292	1 456	969	3 275
south		– 143	– 12	454	512	340	1 151
Net financial benefits[4]							
accruing to: north		72	235	357	418	420	1502
south		– 72	– 235	– 357	– 418	– 420	– 1 502

[1] Includes some other minor items.
[2] Found by multiplying the shares of production accruing to north and south by the figures in the first five rows and then adding.
[3] Found by multiplying the net EAGGF cost by the GNP shares of the north and south.
[4] Found by subtracting budget costs from financial benefits to farmers.

Source: Net benefit data in individual sectors and years are from working documents of the European Commission made available to the author, the rest is computed.

Although then the reforms end up reducing the overall CAP cost from its projected level without the reforms, they do it at the expense of the southern countries.

It is interesting to note that within each southern country the burden of the cost of the reduction in CAP farm support will fall on the smaller producers. To investigate this for Greece, the 1987 farm structure survey was used to find the average amount of land cultivated in cereals and tobacco per farm in each size class, as well as the average number of bovine animals (except dairy cows), dairy cows, and sheep. The average yearly steady state benefits/costs (obtained from Table 6 by dividing the last elements of the first five rows by 5) of CAP reform were divided by the average amount produced in the EUR 12 (1989) of cereals, tobacco, beef and milk, as well as by the average number of sheep. Hence one obtains the average benefit cost of CAP reform per unit of current production. It turns out that the average net financial benefit for cereals is ECU 0,337/ton, for tobacco ECU – 707,6/ton, for milk ECU 9,862/ton, for beef ECU 27,9/ton and for sheep ECU – 1,94/head. The largest absolute and relative effect is on tobacco, where the price declines amount to about 15 to 25% of current target prices.

By multiplying the average areas in the field crops affected by the average Greek yields, and the average numbers of animals in the various size categories by their respective milk and meat yields, one can obtain the average production pattern in each size class, which, when multiplied by the respective benefits, yields the benefits per farm.

Table 7

Impact of CAP reform on Greek farmers by size

Farm size (ha)	< 1	1 to < 2	2 to < 5	5 to < 10	10 to < 20	20 to < 30	30 to < 50	50 to < 100	> 100	All
	1	2	3	4	5	6	7	8	9	10
Number of farms (1 000)	249,8	191,8	296,2	140,7	53,5	11,3	6,2	2,9	0,9	953,3
Average size (ha)	0,48	1,38	3,14	6,74	13,29	23,52	36,86	62,98	213,53	4,03
					Benefit/farm (ECU)					
Cereals	0,1	0,3	1,0	2,8	6,3	11,2	17,0	28,3	35,5	1,5
Milk	1,2	3,3	7,5	14,9	19,2	26,0	23,0	38,8	76,1	7,3
Beef	0,5	0,8	1,3	2,5	3,7	11,8	5,8	6,7	13,3	1,5
Sheepmeat	- 5,5	- 7,0	- 13,3	- 23,9	- 48,6	- 87,2	- 125,5	15,9	0,0	0,0
Tobacco	- 22,2	- 66,2	- 105,4	- 115,0	- 124,3	- 135,9	- 120,1	- 80,4	- 88,9	- 78,6
Total benefit/farm (ECU)	- 25,9	- 68,7	- 108,8	- 118,7	- 143,7	- 174,1	- 199,7	- 22,5	36,0	- 68,3
Total benefit/ha (ECU)	- 53,5	- 49,7	- 34,6	- 17,6	- 10,8	- 7,4	- 5,4	- 0,4	0,2	- 16,9
					Total benefit (1 000 ECU)					
Cereals	18,0	62,0	305,0	396,0	338,0	127,0	105,0	83,0	31,0	1 464,0
Milk	303,0	642,0	2 224,0	2 102,0	1 027,0	294,0	142,0	113,0	67,0	6 914,0
Beef	123,0	153,0	390,0	355,0	197,0	133,0	36,0	19,0	12,0	1 418,0
Sheepmeat	- 1 370,0	- 1 345,0	- 3 926,0	- 3 369,0	- 2 600,0	- 985,0	- 774,0	- 46,0	0,0	0,0
Tobacco	- 5 555,0	- 12 695,0	- 31 217,0	- 16 183,0	- 6 651,0	- 1 535,0	- 741,0	- 235,0	- 78,0	- 74 890,0
Total benefit all farms (1 000 ECU)	- 6 482,0	- 13 183,0	- 32 225,0	- 16 698,0	- 7 690,0	- 1 967,0	- 1 232,0	- 66,0	32,0	- 65 095,0
Share of total (percent)	10,0	20,3	49,5	25,7	11,8	3,0	1,9	0,1	- 0,0	100,0

Source: Computed from data in the Greek National Statistical Service and the method outlined in the text.

Table 7 gives the results of these calculations. The average loss per farm in Greece will be steady at about ECU 68,3. The total loss of farmer benefits for Greece will be ECU 65,1 million per annum. Notice, however, that the loss per hectare is much larger for smaller farmers. It is only the very largest farms that stand to benefit from the CAP reform, but even for these the net benefit is very small, only ECU 36/farm or ECU 0,2/ha.

The significant losses occur because of the relatively large amounts of tobacco area and head of sheep in the Greek average production structure. While sheep ownership is widespread, tobacco production is localized, and this implies that the net losses for the tobacco-growing regions will be much larger per farm or per hectare. Clearly, the fact that no income compensation is envisaged for tobacco and sheepmeat producers will have very detrimental effects on Greek farmers.

Of the total losses to Greek farmers, 30% will accrue to the two smallest size classes, and 80% to the three smallest ones. This is roughly proportional to their numbers (the three smallest size classes account for 77% of all farms).

The benefits to consumers resulting from the CAP reform proposals are rather small (but have marked distributional implications). A first rough indication is given in Table 8, based on the 1989 per capita consumption of various commodities in the EC Member States, and the envisaged absolute price declines. The total envisaged reduction in consumer expenditure in EUR 12 is about ECU 6,3 billion or about 0,18% of the total final consumption expenditure. On a per capita basis, the consumer benefits will be larger in the north at ECU 20,8 compared with the south at ECU 16,8, but as a proportion of final consumption expenditure they will be lower in the north (0,17% versus 0,21% in the south). Most of the savings will occur in the beef and milk products category, chiefly as a result of cereal price reductions.

Table 8

Estimated consumer benefits from the proposed CAP reforms

	Cereals	Milk	Cheese	Beef	Total	Per capita benefit (ECU)	Per capita benefit as percent of consumption expenditure
			(million ECU)				
EUR 12	1 492,6	433,1	2 674,3	1 712,6	6 312,7	19,4	0,178
Belgium	39,9	11,5	91,6	50,0	193,0	19,4	0,168
Denmark	20,0	10,1	45,1	20,0	95,2	18,5	0,126
Germany	249,3	76,6	654,4	341,0	1 321,3	21,3	0,144
Greece	59,0	7,3	110,1	43,6	220,1	21,9	0,571
Spain	158,3	57,3	68,3	106,8	390,7	10,0	0,162
France	247,1	76,0	764,5	385,5	1 473,1	26,2	0,204
Ireland	19,7	8,8	17,0	15,3	60,7	17,3	0,279
Italy	360,8	57,8	454,8	355,5	1 228,9	21,4	0,200
Luxembourg	1,5	0,7	3,0	1,6	6,8	18,0	0,101
Netherlands	49,0	17,1	136,9	74,7	277,8	18,7	0,161
Portugal	48,8	11,9	27,2	30,7	118,6	11,5	0,394
United Kingdom	239,1	98,1	301,4	287,9	926,6	16,2	0,158
North	865,7	298,8	2 013,9	1 176,1	4 354,5	20,8	0,166
South	626,9	134,3	660,4	536,5	1 958,2	16,8	0,212

Source: Computed from data in European Commission *The agricultural situation in the Community*, various years and the hypotheses of the Mac Sharry proposals.

The total consumer benefits of Table 8 if added to the net budgetary benefits of Table 6 give the net benefits of the CAP reform proposals, which amount in 1997 (the year of presumed steady state) to a net gain for the northern countries of ECU 4,77 billion, and a net gain to the south of ECU 1,54 billion, for a total net gain of ECU 6,31 billion per annum. The share of the north in this total is almost the same as the share of the north in the GNP of the EUR 12. In that sense then, the proposals appear neutral from a north-south perspective.

The benefits to consumers are progressive. This can be seen from Table 8, where it is clear that in the two poorest countries of the EC, Greece and Portugal, the consumer benefits amount to much larger shares of the average consumer basket compared with the other countries. But even within each EC country, the benefit is highly skewed in favour of poorer households.

In Greece, for instance, using the results of the 1987/88 household budget survey the shares of bread and cereal products, beef and milk products in the food and total expenditure of the poorest households are 39,1% and 19,0% respectively, while for the wealthiest households they are 27,8 and 5,7% respectively. It is clear that the benefits in terms of price reductions of final goods will comprise a much larger portion of the budget of the poorer households, compared with that of the richer ones.

Interestingly enough, the consumer benefits will fall disproportionally on poorer farmers. In Greece, recent research

shows that in 1988 about 40% of farm households were poor (according to a rather standard poverty line), compared with 19% of non-farm households (Sarris and Zografakis, 1992). Given, as indicated above, that poorer households will benefit the most from the CAP-induced consumer price declines, it is clear that farm households will benefit proportionally more compared with non-farm households. Given that farm households comprise a larger share of all households in the southern EC countries, and if the poverty incidence outlined above is similar for the other southern EC countries, it can be inferred that a significant part of the consumer benefits that accrue to the southern countries will accrue to poor southern farm households.

It is interesting to note that by combining the per capita consumer benefits from Table 8 with the producer benefits from Table 7, the pattern of net benefits is very different than what appears in Table 7 for producers. The average consumer benefit for Greece on a per capita basis from Table 8 was estimated at ECU 21,9/capita. This, as mentioned above, is bound to be smaller overall for poorer households and larger for richer households. This average was adjusted to different household income groups on the basis of their share of total expenditure on cereals, beef and milk products, in the total expenditure on these products in Greece using the 1987/88 household budget survey (HBS). The consumer benefits of CAP reforms end up ranging from ECU 14,1/capita/year for the poorer households to ECU 31,5/capita/year for the richest Greek households. Given, different household composition of different class households, the consumer benefits from CAP reforms range from ECU 25,4/household/year for the poorest Greek households to ECU 118,9/year for the richest ones.

Table 9 provides a comparison of farm benefits and consumer household benefits. The average Greek consumer household will benefit by about ECU 67,5/household/year based on average household size in 1987/88. This is almost the same as the loss of the average farm household. The most revealing part of this table is the fact that for many farm households, and more so for the very smallest and the largest ones, the net consumer producer benefit is bound to be positive. It is mostly the middle-sized farm households that are bound to lose, but even for these households, the average losses will be largely mitigated by the consumer gains, depending on which income class they belong to.

Table 9

Comparison of benefits of CAP reform on farm households and general households

	Farm size classes									
Size in ha	(1) < 1	(2) 1-2	(3) 2-5	(4) 5-10	(5) 10-20	(6) 20-30	(7) 30-50	(8) 50-100	(9) > 100	(10) All
CAP reform benefit per farm (ECU/farm/year)	– 25,9	– 68,7	– 108,8	– 118,7	– 143,7	– 174,1	– 199,7	– 22,5	36,0	– 68,3

	Household expenditure classes								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Annual income in ECU (1987/88 prices)	< 2 968	2 968- 5 195	5 195- 7 421	7 421- 10 390	10 390- 13 358	13 069- 17 069	17 069- 22 263	> 22 263 10 234[1]	All
CAP reform benefit per household (ECU/year)	25,4	42,8	55,5	68,0	81,2	92,3	102,6	118,9	67,5

[1] Average annual expenditure per household.

Source: Computed.

The conclusion of this distributional analysis is that the net losses to Greek farm households are bound to be concentrated among the middle income ones. For these households, some compensation mechanism would seem warranted.

5. Management and control aspects of the proposed CAP reforms

This aspect of the proposed reforms, albeit occupying only half a page of text, will have, in the author's opinion, potentially the most significant and costly effects on the southern EC countries.

It has already been mentioned earlier that one of the key thrusts of the proposals is to alter the mechanism of transferring resources to farmers from one based on direct support to production, to one based on direct support to farmers through more quantitative controls. The key management aspect of the proposal in this context is that the Commission will set the rules, and that it will be the Member States' responsibility to implement them. However, since the new rules involve dealing directly with farms, while the current ones involve dealing with the volume of production, it is clear that the cost of administering the new rules will depend on the number of farms and not on the total amount of production.

Also, the cost of a policy that is based on quantities produced can be reduced by economies of scale in handling large amounts of product. For instance, a producer cooperative could build a large storage silo. However, the cost of administering a programme based on farm-level quotas, flocks, or areas planted, will probably necessitate on-farm inspection and hence might not be subject to similar economies of scale.

To obtain an idea of the bias this imposes on the countries of the south, Table 10 presents an index that computes the ratio between the relative numbers of holdings producing a given product under reform in the south versus the north, and the ratio between the total 1989 production of the relevant product in the south and the north. A value of this index of 'administrative bias' of the CAP reform proposals will be equal to one when the ratio between the number of producers in the south and the north of the EC is equal to the ratio between the respective volumes of production. A value greater than one suggests an administrative cost bias against the south.

It is quite apparent from the results that the magnitude of this index is well above one for all products under CAP reform. Albeit the number of holdings with tobacco for all EC countries was not available to the author, the small size of tobacco holdings in the south should almost certainly imply a value of this index greater than one as well. It therefore, seems that this bias is bound to increase administrative cost substantially more in the EC countries of the south compared with those of the north, who in any case have rather efficient bureaucracies to administer the reforms.

Table 10

Index of administrative cost bias of the CAP reform

	South	North	Ratio south/north
Number of holdings producing or having (1 000)[1]			
Cereals	2 884,4	1 437,7	2,01
Bovine animals	1 193,3	1 456,7	0,82
Dairy cows	758,9	880,6	0,86
Sheep	642,2	335,8	1,80
Production of (1 000 t)[2]			
Cereals	45 528	148 272	0,31
Beef	1 806	5 655	0,32
Milk	18 606	90 476	0,21
Sheepmeat	434	653	0,66
Administrative bias index[3]			
Cereals	6,53		
Beef	2,57		
Milk	4,19		
Sheepmeat	2,72		

[1] 1987 figures.
[2] 1989 figures.
[3] Ratio of south/north ratio of number of holdings to south/north ratio of production.
Source: Computed from European Commission, *Farm structure survey 1987.*

6. Conclusion

The Mac Sharry proposals are shown in this paper to have interesting distributional effects as far as the EC north-south dichotomy is concerned, and as far as distributional impacts within each Member State.

The first major conclusion from the analysis is that the existing bias in CAP support in favour of larger farms is not

likely to stop with the proposed reforms. In fact, if anything, it will increase since the bulk of the net benefit will go to larger cereals, milk and beef producers. The fact that there is a net loss from the proposed reforms in tobacco and sheep, two mostly 'southern' products implies that the EC countries of the south will lose overall farm support compared with the countries of the north who will gain. When the extra cost of supporting the new measures is taken into account, the southern EC ends up transferring about ECU 300 million per annum in steady state to the northern EC. However, the proposed reforms entail substantial consumer gains which are proportionally higher in the south. The net result is net gains to both the north and south of the EC that are almost exactly proportional to the two regions' total GNP. From this overall perspective, the Mac Sharry proposals are neutral in their north-south distributional effects within the EC, as far as the product-related costs and benefits are concerned.

A most interesting result for the case of Greece is that for many, and especially the smallest and hence poorest farmers, the net losses as producers end up being balanced by the net gains as consumers. However, it appears that the middle-income farmers, who form the bulk of farm households will end up losing. The largest farms in the south appear to end up as net gainers despite the fact that the south in general loses.

An unnoticed and potentially very costly consequence of the proposed reforms for the south, however, seems to be the large hidden administrative cost of implementing the new measures. It is shown that the reforms are heavily biased against the south as far as administrative cost is concerned. Given that administration is to be the responsibility (and implicitly the cost) to the Member States, this aspect entails a potentially very large hidden cost for the EC countries of the south.

The most positive aspect of the Mac Sharry reforms for the south appears to be the one concerning the early-retirement scheme for older farmers. The potential transfers to the south are large and could counterbalance the negative additional administrative cost burden.

References

Brown, C. (1989), 'Distribution of CAP price support', Copenhagen, Institute of Agricultural Economics, Report No 45.

European Commission (1991), 'The development and future of the common agricultural policy', Commission communication to the Council and the European Parliament, COM(91) 258 final/3, Brussels, 22 July.

European Commission (1990), *Economic results of agricultural holdings,* No 5, 1986/87, farm accountancy data network, Brussels, 1990.

European Commission, Eurostat Farm structure, 1987 Survey; main results.

Koester, U. (1991), 'Economy-wide costs of farm-support policies in the major industrial countries', in Burger, K., de Groot, M., Post, J. and Zachariasse, V. (eds), *Agricultural economics and policy: International challenges for the nineties,* essays in honour of Prof. J. de Veer, Amsterdam, Elsevier.

OECD (1990), Agricultural policies, markets and trade — *Monitoring and outlook,* Paris.

Sarris, A. H. (1991), 'European agriculture, international markets and LDC growth and food security', *European Review of Agricultural Economics,* Vol. 18, No 3/4, pp. 289-310.

Sarris, A. H. and Zografakis, S. (1992), 'Changes in income formation and distribution in Greece, and pospects from sructural adjustment', mimeograph, University of Athens, Department of Economics, mimeographed, February.

Stoeckel, A. (1985), 'Intersectoral effects of the CAP: Growth, trade and unemployment', Occasional Paper No 95, Canberra, Bureau of Agricultural Economics.

Tyers, R. and Anderson, K. (1986), 'Distortions in world food markets: A quantitative assessment', background paper for the World Bank Development report, Washington, DC.

Winters, A. (1987), 'The economic consequences of agricultural support: A survey', *OECD Economic Studies,* No 9, Paris, Autumn.

Annex

Proof that the reform proposal results in more profit per unit of area sown with cereals

Consider a farmer who currently cultivates an area of COP crops equal to A, and produces an amount Q of the COP product, using a vector of variable inputs X, which can be bought at prices represented by the vector w. Denote the yield of the product per unit area cultivated as y, and the variable inputs per unit area by the vector x. If the price that the farmer receives for the product is p, then the short-term profit per unit area (namely holding non-land fixed factors constant) is:

$$\pi = py - wx \qquad (1)$$

Assuming production with constant returns to scale to all factors, the farmer's technology will be denoted by a twice differentiable function of the form:

$$y = f(x, k) \qquad (2)$$

where k denotes the amount of fixed factor (capital etc.) per unit of land.

Maximization of (1) subject to (2) yields the variable factor demand functions which when substituted in (2) give the profit-maximizing yield y (p, w, k). The short-term variable profit function $\pi(p, w, k)$ is found by substituting the profit-maximizing values of y and x in (1).

Denote the current price received by the producer of this COP product by p_0. Then the current profit per unit area is given by $\pi (p_0 , w, k)$. Under the Mac Sharry policy switch, the farmer will receive a lower price p for his production, but will be compensated. The compensation C per unit area cultivated will be based on historical yields, namely those achieved under the old price regime, and will be equal to this average past yield times the envisaged price decline:

$$C = (p_0 - p)\, y(p_0, w, k) \qquad (3)$$

Therefore, under the new price regime, and assuming that fixed factors per unit area, and variable factor prices do not change in the short term, the farmer's net return per unit area will now be given by:

$$\pi^M (p, w, p_0, k) = \pi(p, w, k) + (p_0 - p)\, y(p_0, w, k) \qquad (4)$$

where $\pi^M(.)$ is the profit function under the Mac Sharry plan. Clearly at $p = p_0$, π^M is equal to $\pi(p_0, w, k)$.

Differentiating (4) with respect to p, and using the Hotelling lemma (which in this case says that the partial derivative of the profit function is equal to the yield), we obtain that the following holds:

$$\frac{\delta \pi^M}{\delta p} = y (p, w, k) - y(p_0, w, k) \qquad (5)$$

If we assume, as certainly must be the case, that the yield responds positively to the product price (i.e. that we have a positively sloping supply curve), then whenever $p < p_0$ the right-hand side of (5) is negative, implying that the derivative of π^M with respect to product price is negative.

This in turn implies that under the compensation regime envisaged by the Mac Sharry proposals, a lowering of producer prices which will certainly and intentionally lower COP product yields, will, nevertheless, result in higher net returns per unit area historically cultivated.

The reason for this result is the nature of the compensation equation, which considers the historical yields and not the new yields or a fraction of the old yields for computing the compensation. It can easily be shown for instance that if the new yield is used in compensation equation (3), namely if p is substituted for p_0 in the expression for y, then the derivative of π^M with respect to p will be given by:

$$\frac{\delta \pi^M}{\delta p} = (p_0 - p) \frac{\delta y(p, w, k)}{\delta p} \qquad (6)$$

For $p_0 > p$ and a positively sloping yield curve, this derivative is positive, implying lower profit per unit area for lower p.

Of course, it is rather difficult in practice to base compensation on the basis of forecasted yields. However, the above analysis implies that if the intent of the reform of the CAP is to decrease the net return to the COP farmers due to the subsidies, then a preferable policy would be to either periodically revise the compensation equations on the basis of new yields, or lower the amount of currently envisaged compensation.

The above calculations hold on the assumption that farmers do not expand their area under COP crops. There is nothing, however, in the Mac Sharry proposals that prevents farmers from doing this. The only disadvantage is they will not be compensated for the new area as they will be for the historical area. However, it turns out that the net profits per hectare could be larger even if the farmers expand their COP area within certain limits.

To see this denote by A_0 the 'historical' area of the farmer and by $A > A_0$ his new COP area. Then his net profit per unit total area will be as follows:

$$\pi_1^M(p, w, p_0, k) = \frac{A_0}{A} \pi^M(p, w, p_0, k) + \frac{A - A_0}{A} \pi(p, w, k) \quad (7)$$

where π^M is given in (4). The derivative of π_1^M with respect to p is equal to:

$$\frac{\delta \pi_1^M}{\delta p} = y(p, w, k) - \frac{A_0}{A} y(p_0, w, k) \quad (8)$$

It can be seen from (8) that if the new yield under the lower Mac Sharry prices is lower than the original yield, as is expected, then there is a range of cultivated area A larger than A_0 within which the expression in (8) is negative. This implies that there is an incentive for farmers to expand their area beyond the historically cultivated one, even if they are not compensated for it.

The above calculations hold for 'small producers' namely those for which no set asides are envisaged. However, the set-aside requirements of the Mac Sharry plan do not substantially change the nature of the results. Consider first a professional producer with a current cereals area less than that required to produced 230 tonnes of COP crops, but larger than that required to produce 92 tonnes. If he puts 15% of his area in set-aside as envisaged by the plan, his net return per total unit area in cereals (both cultivated and in set-aside) will be equal to:

$$\pi^P(p, w, p_0, k) = 0{,}85\, \pi^M(p, w, k) + 0{,}15\, (p_0 - p)\, y\, (p_0, w, k)$$
$$= 0{,}85\, \pi\, (p, w, k) + (p_0 - p)\, y\, (p_0, w, k) \quad (9)$$

Differentiating π^P with respect to p we obtain:

$$\frac{\delta \pi^P}{\delta p} = 0{,}85\, y\, (p, w, k) - y\, (p_0, w, k) \quad (10)$$

Since the right-hand side of (5) was deemed negative, the right-hand side of (10) is *a fortiori* negative. Hence, again, the reduction of target prices would increase the net return per hectare for professional but not too large producers. It also turns out, as in the earlier analysis (see equations (7) and (8)), that farmers have an incentive to increase area cultivated even though the increased area will not be compensated.

For professional farmers with COP area A larger than that required to produce 230 tonnes (call this A*), only the area A* will be compensated according to the professional set-aside scheme, and the area above A* will not be compensated. Hence for these farmers their net return per unit of total area cultivated by COP products will be equal to (utilizing (9)):

$$\pi^L(p, w, p_0, k) = \frac{A^*}{A} \pi^P(p, w, p_0, k) + \frac{A - A^*}{A} \pi(p, w, k)$$

$$= \frac{A^*}{A} [0{,}85\, \pi\, (p, w, k) + (p_0 - p)\, y(p_0, w, k)] + \frac{A - A^*}{A} \pi(p, w, k)$$

$$= \frac{A - 0{,}15\, A^*}{A} \pi(p, w, k) + \frac{A^*}{A} (p_0 - p)\, y(p_0, w, k) \quad (11)$$

Differentiating (9) with respect to p we find:

$$\frac{\delta \pi^L}{\delta p} = \frac{A - 0{,}15\, A^*}{A} y(p, w, k) - \frac{A^*}{A} y(p_0, w, k) \quad (12)$$

At the initial price p_0, this expression is positive if $A > 1{,}15\, A^*$ and negative otherwise. Hence large professional farmers with, COP area smaller than 1,15 A* will still obtain net returns per total COP hectare larger than before. It is only farmers with a COP area larger than 1,15 A* that will experience a decline in average return per total hectare. In the north A* is on average about 40 ha, while in the south it is about 74 ha. Hence only farmers with a COP area larger than 46 ha in the north and 85 ha in the south are likely to experience declines in net returns per area. By reference to Table 1, this involves about 60 000 to 70 000 thousand farmers (mostly in the north) or about 1,5% of all cereal-growing farms.

Consequences of common agricultural policy for rural development and the environment

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1. Introduction: Evolution of the concept of rural development

In all, 50% of the population of the European Community (EC) live in rural areas that cover 80% of the entire territory (European Community, 1988a). Consequently, rural development has always been an important objective in EC policies. At present rural development is generally taken to mean 'an overall improvement in the economic and social well-being of rural residents and the institutional and physical environment in which they live' (Jansma et al., 1981). This widely accepted definition therefore includes socioeconomic conditions as well as the environment (Hodge, 1986 and Whitby, 1986).

In the context of the EC, the concept of rural development has undergone changes over the years. Three phases can be distinguished:

(i) An initial phase, lasting from the foundation of the Community to the mid-1970s, when rural development was considered in terms of agricultural development. This approach was justified by the fact that agriculture was considered to be a kind of 'social buffer' able to keep outmigration from rural areas within limits that could be absorbed by other sectors. This view was reinforced by the trust placed at the time in the common agricultural policy (CAP), probably due to the lack of real alternative policies.

(ii) A second phase, from the second half of the 1970s to the first half of the 1980s, when rural problems were seen in the context of regional policies, and solutions found in extra-agricultural interventions, i.e. integrated rural development open to various economic activities and services (Brunet, 1991). Specific instruments also became available for the socioeconomic development of less-developed areas: the European Regional Development Fund (ERDF), the European Social Fund (ESF) and the European Agricultural Guidance and Guarantee Fund (EAGGF) Guidance Section, together known as the Structural Funds.

(iii) A third phase, during the last few years, when not only has the rural issue been seen in terms of integrated development, but emphasis has also been placed on the environment, given the significant positive — and also negative — externalities connected with agriculture and forestry. In this latter phase, there appears to have been some rejection of the traditional CAP for a number of reasons, including the failure to resolve the problems of rural development in several regions.

Despite the modification and extension of the concept of rural development, there has been no change in the attitude towards family farms, including small and economically weak ones. Such farms have always been considered to be essential for rural development for historical and cultural reasons, and in order to maintain jobs in rural areas. The role played by family farming in environmental conservation, particularly in those areas characterized by natural and structural disadvantages, has also continued to be stressed (European Commission, 1988a and 1991a).

2. Approaches to rural development

Current literature indicates three major approaches to the analysis of rural problems and the related policies: (i) the socioeconomic approach; (ii) the regional economic approach; and (iii) the intersectoral economic approach. In practice, the undoubtedly interdisciplinary nature of any analysis of rural problems has created a field of study in which at times it appears to be difficult to define and identify specific disciplinary and methodological boundaries. The three approaches intermingle in the 'cultural baggage' of scholars of rural issues. However, if one wishes to distinguish between them, the following remarks can be made:

(i) The socioeconomic approach is aimed above all at probing the behaviour of the social groups, the 'actors' who live in rural areas, produce income and use rural services. In this regard, numerous important surveys have been carried out in recent years with the aim of identifying the links between agricultural holdings and the rest of the rural economy. It has been shown that a major contribution to farm holdings' income is given by non-agricultural activities — a contribution which covers about 50% of total family income in Europe (Fuller, 1990; MacKinnon et al., 1991). It has also been shown that on average the total income of agricultural households is comparable with that of non-farming households (Hill, 1992);

(ii) The regional economic approach, on the other hand, tends to identify the major geographic, demographic and economic variables which characterize rural areas. The concept of 'core-periphery' in the structure of regional economies is widely used (King, 1991; Tamminga et al., 1991). Attention is paid to the roles played by rural areas in the macroeconomy and society. In a dynamic perspective, it is pointed out that agriculture has increasingly lost importance in relation to other sectors, while emphasizing its various environmental and cultural roles.

(iii) The intersectoral economic approach, using input-output tables, aims to identify and measure the type and

intensity of the connections between agriculture, allied industries and the rest of the rural economy. Input-output analysis is certainly interesting for its potential and flexibility, despite its various limitations. Rural applications meet serious difficulties in collecting data, and in deriving matrices able to distinguish between the different industries and the local economies — problems of spatial disaggregation. In addition, input-output analysis focusing 'solely on production linkages incurs the danger of ignoring the implications arising from other types of links between the farming sector and the macroeconomy' (Roberts, 1991). It has been pointed out, however, that 'the complexity of economic and social relationships in rural areas is such that the results of input-output analysis are gratefully received by those seeking or exercising influence over policies relating to them' (Midmore, 1991).

Whatever approach is adopted, rural economic analysis encounters problems in defining the rural world — spatially, demographically, socially and economically. Statistical sources adopt various criteria, connected with different aims and objectives of analysis, making it difficult to distinguish between urban and rural areas. However, any distinction can only be arbitrary, as analysis of urban-rural relations involving such demarcation is debatable. These problems of defining rural areas and their economy have also emerged from this work. The analysis was undertaken making use of the socioeconomic and the regional economic approaches for providing a better definition of the agricultural-rural typologies within the EC and their relative problems. The nature of typical rural problems, as already identified in the Commission Communication on the future of rural society (European Commision,1988a) has been probed. On the basis of four typologies, the relationship between agriculture and other rural activities was considered in the light of current rural and regional development policies. Amongst these, the CAP reform was taken into consideration, in an attempt to point out to what extent its various measures are effectively able to influence rural development. The intersectoral view was recalled as a basis for the analysis. In practice, given the lack of data and models able to describe the state of the rural economies, their spatial limits, complexity and diversities, only general considerations and qualitative evaluations have been made. If, in fact, it appears to be difficult to evaluate the effects of possible CAP reforms on agriculture alone, it is almost impossible to make quantitative evaluation embracing the entire rural economy. It should be emphasized that agriculture is only a part, not even the most significant one, of the rural economy. Moreover, individual rural economies appear to be quite diversified in a way that requires specific analysis, and therefore, locally targeted policies.

3. The state of rural areas and agriculture

The abovementioned Commission communication on the future of rural society distinguishes between the following three typologies of rural problems:

(i) rural areas under the pressure of modern life (e.g. south-east England, the Paris–Brussels–Bonn triangle, East Anglia, the Po Valley, the Netherlands, Flanders, northern Germany, the coastal regions of southern Europe);

(ii) declining rural areas (e.g. several regions of Greece, the Mezzogiorno, inland Spain, Portugal and Ireland); and

(iii) marginal rural areas (e.g. the Alps, the Pyrenees, the Massif Central, the southern mountain areas of Greece, Spain and Portugal, the Scottish Highlands and many islands).

This distinction, which refers to the level of economic development, the demography and the physical and environmental conditions of rural areas, emphasizes how agriculture has lost much of its traditional importance, to the extent that on average it employs less than 20% of the total workforce located in rural areas.[1] Agricultural income is of even less importance. In only 10 out of the 166 regions of EUR 12 does agriculture account for more than 10% of the regional product and income (Eurostat, 1991).

The rural typologies defined above can be adapted for analyses of the possible effects of CAP reform on rural areas. For this purpose, the existing relations between agricultural and regional development must be considered. With regard to the regions of the Community, von Meyer (1990) has pointed out a certain correlation between farm net value-added per annual work unit (FNVA/AWU) and gross value-added per inhabitant (GVA/INH).[2] However, on increasing regional income (GVA/INH), this relation becomes weaker, as shown by the triangle in Graph 1, constructed with reference to EUR 12.

[1] The percentage of agricultural workforce in the Community is around 10% and all these people live in rural areas. It follows that for the half of the EC population living in rural areas (European Commission, 1988a) the employment share in agriculture is around 20%.

[2] The two variables, expressed as a percentage of EUR 12 averages, have been worked out respectively from Eurostat (1991) with reference to the year 1985 and from the farm accountancy data network (FADN, 1990) with reference to average values 1985-87, except Spain and Portugal where data are only available for 1987 (Annex 1).
The regions have been defined following FADN and Eurostat distinctions where the two classifications coincided. Elsewhere, because of the lack of regional data on either FNVA or GVA, more extensive aggregations have been made. This has involved considering entire countries such as Greece or Portugal as regions. The analysis has therefore involved 79 cases, covering all the EC except Hamburg and the east German regions.

FNVA/AWU	=	27,8 + 0,93 GVA/INH	$R^2 = 0,28$[1]
SE		(42,11) (0,17)	
t		5,53	

Number of cases : 79; $F = 30,54$

The vertex A (third quadrant), closest to the origin, to some extent characterizes the marginal and/or declining rural areas located particularly in the southern and north-western (Ireland) peripheries of the Community, where both agricultural and non-agricultural income are notably lower than the Community average. The other two vertices characterize rural areas under the pressure of modern life, with regional incomes that are clearly higher than average. Vertex C at the top (first quadrant) indicates regions where economic development is accompanied by high agricultural incomes well above the Community average (e.g. the Netherlands, Denmark, northern France, Belgium, south-east England and northern Germany), whereas vertex B at the bottom (fourth quadrant) characterizes regions where economic development is accompanied by agricultural incomes that are rather modest, that is lower than the Community average (e.g. the central-southern part of the Community, particularly the Alpine areas of Germany and northern Italy). The second quadrant of Graph 1 (the A-C side of the triangle), on the other hand, comprises a group of intermediate regions, generally northern Atlantic, stretching from France to the United Kingdom, with agricultural incomes substantially higher than the EC average, while their regional income per capita is slightly lower.

Thus, on the basis of Graph 1, one can identify the following four groups of regions, represented in Graph 2, of course respecting continuity criteria where necessary:

(i)	Northern-central regions (quadrant I, vertex C):	Pressure of modern life
(ii)	Central-southern regions (quadrant IV, vertex B):	
(iii)	Northern Atlantic regions (quadrant II, side A-C):	Intermediate
(iv)	Southern regions and Ireland (quadrant III, vertex A):	Declining/marginal

[1] R^2 can be increased up to 0,6 taking account of other variables able to contribute to explaining the total variability of FNVA/AWU. Amongst these are the regional percentage of mountain area, the average farm area and AWU per farm of each region.

3.1. Northern-central regions (rural areas under the pressure of modern life)

The northern-central Regions (Graph 2) extend from the Paris–Brussels–Bonn triangle to the Netherlands, northern Germany, Denmark and south-east England. This is in many ways the heart of modern Europe, the most-developed area from both the agricultural-rural and economic-industrial point of view.[2] The high agricultural productivity in terms of labour, on average ECU 15 616 of FNVA per AWU, is due to various factors. Above all, one should recall the natural conditions of this area: a climate favourable to agriculture and especially the lack of mountain areas. Another element is the state of the agricultural structures, with an average farm size of 33 ha, employing 1,6 AWU. Moreover, one can observe the significant weight of farming type 4, i.e. animal breeding (Annex 2).

However, the major characteristic of agriculture in northern-central Europe, apart from its lowland location, is given by large-scale farming. This is due to historical reasons connected with early economic development and the related agricultural economic policies.[3] Looking more closely at the situation in this area, it can be seen that the high labour productivity due to the scale of production is often significantly augmented by the intensity of input use per hectare,[4] whereas in regions like south-east England, Île-de-France and Picardy, it is above all the scale that increases labour productivity; in the Netherlands and other regions it is intensity, accompanied by the necessary scale (Jansen and Hetsen, 1991).

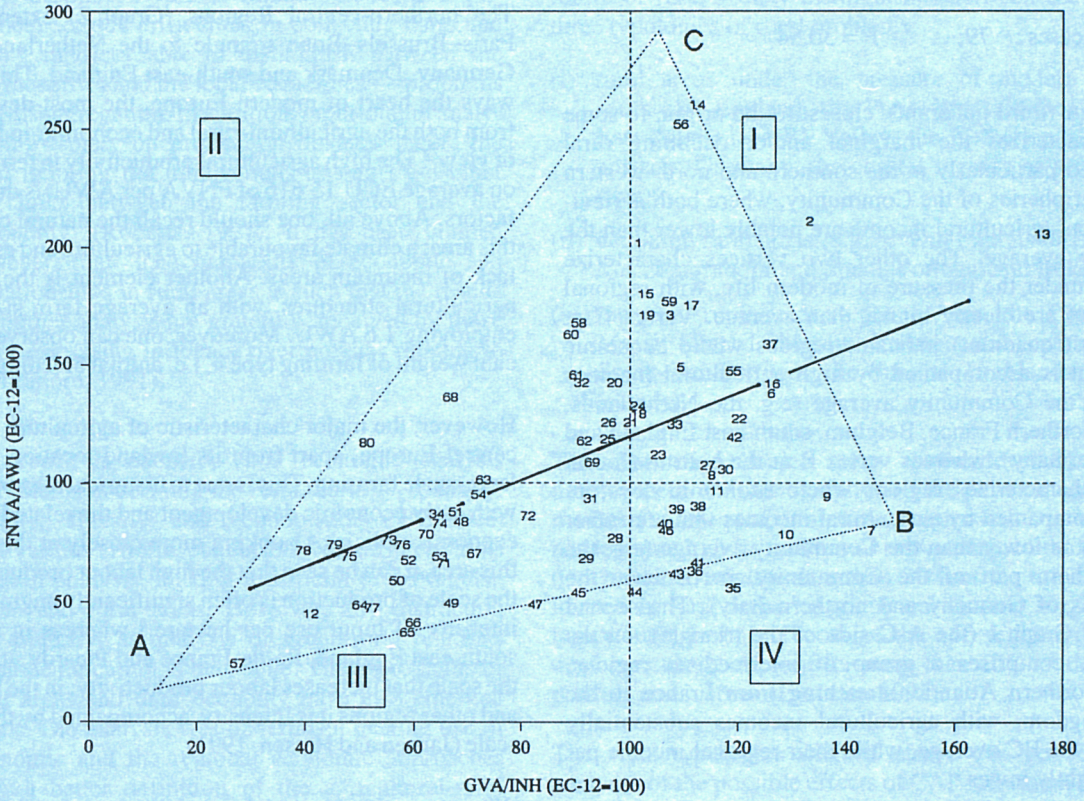
When agriculture is based especially on scale of production, it can result in a certain isolation from the rest of the economy. The case of cereal production is a typical example. It requires a low input of labour and the product itself is often processed elsewhere, so that the added-value remains neither in agriculture nor in rural areas. In areas where agriculture is based above all on intensification and local processing, the agricul-

[2] The fact that the 'best' or 'most highly' endowed regions in agricultural terms are also the most densely inhabited and industrially developed has been emphasized by various authors through approaches involving economic history, geography and ecology (De Wit, 1988).

[3] As is well known, economic development in northern-central Europe took place in the 19th century and was concentrated particularly in the major cities due to lack of transport and communications. Rural areas thus underwent outmigration as the population settled permanently in the cities. Other reasons for the abandonment of the countryside were emigration towards the colonies, policies of enclosure deliberately aimed at expelling the rural population, as well as of free trade in agricultural commodities applied in England, the Netherlands and Denmark which meant selection and survival for only larger more efficient farms.

[4] Intensification can take place by adopting particularly advanced production technologies or by providing an improved quality of agricultural products. Van der Ploeg (1988) distinguishes between technological and quality intensification.

GRAPH 1: **Farm net-value added (FNVA) per annual work unit (AWU) and gross value-added per inhabitant (GVA/INH) in the EUR 12 main regions**



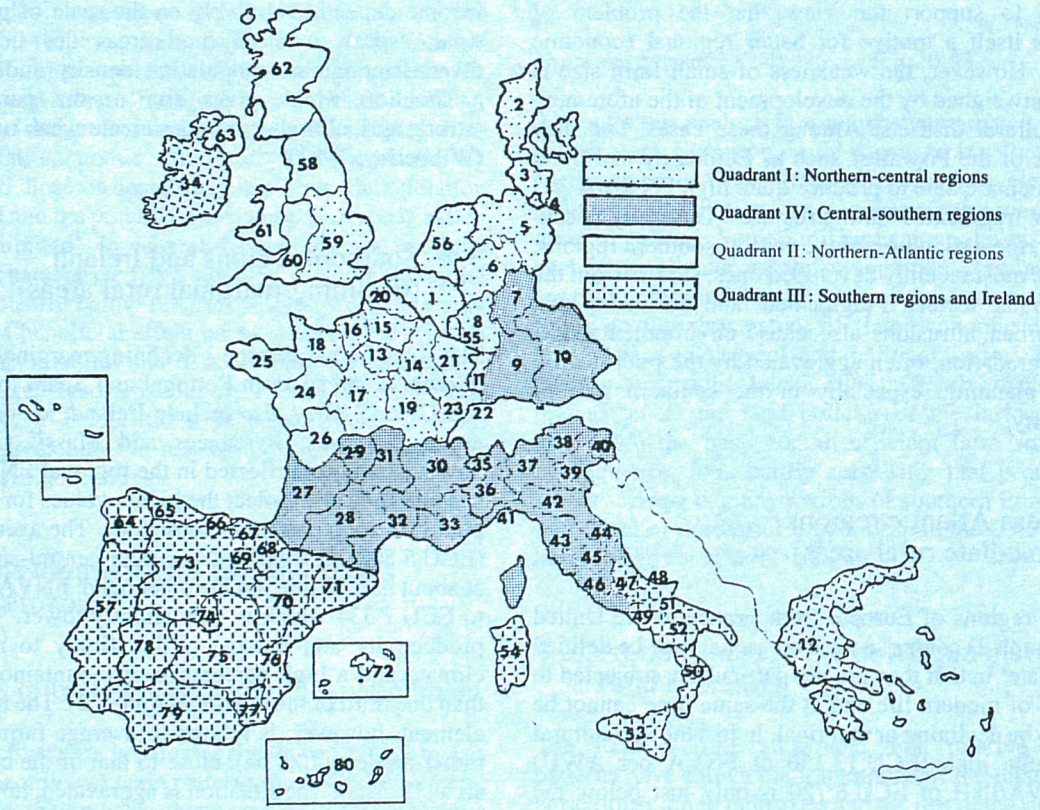
NB: The correspondence between the code numbers and the regions can be seen in Annex 1 where the relative data of FNVA/AWU and GVA/INH are reported.

tural economy appears to be better integrated with the rest of the rural economy. The result is the formation of local agri-food systems or agricultural districts[1] based on network economies where the agribusiness sector plays a key role. These rural systems are more socially and economically balanced, given the greater availability of facilities and opportunities offered to the population, not least jobs.

In the northern-central regions, the economic situation in rural areas nevertheless remains relatively prosperous even where there is a prevalence of large-scale agriculture. Problems of economic diversification and lack of rural services are offset by the facilities, opportunities and jobs provided by urban areas within a range that rarely surpasses 40 to 50 km. It should also be recognized how in these areas physical planning has conserved the quality of the rural landscape, while living standards are among the highest in Europe. Large-scale agriculture in fact often means protection from non-agricultural intrusions. However, the objection is raised that large-scale agriculture has often 'levelled down' the landscape, making it uniform and eroding features (such as hedges, and groups of trees) that go against the requirements of modern agricultural mechanization.

[1] The term agricultural district was coined with reference to some northern Italy rural situations characterized by a high level of innovations, intensity and specialization of production. It has been found that local networks of cooperatives, processing activities, contractors, marketing dealers, i.e. infrastructures, supported by public and private research and extension, provide services to the agri-food system that recent analysis has defined as a rural version of the Marshallian industrial district (Cecchi, 1988; Jacoponi, 1991).

GRAPH 2: The four agricultural-rural typologies of EUR 12



3.2. Central-southern regions (rural areas under the pressure of modern life)

The central-southern regions spread from southern Germany and France to northern-central Italy (Graph 2). Here high levels of economic development can be found, clearly above the European average, in some cases even exceeding the regions of northern-central Europe. The average values of GVA/INH are similar: ECU 11 400 in central-northern Europe, ECU 10 700 in central-southern Europe. Agricultural incomes, on the other hand, with few exceptions such as Lombardy and Languedoc, are significantly lower at about half (ECU 8 713 of FNWA per AWU). The low agricultural income can be explained in various ways, and with opposite reasons with respect to the northern-central area. Difficulties arise from the terrain, where around 25% of the land is mountainous. Farms are also rather small, on average 12,7 ha, and employ just one AWU (Annex 2). This is a rather 'destructured' agriculture based on a small scale that survives thanks to pluriactivity and part-time work (Fuller, 1990; MacKinnon et al., 1991).

The socioeconomic reasons explaining this situation can be found in the 'late economic development'[1] which has generated (or maintained) a weak agriculture in the context of a diversified and integrated economy. However, the overall incomes, often higher than those of the old industrialized regions of northern-central Europe, seem almost to show that agricultural inefficiencies are to a certain extent

[1] Modern transportation and communication technologies, as well as specific agricultural-industrial policies (including those of the EC and the CAP) brought about decentralized development, involving medium-sized and small towns, villages and hamlets, and reaching into the heart of the countryside (Merlo, 1991). The major feature of this 'late, but not traumatic development' (Fuà, 1980), with its many well-known socioeconomic advantages, was that of making agriculture play the role of a 'social buffer', while penalizing its development in terms of efficiency and structures.

compensated for by a more general socioeconomic efficiency. Incidentally, it is just in these regions (southern Germany, north-eastern Italy, etc.) that the lowest rate of unemployment is found (Eurostat, 1991). Obviously there is no evidence to support the view that the problem of agriculture is itself a motive for better regional economic performance. However, the weakness of small farm size is sometimes outweighed by the development of the aforementioned agricultural districts. Among these cases, one may recall regions of the Po valley such as Lombardy or Emilia Romagna which are able to produce quite high FNVA/AWU despite rather fragmented farm structures. Generally speaking, however, the agriculture of the central-southern regions, especially the most recently developed ones, suffers from the strength of other sectors. Fragmented land ownership and the related urban intrusions also cause environmental and landscape degradation, often aggravated by the poor quality of physical planning, especially in the southern part of the Community.

3.3. Northern Atlantic regions (intermediate rural areas)

The Atlantic regions of Europe, from France to the United Kingdom (Graph 2) comprise rural areas that may be defined as 'intermediate' in that they are not particularly subjected to the pressures of modern life and at the same time cannot be considered to be declining or marginal. In fact the agricultural income is quite high (ECU 13 150 of FNVA per AWU) while the GVA/INH of ECU 8 720 is only just below the Community average. These are regions that are relatively close to the large centres of economic and industrial development, to the extent that in the last century there were significant phenomena of rural outmigration and land restructuring towards large-scale farms. Average farm acreage is therefore around 50 ha with an average 1,7 AWU, whereas farming type 4, i.e. animal rearing, is predominant (59%) (Annex 2). The climate, and particularly the lowland location, guarantee favourable conditions for agriculture.

However, the distances from urban centres do not allow for the relative benefits to be felt on the rural economy and social life. Services are at times inadequate given the low population density. There is often a lack of integration between agriculture and the rest of the economy. Local agribusiness systems are not always developed, and therefore rural areas cannot benefit from the processing of agricultural products and the relative added-value. At times these regions may include rural areas that are actually in decline, particularly where the urban economies are stagnant, as in some parts of Scotland and western England. In these intermediate rural areas there is a significant number of full-time farms earning much of their income from agriculture alone (Fuller, 1990; MacKinnon et al., 1991). It has therefore been argued that these are agriculture-dominated rural economies, and this is particularly true where agricultural productivity and income depend exclusively on the scale of production. The weak aspect of these rural areas lies in their lack of diversification, low population density and poor services, a situation which gives rise to the paradox whereby 'strong agricultural economies create weak rural economies' (Wibberley, 1981).

3.4. Southern regions and Ireland (declining/marginal rural areas)

The southern Europe declining/marginal rural areas (Graph 2) spread from Portugal and Spain to southern Italy and Greece. They also include Ireland, as well as mountain areas: the Alps, Pyrennees and Massif Central, which, however, are not reflected in the regional FNVA/AWU data because they also reflect the higher values for the valleys and plains forming part of these regions. The average GVA/INH (ECU 5 802) is clearly lower than central-southern regions at about half. While, on the other hand, FNVA/AWU is equal to ECU 7 334 which is only slightly lower. The low labour productivity and income is due firstly to natural factors: climate and a high percentage of mountainous areas, more than one third of the territory (Annex 2). The most significant element, however, is related to average farm area which is rather modest (10,8 ha), close to that of the central-southern area (12,7 ha). The situation is aggravated, however, because the farms are unable to employ even one AWU. Nevertheless, it can be noted that some regions, such as parts of Spain and Ireland, have relatively favourable structural situations, with farm areas of 20 to 30 ha. In some regions it is therefore possible to find agricultural incomes that are clearly higher than the Community average. Alongside, there are regions with extremely small farms (on average 2 to 3 ha) and almost trivial income, as in the case of southern Italy and Greece.

The rural economic and agricultural situation in the southern regions of Europe is therefore not uniform. If, in some contexts, the economic development has a positive impact on agriculture and the rural economies, elsewhere it appears to severely penalize agriculture towards decline if not its marginalization. A push is given by a certain lack of local agro-system structures which are sufficiently developed and able to exploit the added-value of agricultural products. Some exceptions linked to local 'chains' promoting typically Mediterranean products are, however, notable. They range from horticulture to citrus fruit areas, where whole rural economies have developed in an integrated manner, sometimes linked also to tourism.

According to the communication on the future of rural society (European Commission 1988a), the main characteristic of declining rural areas is 'the relative importance of agriculture, despite major natural and structural handicaps. Additional or alternative employment/income is either insufficient or not available at all, resulting in a fairly high proportion of concealed and almost permanent underemployment'. In the marginal rural areas (European Commission, 1988a), agricultural decline is aggravated by environmental conditions and weak economic structures. 'The symptoms are fairly similar to those of declining areas', but 'depopulation is more marked and the potential for economic diversification is much more limited'. In general the declining or marginal rural areas are characterized by a situation in which economic development (clearly below the European average) not only does not have a beneficial effect on rural areas, but appears to aggravate the situation due to a continuing outmigration of young people, land abandonment and environmental degradation. As a result, there is a worsening dualism between rural areas and the rest of the regional economy, concentrated in urban centres.

4. Rural development and the objectives of CAP reform

4.1. Patterns of regional agricultural development

Analysis of the four rural typologies shown in Graph 2 makes it possible to identify two main patterns of rural development. The first pattern distinguishes those regions where economic development is clearly reflected in agriculture (side A-C of the triangle in Graph 1). The second indicates those regions where the interrelations are less-clearly defined (side A-B of the triangle). Regions belonging to the first development pattern appear to be those spreading from central Spain, along the Atlantic regions (France and the United Kingdom) and towards northern Europe: Germany and especially the Netherlands and Denmark. The second development pattern, on the other hand, appears to involve the Mediterranean and Alpine regions, from Greece to Portugal, parts of Spain, the Mezzogiorno, up to northern Italy and southern Germany.

The two development patterns (Graph 3) are illustrated by the following equations:

Atlantic-northern regions

FNVA/AWV	=	38,96 + 1,12 GVA/INH	$R^2 = 0,45$
SE		(34,06) (0,20)	
t		5,69	
Number of cases :		39; F = 32,4	

Mediterranean-Alpine regions

FNVA/AWV	=	38,31 + 0,46 GVA/INH	$R^2 = 0,37$
SE		(17,65) (0,10)	
t		4,56	
Number of cases :		40; F = 20,83	

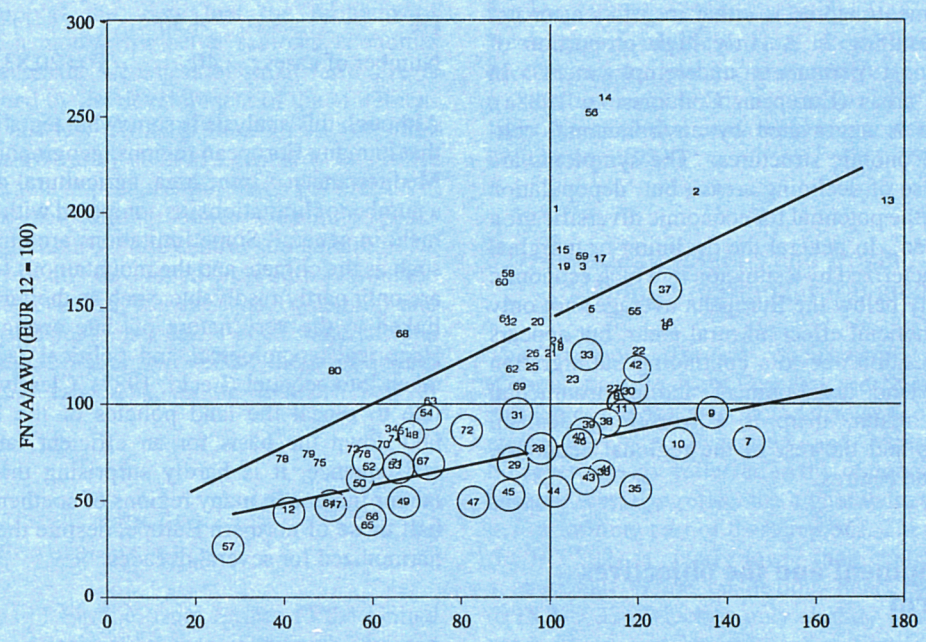
Although this analysis is somewhat tentative, it appears clear that in many European regions, geographically located in the Mediterranean-Alpine area, agricultural development shows a number of limitations, as compared with economic development in general. Some limitations are quite insurmountable, such as the climate and the mountainous terrain; while others are only partly resolvable, such as the farm structures, being linked to the very nature of 'late economic development'. Historical, sociological and political factors must also be taken into account (Lechi, 1987). Clearly, it is now impossible to repeat the land policies of the last century which laid down the basis for an efficient farm structure. As a consequence, it is hardly surprising that productivity and labour income in many regions of southern Europe are about half those of northern Europe, despite the CAP having been harmonized for several decades.

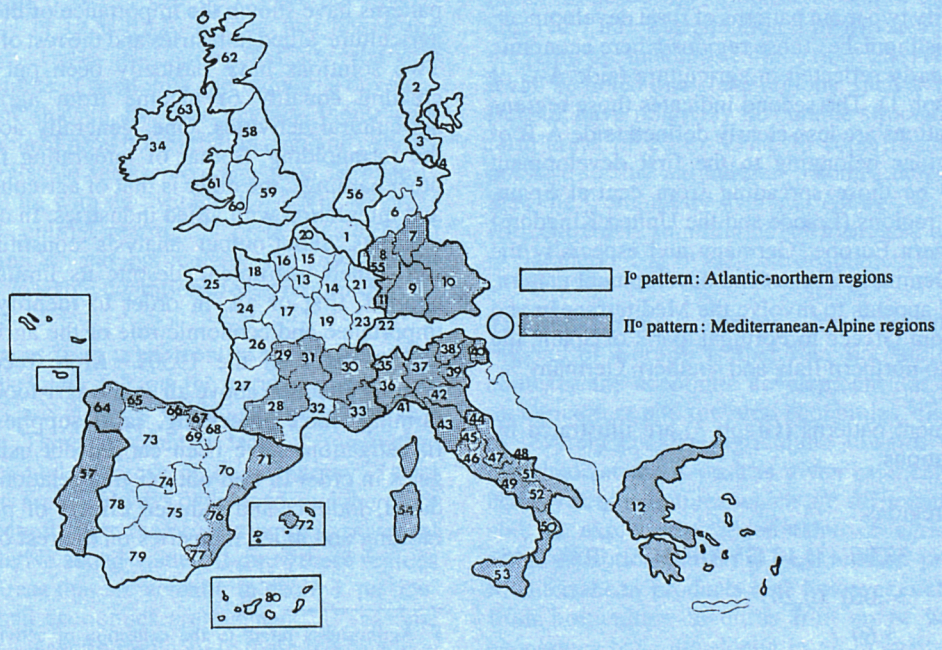
4.2. Agribusiness in the development of the rural economy

The state of rural areas and their relative development patterns have shown the importance of the relations between agriculture, allied industries and the rest of the rural economy. Two solutions have basically been put forward aimed at creating equality of income from agricultural and non-agricultural activities. One, generally accomplished within the farmholding, is that of integrating farm incomes with other earnings; the other is that of agricultural intensification and integration with allied industries. In order to probe these relations, input-output analysis constitutes a particularly well-suited instrument, despite its limitations. It has been applied, first of all, in order to identify and measure the importance and economic role of the agribusiness sector, as defined back in the 1950s.[1] More recent analyses have focused attention above all on the agri-food system, including farming, food processing, farm supplies and distribution. Investigations have been carried out using national aggregates in order to find out existing relationships and to verify direct, indirect and induced effects of possible changes in farming and allied industries on the rest of the economy and

[1] Agribusiness refers to the collection of activities made up of farm supplies, farming, food processing, fibre processing and distribution (Davis and Goeldberg, 1957).

GRAPH 3: **Patterns of agricultural regional development and their location accounting to broad geographical areas: Atlantic-northern regions and Mediterranean-Alpine regions**





vice versa. Calculation has been made of specific multipliers and coefficients which allow the effect of changes on agricultural output, income and employment to be quantified.

There is considerable evidence showing how, within agribusiness, the closest linkages are to be found between farming and food processing which realize a multiplicity of exchanges between themselves and are related to distribution (accommodation and catering). More limited are linkages with farm supplies and those with fibre processing are almost non-existent. Moreover, in the majority of cases, there are few connections with other economic activities. For example, as far as the United Kingdom is concerned, McDonald et al. (1991) have pointed out how 'both agriculture and food processing engage in appreciable intermediate transactions with relatively few sectors: both in purchases of inputs and sales of output. Moreover those intermediate transactions entered into are overwhelmingly with other industries within the food chain.' Similarly, as far as Italy is concerned, Costa et al. (1991), using a specific model, Agrimodist,[1] observe that 'the agri-food system, i.e. farming and food processing, is a very compact system relatively independent from the rest of the economy; therefore it shows network relations above all within its different branches leaving alone the rest of the economy'.

Table 1 points out these relationships with reference to the sales composition of the agri-food systems of the United Kingdom and Italy in the 1980s. The data indicate how, within their isolation from the rest of the economy, the agri-food system of the United Kingdom, as compared with Italy, shows greater integration between farming and food processing. Italian farming, for example, sells less than 40% of its production to food-processing industries and at the same time delivers through distribution one quarter of its production directly to consumption. British agriculture, on the other hand, sells 55% of its production to food processing and only 15% directly to consumption. Patterns of agri-food systems similar to those of the United Kingdom and Italy can be found in various European countries such as France, Germany and the Netherlands (Gios and Miglierina, 1987).

The fact that farming is closely linked to food processing and, to a certain extent, to distribution represents a factor of rural development to the extent that food processing and distribution are actually located in rural areas where they generate added-value. This appears to occur particularly with small and medium-sized activities, especially farmer cooperatives as well as the long-established traditional food-processing industries run by local entrepreneurs (Bryden, 1991). Also, the trend towards a greater importance of processed products in consumer demand, which is stronger in the United Kingdom and northern Europe than in Italy and southern Europe, contributes to rural development to the extent that food processing and distribution are actually located in rural areas — but this does not always appear to be the case.

Sales to other sectors, including fibre processing, a part of agribusiness, are no higher than 10%, in the case of both Italian and British farming. Fibre processing (clothing, wooden furniture, leather shoes), particularly in Italy, has to a large extent been located in rural areas, due almost exclusively to the availability of labour and local craftsmanship rather than to the production of fibres themselves which are mainly imported. Purchases by the agri-food system from other sectors, including farm supplies, appear to be rather meagre. Agriculture in Italy, for example, purchases 27,5% of the total inputs from farm supplies, equal to 12,48% of the total value of agricultural production. However, it has already been seen that suppliers to agriculture — without mentioning suppliers to food processing — are only partially located in rural areas, as in the case of fertilizers, pesticides and machinery, all of which are activities mostly located in urban areas. It has been pointed out, however, that a large share of agricultural supplies (some 70%) is actually made up by service and construction industries that are mainly located in rural areas (Errington, 1991).

Agriculture thus appears to purchase intermediate products above all from within its own sector (52,33% of inputs) and from food processing (19,95%) (Costa et al., 1991). It should be emphasized that Italian and, more generally, Mediterranean agriculture is, unlike northern Europe, characterized by a lower level of intermediate inputs, due to the lesser importance of animal breeding and, to a certain extent, a lower technological level (Gios and Miglierina, 1987). As far as other industries are concerned (those extraneous to agribusiness, from light engineering to a great variety of activities which are today commonly found in rural areas), it is clear from the input-output analysis that they do not trade with agriculture. This does not mean that there may not be important exchanges of manpower connected with part-time and pluriactive rural people. In addition, such industries contribute to the support of the overall rural economy in terms of consumption and services. Therefore they appear to be essential for rural development. However, they are to a large extent ignored by input-output tables.

Knowledge of the linkages between the sectors intermingled with agribusiness and the rest of the economy is increased by deriving from the input-output matrices the coefficients and

[1] Agrimodist is an input-output model of the Italian economy characterized by a disaggregation of the Italian agribusiness sector in 14 agricultural subsectors and 13 food-processing subsectors (Costa et al., 1991).

multipliers of output, income and employment. With regard to forward linkages, Italian agriculture — in this way probably similar to other Mediterranean countries — is characterized by a high level of self-activation, whereas German agriculture is characterized by the highest level of forward integration, with its downstream sectors being activated more by consumer demand for processed products (Gios and Miglierina, 1987). This difference may largely be explained by Italian specialization in fresh horticultural products.

Table 1

The agri-food sector: composition of sales

(%)

		Farming	Food	Other industries	Consumer (distribution)	Rest	Export	Total
*United Kingdom, 1984**								
Farming								
Domestic		15,21	55,69	4,44	14,67	0,99	8,99	100
Import		13,40	40,69	18,02	25,72	0,49	1,69	100
	Total	14,88	52,91	6,96	16,72	0,90	7,63	100
Food processing								
Domestic		7,66	14,97	10,14	54,94	1,94	10,35	100
Import		1,94	29,55	9,30	52,37	4,87	1,69	100
	Total	6,69	17,44	10,00	54,51	2,44	8,92	100
Total								
Domestic		9,98	27,52	8,39	42,53	1,65	9,93	100
Import		5,74	33,24	12,19	43,54	3,42	1,87	100
	Total	9,24	28,52	9,05	42,71	1,96	8,52	100
*Italy, 1980***								
Farming								
Domestic		21,28	37,84	5,94	25,84	3,61	5,50	100
Import		10,78	54,59	23,33	11,89	−0,60	0,02	100
	Total	19,30	40,98	9,21	23,22	2,82	4,47	100
Food processing								
Domestic		4,83	10,87	10,77	65,90	2,39	5,24	100
Import		11,69	19,90	16,65	51,12	0,64	0,00	100
	Total	5,72	12,04	11,53	63,98	2,16	4,56	100
Total								
Domestic		11,84	22,37	8,71	48,81	2,91	5,35	100
Import		1,20	38,49	20,23	30,10	−0,02	0,01	100
	Total	11,74	24,88	10,50	45,90	2,45	4,52	100

Sources: * Barker (1991); ** Costa et al., (1991).

Basically, the Italian agri-food system (quite typical of the southern Europe situation) has a greater rural connotation. This is due both to the characteristics of Italian products and the rural location of the plants, which are sometimes found on the farms themselves. This is particularly the case, as pointed out earlier, when food-processing activities are small to medium-sized and managed by local entrepreneurship, and even better if constituted by cooperatives and/or associations of producers. In this regard, the importance of what has already been defined as the

agricultural district or system is again emphasized. Its main characteristic is that of being able to maintain agricultural value-added within agriculture and indeed the rural economy as a whole. In addition, thanks to its overall efficiency, it provides the means to overcome natural or structural disadvantages, once a minimum threshold in farm structures has been achieved.

These situations, where agriculture is open and integrated with the rest of the rural economy via direct or indirect links, arise in particular when the processed products are linked (by law) with the area of production, as for wines, cheeses, ham and quality horticulture. In this regard, the importance of recent EC regulations on product origin and quality (Regulation No 2081/91 of 14 July) and on organic farming (Regulation No 2092/91 of 24 June) must be borne in mind. A factor acting in favour of such rural location is the so-called 'green consumerism' which tends to encourage high-quality agricultural produce, processed in rural areas, especially when the landscape and environment within which a product is produced adds to its final value. Another important point is the connection — evident also in the national aggregates — between the agri-food system and distribution (accommodation and catering) that appears to be particularly well developed in Italy and France (Gios and Miglierina, 1987). This can be an extremely interesting aspect as far as rural development is concerned, since it underlines the importance for agriculture of services, often connected with rural tourism.

The major differences between the agri-food systems of EC countries are not so much between Italy, France and Germany, but between these countries and the Netherlands. According to Gios and Miglierina (1987), this is probably due to the 'difference in size between the Dutch economy and that of the other three countries'. In any case, it is important to underline the 'close relationship between Dutch agriculture and the other industries' (Harthoorn and Wossink, 1987) because of the advanced technologies applied there and that country's capacity to develop integrated systems in which agriculture is in a better position to control processing and marketing of its products. These characteristics are more obvious due to the relatively small size of the Dutch economy.

Similar situations in fact may also be found in individual regions of other EC countries though they are generally masked in the national aggregates. Two examples have recently been reported in the literature: the Grampian region (north-east Scotland) and the Lombardy region (the Po Valley). The Grampian Region (Brown and Leat, 1988) is characterized by the production of cereals and cattle which feed the local agri-food system, involving 'malting and distilling' and 'slaughtering and meat processing'. The two chains are well integrated, showing also rather close links with the rest of the economy. One may hence note the basic role played by the agri-food system in the local economy as a whole, providing an appreciable contribution to exports. It is therefore pointed out that 'for every 10 jobs lost/gained on farms in Grampian, a further nine could be lost/gained elsewhere in the economy. Out of these 9,5 might be rurally located and four in Aberdeen' (Brown and Leat, 1988). It is also stressed, however, that 'in the case of reduction in farm output, the indirect effects will be reduced or avoided where Grampian food-processing plants are able to source their supplies from outside the Region' (Leat and Chalmers, 1991). Lombardy (Miglierina, 1992), one of the most industrialized regions of Italy, has an agriculture based on intensification and quality products — hence the links between agriculture, food processing and the rest of the economy are more strongly developed than in the national aggregates. This close integration is indicated by the weight of intermediate inputs (66%), significantly higher than the national average (57%), and a sign, moreover, of a remarkable tendency to adopt innovations. Regional input-output analysis shows 'the undoubtedly strategic position of the Lombard agri-food business within the regional economic system', a result which is all the more significant if one takes account of the notable financial and economic development in this region. Moreover, Lombardy's agricultural system was shown to be highly dynamic in the 1980s, with the highest growth rate in value-added with respect to the national average, and lower losses in employment and investments (Miglierina, 1992). In short, the clear gap between the agri-food system and other economic activities, generally shown by input-output analysis of national aggregates, may be partially corrected when referring to specific local situations. Therefore, the notion of integrated rural development, due to 'ruralists', on the basis of sociological and cultural considerations (which may seem rather wishful), has a general validity of its own, confirmed by regional input-output tables. Once again these results highlight the importance of keeping value-added within agriculture, and hence within the rural economy, as a response to market difficulties (Kroll, 1991).

4.3. Policies for rural development and the CAP reform

The communication on the future of rural society (Europan Commission, 1988a) recognized three principles that should be considered in any policy of rural development: (i) social and economic cohesion as a response to notable regional

disparities; (ii) environmental conservation and maintenance of the Community's natural heritage; (iii) adjustment of European agriculture to international markets, with the relative consequences for both the agricultural sector and the rural economy as a whole. These three principles, laid down in 1988, have been taken up by various measures of regional and agricultural policy: (i) the reform of the Structural Funds; (ii) the various interventions aimed at reducing agricultural production and improving the environmental conditions of rural areas; (iii) the recently approved CAP reform.

The Structural Funds, as reformed in 1988 (Regulation No 2052/88 of 24 June), certainly represent an answer to the need for social cohesion and environmental enhancement. Five main priority objectives have been singled out. Mention must be made of Objective 1 concerning the development of predominantly rural backward regions and Objective 5b aimed specifically at rural development. Objective 3 (elimination of long-term unemployment) and Objective 4 (professional opportunities for young people) may also involve rural areas. The framework within which the Structural Funds should operate involves an approach (European Commission, 1990) based on: planning (each project being part of a more general plan), additionality (aid from the EC is not a substitute but a complementary aid to funds allocated by the Member States) and partnership (there should be consultation among the EC, the Member States, the regions and the local authorities). Therefore, the new approach requires the simultaneous intervention of different public bodies and funds — European, national and local — planned through a Community support framework that should reflect the Commission's response to the plans presented by Member States.

The measures aimed at reducing overproduction, improving the rural environment and now the CAP reform all reflect the recognition that the price-support policy has exhausted its post-war role of assuring self-sufficiency. What is currently needed includes: (i) adaptation to the new international order which no longer accepts strict agricultural protectionism; (ii) containment of EC budgetary financial costs; (iii) quality of the environment and agricultural products demanded by the majority of EC consumers; and finally, (iv) achievement of rural development, with all its socioeconomic and environmental connotations. This classification of the reasons for the CAP reform, though not expressed explicitly, appears to emerge clearly from examination of the recently adopted measures (European Commission, 1992b):

(i) the new price policy, which in practice aims to approximate prices of cereals, oilseeds and protein crops at international levels and to reduce livestock prices, also constraining milk production through quotas;

(ii) the compensation for lower prices in the form of direct payments to existing farmers; followed by

(iii) the accompanying measures which ought to deal with agri-environmental problems, afforestation, and structural improvement.

Thus, the specific proposals aimed at rural development and environmental enhancement appear to be complementary, accompanying, rather than central to, the CAP reform with respect to a much more consistent series of proposals concerning market regulation and compensation to farmers. The relative financial commitment appears to be somewhat limited, and partially left to the discretion of individual Member States.

5. The effects of possible CAP reforms: Examination of the measures

5.1. Market and price policy

5.1.1. Northern-central regions

The rural areas of northern-central regions with strong agricultural structures based on large-scale intensive farming are obviously those which could be most influenced by the CAP reform. These include a large proportion of the 20% of farms currently benefiting from 80% of the CAP's financial resources (European Commission, 1991a) and at the same time contributing, more than any other part of Europe, to cereal and livestock production. For example, the 10 to 20% of cereal farms occupying 60 to 70% of the land under cereals (European Commission, 1991b), which have benefited greatly from the CAP, are now likely to experience a significant fall in income (Allanson, 1991). However, it is not easy to envisage the future of rural areas affected by this reduction in agricultural prices. Small farms may be likely to be absorbed by the larger farms or else might be used for non-agricultural purposes. So a drastic reduction in prices alone would do no more than confirm political and economic trends that go back to the last century, i.e. consolidation of large-scale farms with low labour requirements, and in the end a further fall in the rural population. A price reduction could also exacerbate the phenomenon of productive specialization, causing, at least for crops like cereals, a certain 'desertification', hence isolating agriculture and the rural areas from the rest of the economy. It should be recalled that medium-sized and small farms are those which are more

likely to become involved in non-agricultural activities (by providing manpower and services), so that these rural economies would be even less likely to undergo processes of diversification and integration.

This hypothesis of further extensification and growth in the scale of operation of farms, as suggested by economic theory, does not seem likely to be confirmed everywhere. One should not forget that the disappearance of small family farms has been regularly forecast since the last century, without actually taking place, at least in the majority of European rural areas (Schmitt, 1991). In fact, in the rural areas of many regions, where farm incomes owe their current level to intensity and to value-added rather than to scale of production, small to medium-sized farms seem to be in reasonably good economic health. It is quite likely, therefore, that the combined shock of lower prices and incomes could stop the growth of big farms, stimulated most of all over the last 20 years by the CAP.[1] The reaction to low prices in agriculture may be product diversification, including non-agricultural ones, and/or 'decentralization' of various operations, i.e. 'destructuring' of traditional farms encouraged to hire external services for various farming activities and also first-level processing operations undertaken by contractors. Incidentally, these contractors could develop from small family farms specializing in certain operations. This would mean that scale economies and especially greater enhancement of agricultural produce could be achieved at district level, rather than within the farm. Therefore one can suppose that, in the face of agricultural product price reductions, farmers will be stimulated to search for new opportunities. Much, it seems, will depend upon the possibility for the local systems to sustain such changes (infrastructure, marketing, research and extension). Thanks to the information and services provided for the farmers, these systems could alleviate the trauma of prices and market changes and also lead to new solutions. Such developments, where innovators are called upon to play a key role, could provide the basis for a new rural economy open to many different activities both on and off the farms. Quite obviously, the results could be highly positive in terms of integrated rural development as a whole.

Something of this kind is already occurring in various regions, and may also be due to the effects of the current or expected fall in prices. The nature of these changes can only be seen through analyses carried out locally, referring to individual rural areas. It is more difficult, on the other hand, to see such changes in aggregate analysis at national level. However, in the second half of the 1980s there appear to have been reactions that should be evaluated carefully. An analysis by Bartola and Sotte (1992) comparing the period 1980-84, when prices remained relatively static, with the years 1984-88, characterized by falling prices, indicates what might happen with CAP reform. Table 2 shows that in the second half of the 1980s in almost all EC countries there was a fall in the value of the gross product which appeared to be growing in the first half of the 1980s when farmers responded to stagnant prices by increasing productivity.

This fall was felt less sharply in countries such as the Netherlands, where in the second half of the 1980s the value of non-animal products actually increased. Going on to examine net margins, positive results were observed, showing clearly farmers' ability to convert to new products in a relatively short time, as soon as they saw the first signs of lower protection for milk, meat and cereals. These results are even more interesting considering that the net margin per family AWU increased, without an accompanying decrease in farm employment. Elsewhere, safeguarding of income per AWU has taken place simply by less use of labour. In contrast to the Netherlands, two rather different countries such as the United Kingdom and Italy show difficulties in changing the product-mix of agriculture, probably for opposing reasons, farm structures that are on the one hand, too large and rigid, and on the other, excessively fragmented and precarious. The poor performances can also be imputed, especially in some regions, to a certain lack of agricultural-rural systems that provide farmers and associated activities with information, services and especially the infrastructures necessary to change and enhance agricultural added-value.

5.1.2. Central-southern regions

As far as the rural areas of central-southern regions with weak farm structures but diversified, developed and integrated economies are concerned, a fall in prices might have less-significant effects. Production is often 'destructured' and differentiated, and therefore will only be partly affected by the reform. In any case, non-agricultural income may compensate for the losses from farming. A fall in the income of part-time farmers might also be acceptable if the full-time family farms were given the opportunity of developing, thus creating sufficiently competitive structures. However, where agricultural systems are not well developed, this hypothesis appears to be contradicted by a situation in which farm families' income and financial potential, deriving from off-farm activities, are an impediment to greater land mobility. While waiting for the various landholders who keep farmland as a real asset for recreation and other purposes to

[1] It has been argued that 'in the name of preserving rural life, the CAP has led to the Americanization of European agriculture' (Runge, 1991).

Table 2

Gross product and net margin of European agriculture

(percentage changes in terms of purchasing power standard)

	UK	IRL	DK	NL	B	L	D	F	I	GR	E	P	EUR 12
1980-88													
Gross product	– 15	– 2	– 13	8	– 1	7	– 18	– 9	– 24	– 6	2	– 25	– 12
Crop	– 20	– 24	5	24	8	32	– 4	0	– 23	– 3	5	– 38	– 16
Livestock	– 6	2	– 20	– 1	– 5	4	– 25	– 16	– 27	– 14	– 3	– 13	– 7
Net margin	– 18	10	– 4	34	0	13	– 12	– 12	– 27	– 6	– 2	– 37	– 12
Net margin per family AWU	– 16	34	20	41	15	46	– 2	11	1	– 6	25	– 20	7
1980-84													
Gross product	6	4	13	15	13	13	1	3	– 12	1	7	– 9	1
Crop	25	5	36	22	15	41	10	7	– 14	3	11	– 14	4
Livestock	– 5	3	5	12	12	9	– 3	– 1	– 9	– 4	4	– 5	– 1
Net margin	13	9	30	32	12	15	7	1	– 15	1	1	– 14	1
Net margin per family AWU	15	21	43	35	19	30	13	13	– 1	– 3	11	– 4	10
1984-88													
Gross product	– 19	– 5	– 24	– 7	– 12	– 5	– 19	– 11	– 14	– 7	– 5	– 18	– 13
Crop	– 25	– 28	– 23	2	– 6	– 6	– 12	– 7	– 11	– 6	– 5	– 27	– 10
Livestock	– 15	– 1	– 24	– 11	– 16	– 5	– 23	– 16	– 19	– 10	– 7	– 9	15
Net margin	– 27	1	– 26	1	– 11	– 2	– 18	– 13	– 14	– 7	– 3	– 26	– 13
Net margin per family AWU	– 24	14	– 13	5	– 2	20	– 13	0	2	– 3	16	– 19	– 2

Source: Bartola and Sotte (1992) (elaboration from Eurostat).

give up their land, there is the risk that the few professional full-time farmers would eventually disappear, for it is they who are the most seriously affected by the fall in agricultural income. There is, therefore, a danger that certain types of farming based on contracting would spread further. Moreover, one should also expect further abandonment of marginal land in areas where the farm structures are weaker.

5.1.3. Northern Atlantic regions

Intermediate rural areas of the Atlantic regions appear to be more substantially affected by reductions in prices. Here there are situations based on large-scale farming with all its related problems, including a lack of alternative employment. A 'containment' of agriculture could thus involve a further depopulation due to the loss of jobs, services and infrastructures. It should be pointed out however that these regions, according to recent data, do not appear to show indexes of interregional migration, unemployment and job requirements that are particularly negative with respect to the European average (European Commission, 1992a).

5.1.4. Southern marginal regions

Finally, there is the situation of declining and/or marginal rural areas of southern Europe where emigration is still widespread, not to mention areas that are already depopulated. Here, decline in the rural and agricultural economy appears to be inevitable, with or without the new price policy. The evidence resulting from Table 3 (linear programming model of an Alpine area) is quite significant. A fall in prices would, to some extent, accelerate emigration without providing the conditions for a gradual progression towards an integrated rural economy, a phenomenon which has successfully taken place in many areas of central-southern Europe. It is not certain, however, that this kind of development could be achieved in the extremely marginal areas, given their environmental limitations — climate, soils, geography, farm structure and behaviour of the population. Yet there are less marginal areas, especially in mountain regions whose agricultural economies are based on livestock and milk production and where falling prices for those products could lead to further rural depopulation, unless some other support policies are put in place.

5.1.5. Non-agricultural activities

An Italian simulation of a reduction in the prices of cereals and livestock products by 19% in five years, carried out using the Agrimodist model (Costa *et al.*, 1991), shows rather modest effects which could be absorbed within the agri-food system. Distribution does not appear to be particularly affected either. Consumer prices of agricultural products register a slight fall without actually modifying the general index. Fibre processing remains completely unaffected, as well as the rest of the economy. Therefore a fall in agricultural product prices should have an impact above all on farming activities involving a reduction in income, with the possibility of unemployment. Food processing, on the other hand, should, generally speaking, gain, in the sense that it can benefit from the lower prices of the raw materials. This is a point worthy of consideration, particularly where the processing plants are located in rural areas and controlled by farmers' cooperatives. In these cases, it is likely that the losses in agricultural income could be partially compensated by processing activities.

The other sectors of the rural economy should, on the other hand, register greater availability of labour. In this regard, should the Community measures involve a contraction in production by 12 to 15%, Agrimodist shows that, as far as Italy is concerned, agricultural employment would decrease by 4,4% (Costa *et al.*, 1991). With reference to England and Wales, a piece of research work by the Centre for Agricultural Strategy (CAS, 1986) considered a 20% decrease of agricultural employment in the extreme case of price reduction to world levels. However, should the price reductions be more limited as in the approved CAP reform package, then the effects on employment will be much reduced. Moreover, it is probable that the diversification of production following the reform would involve the creation of on- and off-farm jobs, to the extent that they would make up for the unemployment arising in current productive structures. An interesting option is that of tourism, which involves marginal and decentralized areas. The relationship between the agricultural workforce and alternative economic activities in the various rural typologies is nevertheless complex. It may be suggested that a 'containment' of agriculture may also be a stimulus to part-time and multiactivity, even involving farms that are currently run on a full-time basis. In this sense, price reduction could bring about farm destructuring, as is shown earlier.

5.1.6. Rural environment and quality of agricultural products

Strictly related to the rural economy and its development is the environmental impact of the lowering of agricultural prices. What might happen seems quite controversial. Some authors argue that the decrease in chemical input usage such as nitrates will not be so significant (Bauer, 1987; Dubgaard, 1989; Weinschenk, 1990) while others, supported by the evidence of declining prices in recent years, consider that the reduction in input use will be quite significant (Giacomini et al., 1992; CAS, 1986). It is questionable if the expected extensification will take place, while it is realistic to foresee the possibility of further land abandonment in marginal and/or ill-structured areas — thus reducing some very important positive externalities. Also, the hypothesis of farm decentralization and destructuring does not give any guarantee of environmental improvement. Rather, one must bear in mind that agricultural operations based on contractors sometimes involve environmental risks, where the spraying of pesticides, herbicides and fertilizers is carried out with less care and is sometimes ill-timed, as is the case in the Po Valley.

Regarding the quality of agricultural products, which is now part of the environmental debate, according to 'green consumerism' aimed at a sort of 'global quality agriculture', price lowering does not seem to bring about substantial improvements. The reform does not involve sufficient price differentiation according to quality (Ferro, 1992). It should nevertheless be emphasized that the threshold prices which have been kept rather high in the approved reform (as opposed to the initial proposal), leave space for considerations of product quality, an aspect recognized by the market, at least in the EC Member States or regions which are net importers (Boatto, 1991).

5.2. Compensation

Annual compensation measures are envisaged by the reform in order to offset the effects of falling prices and to safeguard farming and farmers as essential and irreplaceable features of rural society. The explicit aim is 'to maintain economic and social cohesion to the benefit of the vast majority of farmers who are less well placed to fully avail of the benefits of the policy' (European Commission, 1991b). According to an Italian estimate (AGRAL, 1992), the amounts of compensation seem to reach the objective of supporting farm income. The fall in income should not be greater than 10 to 11%, with an average of 4 to 5%. A few regions could even experience a slight rise in income. The foreseen compensation does not appear to alter the distribution framework — obviously with all the current distortions. Obligatory set-aside should bring about a containment of income, concerning a numerically modest component, without affecting the majority of farmers and the role they play

within rural areas. Apart from farm income, the reform foresees explicit support to cereal farmers that should amount to some 20 to 30% of the gross product. Compared with previous policies where explicit subsidies amounted to a maximum of 6 to 7% of the gross product, with an EC average of 4% (Bartola and Sotte, 1992), this new policy represents a real change. Moreover, compensation places the farmer 'on welfare' or, in other words, entitled to 'unearned income', a condition that goes against the social status he enjoys within rural society.[1] Quite understandably, therefore, the idea of annual compensation implies various concerns and problems. The main arguments advanced in Italy for instance are:

(i) compensation extended to all landholders (whether large or small and not necessarily farmers) would not only be extremely expensive for the EC budget, but would also confuse the professional role that it is intended to safeguard, i.e. the small to medium-sized farmer, an 'actor' who does not appear to be adequately defined by the reform;

(ii) compensation, therefore, conceived on a per-hectare basis would lead in practice to a land rent given to any landowner and would be automatically capitalized in land values, no different from artificially high prices which were also capitalized in land values (Larsen, 1991);

(iii) compensation capitalized in land values of all those who may in some way be considered as producers maintains a situation in which land prices are high, impeding the growth of small farmers and hence damaging the farm typology that the policy ought to protect;[2] one must also bear in mind that the compensation alone is sometimes higher than the amount of the legal tenancy rents, hence worsening the position of farmers wishing to rent land;

(iv) unions and other rural organizations also question the certainty and continuity of this compensation jointly with the administrative difficulties and burdens of managing the scheme, especially in countries like Italy, with its millions of landholders; it is argued that the uncertainty of agricultural prices — which are negotiated annually — appears to be substituted by the even greater uncertainty of annual compensation, subjected to budgetary and above all administrative constraints, therefore increasing instability within the farming population and rural society as a whole;

(v) finally it should be noted that, generally speaking, having in mind the main objectives of rural development, the compensation does not provide any incentives either to problem areas or to environmentally friendly techniques and the quality of agricultural products.

These arguments suggest that the compensation scheme, aimed above all at maintaining the status quo in the short term, should sooner or later be adjusted. This will be possible once the administrators have effectively shown that they are able to manage the compensation scheme — and this is a point which is not so certain in countries like Italy. First of all, the compensation could apply only to farmers, to the extent that they carry out environmentally acceptable farming practices maximizing positive externalities and minimizing negative ones. In this way, compensation would not be considered as an indemnity for the loss of an acquired right, but as payment for a service rendered to society. This application appears to automatically imply greater attention towards those farms producing positive externalities, most of which are located in less-favoured areas, and less attention to those producing negative externalities, located in plains and valleys and which already benefit from favourable environmental conditions. There might, therefore, be some sort of redistributional effect in favour of those less-favoured areas and farms with lower incomes. In other words, this would overturn a situation which, paradoxically would aggravate the disparity of income in less-favoured areas (Bazin, 1991). The compensatory mechanism in fact could be a unique opportunity to achieve various objectives of the Community concerning agricultural product quality, environment enhancement and rural development. One has to recognize that the compensation mechanism currently adopted appears to take account of this possibility when, for example, it provides additional compensation for those areas producing durum wheat, or when it foresees that 'premium rights are not transferred out of sensitive areas or regions where sheep production is of particular importance for the local economy' (European Commission, 1992b). Yet premium benefits are considered for all livestock rearers who respect given stocking rates. However, the possibility of using the compensation scheme in a more determined

[1] As is well known, the implicit support deriving from price policies is not considered as such by the farmers, nor by the majority of public opinion, at least in continental Europe (De Filippis and Salvatici, 1991).

[2] An alternative policy that could make up for the shortcoming of price support and compensation capitalized in land values could be found in a reform providing *una tantum* compensation based on marketable bonds (Lufpig, 1990). This would make a clear distinction between the land's actual value and the value of land with CAP income. In this way, farmers would behave in accordance with international market prices. Moreover, this would eliminate the conflicts occurring every year between farmers and the EC when defining prices and/or compensation (Tarditi, 1991). A number of questions arise, however. The proposal would appear to create, in the medium and long term, an agricultural structure based solely on large farms that are able to keep up with the market. There is, however, the possibility that *una tantum* compensation could more easily promote restructuring and productive conversion that could be financed by the bonds.

manner could be developed further and linked to a series of commitments on the part of the farmers including:

(i) adoption of farming practices reducing leaching of nutrients and pesticides to a minimum;

(ii) respect for minimum standards of quality;

(iii) acceptance, in general, of agricultural standards (buildings, field size, etc.) that reduce environmental impact and enhance the positive externalities connected with farming.

It may be claimed that the compensation mechanism should be 'modulated' in accordance with its effects on the quality of the environment and agricultural products, thus adapting to the recent EC regulations concerning product origin and quality (Regulation No 2081/92 of 14 July) and organic farming (Regulation No 2092/91 of 24 June). This could make the reform a real policy change oriented towards rural development *latu sensu*. The above conditions should not necessarily imply the stipulation of management agreements at the level of individual farms, but rather the acceptance of a code of conduct at the level of agricultural regions, involving commitment from both the agricultural administration responsible for paying the compensation and the farmers' associations adhering to the compensation scheme. Extension services would act as a *trait d'union*, or indeed as the vehicle of farmer self-regulation.[1] The consequences of this approach should not only be seen in terms of greater income deriving from the amount of compensation, but account should also be taken of the greater value of the products, employment in the food-processing industries and all the secondary activities that may be carried out on farms providing public services; in short, the improvements that would be made to the rural economy as a whole. As has already been stressed, multipliers are higher where agriculture is part of an agro-system that is well integrated in the rural economy.

5.3. Accompanying measures

In order to find, a series of measures specifically aimed at rural development and environmental enhancement amidst the CAP reform, reference has to be made to the so-called accompanying measures 'designed to ensure that economic and social cohesion is strengthened through fully safeguarding the position of the vast majority of farmers... They should also improve the standard of land use and land conservation and ensure balanced development of the countryside' (European Commission, 1991b). It is therefore recognized, in line with the communication on the future of rural society, that 'a thriving agricultural sector is an integral part of rural development', while noting that 'effective rural development has to integrate wider objectives, in particular those of reorienting rural economies towards new economic activities on and off the farm' (European Commission, 1991b).

In the context of CAP reform, the accompanying measures take on a complementary role; but, they may also be presented as a *trait d'union* between the short-term market measures (prices and compensation) and the long-term intervention of a structural and regional nature (the EC Structural Funds). In fact, the reform appears to attribute significant importance to the accompanying measures, especially towards the end of the 1990s after full implementation of the new market measures.[2] The accompanying measures include: (i) an agri-environmental programme; (ii) a programme for the afforestation of agricultural land; (iii) an early-retirement scheme to promote structural improvement.

5.3.1. The agri-environmental programme

The idea behind this programme is outlined in the reflection paper where it is 'emphasized that the farmers' role in protection of rural environment and management of the landscape should be recognized more fully and remunerated accordingly' (European Commission, 1991a and b). A premium system is therefore foreseen:

(i) to encourage farmers to use less-intensive production methods with lower risks of pollution and damage to the environment;

(ii) to promote environmentally friendly management of farmland in order to conserve or re-establish the diversity and quality of the natural environment (scenery, flora and fauna);

(iii) to ensure the environmental upkeep of abandoned farmland and woodland by farmers and other people living in rural areas;

(iv) to develop land management for public access and leisure activities, including parks and natural reserves on land set-aside over the long term;

[1] It should be pointed out that quite often agricultural pollution is simply due to intrinsically wrong farming practices that do not result in higher production, see for instance the mix between organic and inorganic nitrates (Stellin and Dosi, 1989; Dubgaard, 1991).

[2] According to the text of the first proposal (European Commission, 1991b), the budgetary cost of these accompanying measures in 1997 should be ECU 1 544 million as opposed to ECU 2 300 million for the market measures.

(v) to educate and train farmers for environmental protection and upkeep of the countryside.

It is almost impossible at this stage to give any evaluation of the various possible effects of the agri-environmental programme (Regulation No 2078/92, of 30 June). In fact Member States are to implement the scheme throughout their territories by means of detailed zonal programmes that have to be prepared and then approved by the Community. However, quite obviously, the programme represents an important step towards an agricultural policy that provides the basis for agriculture to play its various roles better: on the one hand, reducing negative externalities and, on the other, enhancing its positive ones. All in all, the scheme consists of an impressive series of measures which, if implemented on a large scale, could change and improve large tracts of the EC rural landscape. The premiums are presented as additional to the compensation scheme; moreover, they may involve both thriving agriculture based on intensive farming and weaker or marginal agriculture with its structural and environmental limitations.

In the case of marginal areas, the measures foreseen could be quite easily applicable. In fact, the farming practices currently carried out by the 'surviving' farmers are already in line with the agri-environmental scheme. Therefore, once applied, they may actually involve significant increases in income as shown in Table 3. As a consequence, these measures lay down the foundations so that this type of agriculture may survive along with a landscape which is highly appreciated by local inhabitants and tourists alike. An example is the meadows, currently disappearing, whose maintenance is stimulated by the environmental measures.

It seems more difficult, on the other hand, to apply environmental measures in areas of highly intensive farming and income, along with a high pollution potential, such as the plains, and along coastlines, rivers and lakes. The profitability is higher and it is not clear to what extent the existing margins can be offset by the foreseen aids. It should be emphasized, however, that far from being an opportunity for earning premiums, conservation of the rural environment involves significant economic effects, both inside and outside agriculture. In fact, landscape conservation, environmentally friendly farming practices, etc., call for a certain amount of manpower.[1] Moreover, a pleasant, well-kept rural environment encourages the establishment of a series of recreational activities which could be managed by the farmers themselves, achieving significant economic results, as is the case for farm-based recreation including sport, accommodation and sales of products. Surveys undertaken in Italy have shown that agri-tourism, the so-called 'green tertiary', is the segment of the tourist industry with the best prospect for growth. It has also been calculated, on the basis of a social accounting matrix, that the 80 000 visitors to the Parco dell'Orecchiella in Tuscany have led to the creation of 200 new jobs in tourism and agriculture, and this in an area of 30 000 permanent residents (Marinelli et al., 1990). Also, input-output analysis indicates that a 10% expansion of rural tourism in the Grampian Region might create a total of almost 900 jobs, equal to the reduction in the region's agricultural employment between 1984 and 1988 (Leat and Chalmers, 1991).[2]

A well-kept rural environment, moreover, lays the foundations for a better quality of life for the 50% of the EC's population who live in rural areas without actually being farmers. An indicator of this is the value of houses which increases significantly in areas where agriculture and forestry enhance the landscape and the environment. Another sign emerges from numerous surveys undertaken in recent years showing that people are increasingly willing to pay for such externalities.[3] Finally, one should not overlook the fact that the presence of a stable non-agricultural population attracted to rural areas because of good environmental conditions brings benefits in terms of production and services which certainly contribute to invigorating the rural economy. A strong point of the agri-environmental measures is their formulation in terms of zonal programmes that, in the end, will be implemented through management agreements that commit farmers to specific actions and allow for regular controls. At the same time, the farmers are placed in the position of a person who is paid for doing something useful and important. These premiums, conceptually different from compensation, are intended to 'compensate' for increased costs (and/or decreased production) due to the adoption of environmentally friendly techniques. Therefore, such remuneration does not have the connotations of support for a disadvantaged (or low-income) social group, which are associated with compensation payments.

[1] Even extensification measures should not involve a significant reduction of labour (Whitby, 1987).

[2] It has been stressed (Brown, 1992) that 'tourism is increasingly regarded as a valid economic device to assist rural economic regeneration' and various factors make it 'a desirable form of economic activity to promote in rural areas. In particular: (a) the investments required to start up in a tourist-related business are modest; (b) tourism can be a 12-month industry offering different experiences and products at different times of the year; [above all] (c) tourism can be a lifestyle industry, well suited to the rural way of life and to lower expectations of commercial gain.'

[3] There is substantial evidence based on a voluminous bibliography covering almost all EC countries where methodologies such as travel cost, contingent valuation and hedonic pricing are becoming almost routine for environmental evaluation carried out by public administrations.

Table 3

Simulation of the CAP reform in an Alpine area with problems of rural development and environmental enhancement

Land uses and production activities	Current situation	Linear programming solutions				
		Current CAP	Price reduction[1] plus compensation[2]	Price reduction plus compensation plus environmental programme[3]	Price reduction plus compensation plus environmental and forestry programme[4]	Constraints
Gross margin net of imputed labour cost (1 000 LIT)	1 847 353	2 415 233	2 505 733	3 888 216	4 942 609	
Cows (number)	1 100	1 100	1 100	1 100	1 100	≤ = 1 100
Sheep (number)	1 162	3 000	3 000	3 000	3 000	≤ = 3 000
Meadows (ha)	1 500	908	908	1 340	1 000	≤ = 2 000
Maize (ha)	75	50	50	0	12	≤ = 100
Maize (silage) (ha)	25	100	100	0	100	≤ = 100
Pasture farm (ha)	1 900	2 000	2 000	2 000	2 000	≤ = 2 000
Pasture common (ha)	840	850	850	850	850	≤ = 850
Pasture marginal (ha)	0	1 170	1 170	1 170	1 170	≤ = 2 000
Vegetable garden (ha)	50	50	50	50	50	≤ = 50
Orchard (ha)	30	30	30	30	30	≤ = 30
Forestry private (ha)	2 886	3 500	3 500	3 500	3 500	≤ = 3 500
Forestry Community (ha)	3 700	3 700	3 700	3 700	3 700	≤ = 3 700
Afforestation (ha)	—	—	—	—	1 000	≤ = 1 000
Set-aside (long-term) (ha)	—	—	—	100	38	≤ = 100
Abandoned (ha)	2 864	1 512	1 512	1 230	458	
Total (ha)	13 870	13 870	13 870	13 870	13 870	
Labour days/year	39 868	39 354	39 354	46 224	45 251	

[1] Price reduction practically does not affect the gross margins because the main production is milk, which prices is not touched; forage feeds, meanwhile, are mainly produced within the farms.
[2] Compensation concerns 100 ha of maize, plus beef, suckler cows and sheep which are considered eligible for receiving the highest rate of compensation — because of less than 1.4 LU per hectare of forage.
[3] Environmental measures concern long term set-aside, meadows, pastures (except the marginal ones) and sheep, all of which are considered eligible for receiving the highest premiums for farming extensification.
[4] Forestry measures apply to broad-leaved indigenous species according to the highest premiums for plantation and maintenence — annuities have been taken into account.
Source: Own calculations.

The application of the environmental measures on the basis of local programmes, despite being a strong point, may be a problem in areas with weak agricultural structures and small fragmented tenures, along with inefficient local administrations. Here zonal programmes will encounter more difficulties given the large number of landholders, not necessarily farmers, and therefore with various, often diverging, objectives. It is foreseeable then, as has occurred with previous structural interventions, that while the measures may be widely applied in northern Europe, they will have a much lower application in the south and in difficult areas where the problems are often greater. Clearly not only the object of the interventions, but also their administrative modalities, and related time-spans, should be diversified according to the various EC countries and regions. Obviously, the need for strict control remains everywhere.

One term in the programme which should be better defined, in order to apply it more effectively and to a greater extent, is that of quality products. The reform certainly makes general references to organic farming, but no explicit reference is made to the Regulation on organic farming (Regulation No 2092/1991 of 24 June) and to the recent one on the protection the product origin and quality (Regulation No 2081/1992 of 14 July). It would thus be desirable to achieve better links between environmental conservation and

product quality. This kind of connection has in fact already been established in various agricultural systems, leading to the success of certain products in some European countries well before the CAP, satisfying both producers and consumers at no public cost. An agri-environmental programme should take account of these important experiences in defining a global concept of agricultural quality which includes both products and the environment. Seeing that people are willing to pay for environmental quality, as well as for the quality of agricultural products, CAP reform application could provide guidelines in this sense, letting the concept of quality express itself in the market.

5.3.2. The afforestation of agricultural land programme

Afforestation of farmland, already proposed in the Mansholt Plan of 1968, has been at the centre of the EC's attention in the last few years (European Commission, 1988b). The inclusion of forestry in CAP reform is certainly appealing, considering that afforestation of agricultural land could, at least in theory, resolve a whole series of problems at once: surplus of agricultural production, the all too apparent timber deficit, environmental enhancement, and creation of jobs in the timber industry located in rural areas.

The afforestation programme (Regulation No 2080/92 of 30 June) undoubtedly includes a series of measures which, once applied, together with the environmental programme, could have a profound effect on the landscape and on the economies of the farms and rural areas concerned. However, it does not seem to be possible to quantify such effects. As in the case of the environmental measures, their application is based on programmes to be presented to the EC for approval. It is difficult to say to what extent the Member States will be able and willing to commit themselves. The major question concerns those countries with fragmented farmland and weak structures which in the past have already found it difficult to apply structural measures. Apart from the administrative difficulties, it is felt that in approving the new programmes importance should be given to a careful review of the measures so far adopted in the CAP context — and even earlier, to the forestry policies of the individual countries.

It is usually and correctly pointed out that the difficulties involved in afforestation are connected with the long time-span of the productive cycles that take many years before providing a pay-off for the farmer. From this point of view, the measures adopted appear to provide an adequate solution if one considers the aid foreseen for plantations and maintenance costs. More recently it has been realized, however, that for an individual farm afforestation not only represents a new production enterprise, but also a completely different organization and attitude when compared with farming on its own. It should also be said that successful afforestation is connected with the ability to enhance the value of the timber, i.e. wood processing and marketing. Even though there is a huge timber deficit within the EC, some regions lack the industrial structure and/or the technological know-how to ensure that the timber is absorbed by the market at a favourable price. Afforestation should thus be accompanied, particularly in countries with modest forestry traditions, by measures that encourage organization of the entire forest-timber system, from farms to wood processing, as laid down in Regulation (EEC) No 867/90.

Afforestation of farmland also calls for careful consideration of the local environment, soil and climate. The national, regional and local programmes foreseen by the Regulation should certainly give specific replies according to the various situations. However, there still seems to be space for ambiguous solutions. Two profoundly different situations exist: afforestation of the fertile land in the plains and afforestation of marginal land, especially in mountain areas. In the former case, the choice is often that of fast-growing species requiring specialized techniques, similar to those adopted in agriculture. This is an operation that in some cases appears to be economically viable even if no incentives are provided. As regards marginal areas, afforestation may take place naturally over time, as shown by the millions of hectares of farmland that have returned to woodland in Europe over the last century.

Afforestation may thus concern two situations that are clearly differentiated and in both cases may occur spontaneously, in line with market forces. A middle-of-the-road case is the type of afforestation often envisaged by agricultural policy-makers, and which is the most difficult to achieve because it concerns agricultural land still in production where afforestation is aimed at reducing farm production, while improving the environment and producing timber. As a consequence, the solution often chosen has been that of fast-growing species such as poplar, eucalyptus and sitka spruce. Various problems evidently arise: the environment and the landscape which are not improved by plantation forestry; the timber surplus that periodically appears for poplars for instance, which could create problems for traditional growers, who do not benefit from aid; and, finally, exotic timber of low quality is not always easily marketable.

The above remarks demonstrate the risks inherent in afforestation of agricultural land as shown by past experience. However, the levels of incentives foreseen by the reform are relatively high and may thus encourage non-farmer landowners in particular to consider the possibility of afforestation on rather fertile agricultural land, employing indigenous broad-leaved trees that could certainly improve the

environment and be easily sold once matured. The situation remains critical of very productive land along the coasts and rivers where forestry is urgently needed in order to prevent nitrate leaching or other forms of agricultural pollution. Here the incentives do not seem to be sufficient, as the land's economic potential is so high. Incidentally, afforestation has to overcome the obstacle of CAP-augmented land values if it is to be profitable. This puts an extra burden on those seeking to set up forests. In these cases a good compromise may be the one foreseen in the agri-environmental measures which encourages hedgerows, shelter-belts or small ecological niches that represent a way of reducing the farm acreage without causing undue problems for the individual farms, yet bringing substantial environmental benefits. Otherwise, there is a possibility that the proposed incentives will be channelled towards marginal land where such high levels of aid are not justified. From Table 3, it is quite clear that in the mountain areas the afforestation scheme may even offset the agri-environmental measures, at the expense of the meadows and pastures. This fact is particularly serious in situations such as the mountain areas where, from the ecological point of view, it seems to be important to maintain a balanced mix between the *ager* (which has almost entirely disappeared), the *saltus* (on the decrease) and the *silva* (which has increased too much over the past 50 years).

It is therefore desirable that, in the various local programmes, attention should be paid to issuing aids and premiums in accord with reasonable margins of profitability, while at the same time orientating it towards indigenous species typical of the local environment, where their positive environmental impact is also accompanied by good potential for economic enhancement as is the case for oak, chestnut and other traditional trees, and better still if there is the possibility of obtaining additional products such as mushrooms and truffles. Under the approved reform, more attention should be paid to afforestation programmes involving more than one private and/or public landowner in order to reach land consolidation. In this sense, there have already been positive experiences from the French 'groupements forestiers' and the Italian 'consorzi forestali'. In short, all attempts at afforestation of agricultural land should be considered with extreme caution, bearing in mind both technical aspects (location, species, management and procedures for granting the incentive) as well as commercial and industrial ones. The final goal should be that of creating multipurpose forestry (ecology, watershed, nature conservation) and producing timber or other goods that are well appreciated by local users and exploited by local industries operating on a small scale. More ambitious forestry policies do not appear to be particularly appropriate. They would call for great investment and, incidentally, according to Italian experience, it does not always seem easy to find large tracts of available land. In addition, they need specific market organization and the development of a wood industry able to make full use of the newly available timber. One must also take account of the fact that the impact of big projects in terms of rural development and environmental quality does not appear to be always positive, as is shown by the fact that Scandinavian countries are also attempting to develop farm-based silviculture serving small-scale sawmills located in the countryside (Selby, 1984).

5.3.3. The early-retirement scheme

The idea of improving agricultural structures by pensioning off older farmers who are willing to pass their land on to younger generations was also one of the basic proposals of the 1968 Mansholt Plan. In taking up this idea once more, the CAP reform puts the blame for the previous failures of such schemes on the lack of adequate financing. Even with the new levels of 'pensions' — which are undoubtedly higher — it is nevertheless unlikely that the scheme will be widely applied. Thus its effects could be rather limited, concerning specific cases alone, and without substantial impact on agricultural structures, particularly in areas where the situation is more problematic. In integrated rural economies resulting from recent industrial and commercial development, with extremely high land prices — often 10 times higher per hectare than the basic yearly pension proposed (ECU 4 000) — there appears to be no good reason why a farmer aged 55 to 65 should leave a farm which in itself, with its few hectares, represents security against any eventuality.

The early-retirement scheme would appear to be more applicable in the Community's marginal rural areas where industrial and tourist development has not taken place. In this case too, however, it should be emphasized that the scheme goes against the grain of a certain type of farmer attitude — or rather, that of the small landowners, particularly in southern Europe. It is not difficult to foresee that the scheme would be applied for motives of convenience alone and would be basically ineffective in terms of structural improvement. Very probably, the scheme, as in the case of previous similar structural interventions, will be applied above all in areas that already have good long-standing structures, where individual families will find that the scheme fits in with decisions and internal arrangements that have already been made.

In order to achieve structural improvements — which are particularly needed in weakly structured, marginal agriculture — one should envisage and undertake a series of actions regarding the entire jurisdictional and institutional framework of landownership rights, particularly in Mediterranean Europe where the problem is more serious. It is surprising in this respect that the EC has never attempted to

deal with the more basic issues connected with land tenure[1] and which are in the end reflected in the competitiveness of various types of agriculture. An example is the legislation concerning tenancy which in some countries (e.g. Italy) is an obstacle to the stipulation of new contracts, so that land can be consolidated only when it is sold. Another aspect is the taxation system based on notional incomes that are so low that they almost cancel out the 'cost' of the land in terms of taxes. These reasons, along with a certain kind of 'peasant' attitude typical of much of the rural population, contribute to increasing land prices and perpetuate the notion of land as the best 'savings bank' or reserve of wealth. The CAP has played a role in all this, in the sense that it has allowed for high prices, indemnities for set-asides and, according to the CAP reform, various forms of compensation for all landowners. All these measures, of course linked to 'late development' effects, have contributed, and still contribute, under the CAP reform to prevent land consolidation where it is most badly needed.

6. Conclusions

The above analysis of the consequences of CAP reform was undertaken with reference to various rural typologies throughout the Community. In general, it was shown that price reductions accompanied by compensation, are not likely to have dramatic effects on the state of rural development. It is not possible to generalize, however, as there are so many different situations due to the variety of activities now located in rural areas. Every area is a specific case: a mix of industries and services differently intermingled within themselves and variously linked to agriculture. Therefore it is pointed out throughout the paper that while it makes sense to speak of a common agricultural policy, it is almost impossible to imagine a unique rural policy which by its very nature must be differentiated according to the structure of the various local economies. Generally speaking, it has been observed that the reform, once established, could give rise to interesting new developments both within and outside agriculture, affecting in the end the whole socioeconomic system of rural areas.

The following points emerge from the analysis:

(i) The trends in strong agricultural areas ought to continue, even with lower prices, provided adequate compensation is allowed, at least in the short term, for supporting adjustments. One must not, however, overlook the fact that a fall in prices, with the uncertainty of compensation left to year-by-year decisions, could lead to large productive conversions and/or unexpected reactions in terms of destructuring of traditional farming. In any case, room is left for interesting new developments in the socioeconomic systems of rural areas.

(ii) Agriculture of well-developed rural areas with weak farm structures is expected to survive thanks to its close integration or dependence upon other economic sectors. It is difficult, however, to envisage in these areas the kind of agricultural restructuring that seems so important and urgent, above all for environmental and conservation purposes.

(iii) Declining and marginal rural areas ought to decline even further, a trend which would not be reversed by a hypothetical increase in agricultural prices. Only compensation and aids extensively applied could significantly improve the agricultural income situation of these areas, but this would not necessarily mean a real development in agriculture or in the rural economy as a whole.

(iv) Much seems to depend upon the existence and development of local agricultural systems able to absorb lower prices and to provide services and structures for maintaining added-value within agriculture and rural areas. It has been pointed out that the general efficiency of the agribusiness system is sometimes more important than the structures of individual farms.

(v) From the environmental point of view, a fall in prices accompanied by compensation, would not dramatically change the level of externalities (both negative and positive) produced by agriculture. Certainly, there will be some reduction in negative externalities, as a result of possible extensification and the benefits granted to non-intensive livestock breeding, while there would be a fall in the positive externalities produced in marginal areas, considering that the market measures (prices and compensation) do not appear to slow down their decline.

(vi) Positive signs, in terms of rural development and environmental quality, emerge from the reform's accompanying measures. The agri-environmental and afforestation programmes appear to be particularly interesting. They, in fact, lay down the foundations for a radical change in the way agriculture is practised, and hence in the environment and the rural economy. However, it is not clear what could be their effectiveness in the general context of CAP reform, given the uncertain financial commitments. Accompaning measures are, in fact, left to the initiative of individual Member States and regions with all the uncertainty of this process.

[1] In this sense, the EC strictly adheres to the Treaty of Rome.

(vii) Whereas the market measures can be perceived as certainties, at least in the short term, the accompanying measures may be seen as complementary, similar to the structural policies applied so far. It appears that the States and regions in which the problems are most deeply felt are those that will probably come across the greatest difficulties, particularly at the administrative level, in applying such measures.

(viii) There is also a concrete possibility that the market measures are in practice aimed at agricultures with strong structures, whereas the weakest areas have to rely on the uncertain nature of the premiums provided by the accompanying measures. In short, with respect to the past, the form, but not the substance, of the CAP might change.

(ix) It is felt, therefore, that in order to have a positive effect on rural development and environmental quality, CAP reform should use the compensation measures for more specific purposes, orientating them towards rural development *latu sensu*, i.e. a 'global quality agriculture', including environmental conservation and quality of products, which, in the end, substantially contributes to the rural economy and social cohesion of rural society.

(x) The question remains whether the individual States and regions have the bureaucratic capacity to apply the compensation scheme correctly. There is a real possibility that in much of southern Europe the whole reform will be jeopardized by difficulties in applying it, and by the related costs. And this is not only a question of administrative capacity, but also of numbers. It is one thing to manage compensation for hundreds of thousands of farmers, and another for millions of landholders. Clearly selecting the subjects who can benefit from compensation would make the measures not only more effective for achieving policy objectives, but also easier to apply.

(xi) The extension of the measures to all landowners, moreover, contributes to keeping land values high and substantially prevents any tendency towards land consolidation. Once again, there is the impossibility/incapacity to intervene in the land problem by harmonizing taxes and tenure legislations. The context of southern EC countries is such to make the early-retirement scheme, applied alone, rather wishful.

(xii) The analysis has pointed out that when dealing with the problem of rural development, one has to avoid the danger of taking up an 'agriculture-centric' position. Such an approach now finds its limits, and is largely contradicted, within agriculture itself, by generalized situations where the farm household income is made up substantially by other activities and social benefits that allow income levels to be comparable with the rest of the population.[1]

(xiii) In any case, it appears to be clear that support for agriculture is rarely justified in terms of the need for rural development. Agriculture and its associated activities may make a contribution in this direction, which can be remarkable in an integrated rural system, but it has to be accepted that, generally speaking, their role remains rather limited when other activities and services are lacking.

(xiv) One must take account of the fact that other productive activities and services now provide on average, 80% of the job opportunities. Rural areas thus see their future linked to a multitude of activities which determine their development, stability or decline, independent of agricultural policy, and in this case, independent of CAP reform.

(xv) When there are problems of rural development, the basic role must be therefore played by the Structural Funds (European Commission, 1990) and the actions undertaken by the various regional and local authorities concerned. However, it should be emphasized that economic activities and services must be integrated and compatible with the rural environment — where 80% of the land is used for agriculture and forestry.

(xvi) The importance of physical planning must be recalled. Appropriate regulation appears to be required both for industries and services as well as for agriculture (Jansen and Hetsen, 1991). Many mistakes have been made, especially in the rural areas of countries characterized by 'late economic development' where the need for development has meant that the rural environment has been overlooked, and hence agriculture itself. At the same time, it should be recognized that, almost everywhere in Europe, agricultural development itself has often caused severe problems for the environment.

(xvii) There is, therefore, a dilemma in choosing between the enforcement of strict physical planning within agriculture or rather stimulation of farmer self-regulation by means of a code of conduct. It should be recognized that CAP reform may make a large contribution to the extent in which, through premiums and new compensation mechanisms, it may encourage farmers to adopt self-regulation. From this point of view, agriculture and forestry may once again play a central role in rural issues and hence in rural development.

[1] Quite interesting is the debate between those who continue to support the notion of a farm problem, which the CAP has in some way dealt with over the past 30 years (Koning, 1991), and those who call for a revision of existing agricultural policies and underlying economic theories (Gardner, 1992).

References

AGRAL — Centro Ricerche Agricole Alimentari (1992), 'La riforma della PAC: conseguenze sui redditi aziendali in Italia', *Il coltivatore,* luglio, 1992.

Allanson, P. (1991), 'The Mac Sharry plan: modulation in the cereals sector', ESRC No 27, Department of Agricultural Economics, University of Newcastle.

Barker, T. S. (1991), 'Sources of structural change in the UK agriculture and food industries 1979-84', in Midmore, P. (ed.), *Input-output models in the agricultural sector,* Avebury.

Bartola, A. and Sotte, F. (1992), 'Riforma della PAC e agricoltura nella CEE', *Rivista di Economia Agraria,* Vol. XLVII, 1, pp. 89-122.

Bauer, D. (1987), 'Preissenkungen und einkommensstützende Ausgleichzahlungen als Instrumente der Extensivierrung', *Bayerisches Landwirtschaftliches Jahrbuch,* 64, Jahrgang, H. 6 and 8.

Bazin, G. (1991), 'PAC et zones defavorisées: bilan et perspectives', SFER, Session d'automne, Montpellier.

Boatto, V. (1991), 'Analisi della competitività del comparto cerealicolo padano', Deptartment TeSAF, University of Padua.

Brown, D. A. and Leat, P. M. (1988), 'Developing Grampian and its rural economy', Economic report 1, Aberdeen, Scottish Agricultural College.

Brown, R. L. (1992), 'Tourism as a tool in rural economic regeneration', *Tourism in Europe — the 1992 Conference,* Durham.

Brunet, P. (1991), 'Le développement régional rural en Europe', *Regional rural development in Europe,* Centre de publication de l'Université de Caen.

Bryden, J. (1991), 'The Impact of 1992 on Rural Europe', in Tracy, M. (ed.), *Rural policy issues,* Oxon, The Arkleton Trust.

CAS (1986), 'Countryside implications for England and Wales of possible changes in the CAP', University of Reading.

Cecchi, C. (1988), 'Distretto industriale: l'agricoltura dalla complementarità alla dissociazione', *La Questione Agraria,* 32.

Costa, P., Giacomini, C., Giraldi, G. and Manente, M. (1991), 'Il sistema agroalimentare nella struttura dell'economia italiana', Milan, Franco Angeli.

Davis, J. H. and Goeldberg, R. A. (1957), 'A concept of agribusiness', Boston, Harvard University.

De Filippis, F. and Salvatici, L. (1991), 'La proposta Mac Sharry di revisione della PAC: un'occasione per discutere', *La Questione Agraria,* 42.

De Wit, C. T. (1988), 'Environmental impact of the CAP', *European Review of Agricultural Economics,* Vol. 15, pp. 283-296.

Dubgaard, A. (1989), 'The need for a common environmental policy for EC agriculture', *Economic aspect of environmental regulation in agriculture,* Kiel, Wissenschaftsverlag Vauk.

Dubgaard, A. (1991), 'The Danish nitrate policy in the 1980s', Report 59, Copenhagen, Statens Jardbungskonomiske Institut.

Errington, A. (1991), 'Input-output relationships and the rural economy', in Midmore, P. (ed.), *Input-output models in the agricultural sector,* Avebury.

European Commission (1988a), 'The future of rural society', Com(88) 371 final, *Bulletin of the European Communities,* Supplement 4/88.

European Commission (1988b), 'Strategia ed azioni della Comunità nel settore forestale', COM (88) 255.

European Commission (1990), 'Agriculture and the reform of the Structural Funds — Vade-mecum', *Green Europe,* No 5.

European Commission (1991a), 'The development and future of the common agricultural policy — Reflection paper', Com(91) 100 def., 1 February.

European Commission (1991b), 'The development and future of the common agricultural policy — Proposal of the Commission', Com(91) 258 def., 19 July.

European Commission (1992a), 'Demographic evolution through time in European regions', Regional development studies, Brussels.

European Commission (1992b), 'CAP working notes 1992', Directorate-General for Agriculture.

Eurostat (1991), 'Annuario statistico regionale', tomo 1, Cronos and Regio.

FADN — Farm Accountancy Data Network (1990), *Economic results of Agricultural Holdings'*, No 5.

Ferro, O. (1992), 'La nuova PAC punisce l'efficienza delle aziende', *Il Sole 24 Ore,* 18 gennaio.

Fuà, G. (1980), 'Problems of lagged development in OECD Europe: a study of six countries', Paris, OECD Document No 2277 (derestricted).

Fuller, M. A. (1990), 'From part-time farming to pluriactivity: a decade of change in rural Europe', *Journal of Rural Studies,* Vol. VI, No 4, pp. 361-373.

Gardner, S. (1992), 'Changing Economic perspectives on the Farm Problem', *Journal of Economic Literature,* Vol. XXX, No 1.

Giacomini, C., Arfini, F. and Cesaro, L. (1992), 'Possibili conseguenze dell'applicazione delle proposte Mac Sharry sull'agricoltura dell'Emilia Romagna', Rome, INEA.

Gios, G. and Miglierina, C. (1987), 'Cost structure and integration in the agro-food sectors: a comparative study in EC countries', *European Review of Agricultural Economics,* Vol. 14-2, pp. 179-194.

Harthoorn, R. and Wossink, G. A. A. (1987), 'Backward and forward effects of Dutch agriculture', *European Review of Agricultural Economics,* Vol. 14-3, pp. 325-333.

Hill, B. (1992), 'Total income of agricultural households', 1992 Report prepared for Eurostat, Wye College, University of London.

Hodge, I. (1986) 'The scope and context of rural development', *European Review of Agricultural Economics,* Vol. 13-3, pp. 271-282.

Jacoponi, L. (1991) 'Distretto Marshalliano ed organizzazione delle imprese in agricoltura', *Rivista di Economia Agraria,* Vol. 45-4, pp. 711-743.

Jansen, A. J. and Hetsen, H. (1991), 'Agricultural development and spatial organization in Europe', *Journal of Rural Studies,* Vol. 7-3, pp. 143-151.

Jansma, D. J., Gamble, H. B., Madden, J. P. and Warland, R. H. (1981), 'Rural development: a review of conceptual and empirical studies', in Martin, L. R. (ed.), *Economics of welfare, rural development and natural resources in agriculture, 1940s to 1970s,* Minneapolis, University of Minnesota Press.

King, R. (1991), 'Core periphery in the structure of regional economies', *Regional rural development in Europe,* Centre de publication de l'Université de Caen.

Koning, N. (1991),'Il sostegno dei prezzi agricoli: la vera storia ed il punto di vista liberale', *La Questione Agraria,* 43, pp. 25-44.

Kroll, J. C. (1991), 'Les alternatives au soutien des prix', SFER, Session d'automne, Montpellier.

Larsen, A. (1991) 'Impact of agricultural policy reform', Dublin, The National Economic and Social Council.

Leat, P. M. and Chalmers, N. (1991), 'Analysing agricultural adjustment in Grampian using an input-output model of the agricultural and food complex', in Midmore, P. (ed.), *Input-output models in the agricultural sector,* Avebury.

Lechi, F. (1987), 'Desequilibrio regional y evolución en el proceso de la política agrícola. Diferencias regionales y evolucion de la política agrícola', *Revista de Estudios Agro-Sociales,* No 140, April-June, pp. 51-86.

Lufpig Group of the European Parliament (1990), 'A future for Europe's farmers and the countryside', (B. Green, B. Kearney, L. Mahe, J. Marsh, S. Tangerman, S. Tarditi).

MacKinnon, N., Bryden, J. M., Bell, C., Fuller, A. M. and Spearman, M. (1991), 'Pluriactivity, structural change and farm household vulnerability in Western Europe', *Sociologia Ruralis,* Vol. XXXI, No 1, pp. 59-71.

Marinelli, A., Casini, L. and Romano, D. (1990), 'Valutazione economica della ricreazione', *Genio Rurale,* No 9.

Mac Donald, J. R. S., Rayner, A. J., Bates, J. M. (1991), 'Productivity growth and structural change in agriculture and the UK food chain: 1954-84', in Midmore, P. (ed.), *Input-output models in the agricultural sector,* Avebury.

Merlo, M. (1991), 'The effects of late economic development on land use', *Journal of Rural Studies,* Vol. 7-4, pp. 445-457.

Midmore, P. (1991), 'Input-output in agriculture: a review', in Midmore, P. (ed.), *Input-output models in the agricultural sector,* Avebury.

Miglierina, C. (1992), 'Struttura del settore agro-alimentare lombardo e sua evoluzione nel tempo', Milan, Regione Lombardia.

Roberts, D. (1991), 'A comparison of input-output and social accounting methods for analysis in agricultural economies', in Midmore, P. (ed.), *Input-output models in the agricultural sector,* Avebury.

Runge, F. (1991), 'Illusion and reality in international agricultural trade negotiations', colloquium of 4 and 5 December 1991, AG PB, Paris.

Schmitt (1991), 'Why is the agriculture of advanced Western economies still organized by family farms?' *European Review of Agricultural Economics,* Vol. 18-3/4, pp. 449-458.

Selby, A. (1984), 'Entrepreneurs in rural areas: a humanistic approach to the study of small sawmills in North Karelia', Metsäntutkimnslaitaksen, 146, Helsinki.

Stellin, G. and Dosi, C. (1989), 'Influencing land-use patterns to reduce nitrate pollution from fertilizers and animal manure', in Dubgaard, A. and Nielsen, H. (eds), *Economic aspect of environmental regulation in agriculture,* Kiel, Wissenschaftsverlag Vauk.

Tarditi, S. (1991), 'Strumenti per l'aggiustamento strutturale dell'agricoltura italiana', Atti SIDEA, Bologna, Il Mulino.

Tamminga, G., von Meyer, H., Strijker, D. and Godescholk, F. E. (1991), 'Agriculture in the less-favoured areas of the EC-10', The Hague, Agricultural Economics Research Institute.

Van der Ploeg, J. (1988), 'Recent developments in European agriculture', *Changing agricultural landscape in Europe,* IFLA Conference, Rotterdam.

von Meyer, H. (1991), 'From agricultural to rural policy in the EC', in Tracy, M. (ed.), *Rural Policy Issues,* The Arkleton Trust, Oxon.

Weinschenk, (1990), 'Strategies to reduce surplus production and environmental burden', *European Review of Agricultural Economics,* Vol. 17-2, pp. 215-230.

Whitby, M. (1986), 'An editorial postcript: the place of rural development in the traditional agricultural economics', *European Review of Agricultural Economics,* Vol. 13-3, pp. 433-438.

Whitby, M. (1987), 'The potential impact of extensification schemes on rural employment', Merlewood Conference, November.

Wibberley, G. P. (1981), 'Strong agricultures but weak rural economies', *European Review of Agricultural Economics,* Vol. 8-2/3, pp. 155-170.

Annex 1

Farm net value-added (FNVA) per annual work unit (AWU) and gross value-added per inhabitant (GVA/INH) of European regions (EUR 12) distinguished according to agricultural-rural typologies

	Regional code	FNVA/AWU (ECU)	% of EUR 12 average	GVA/INH (ECU)	% of EUR 12 average
Regions with rural areas under the pressure of modern life					
Northern-central (vertex C, I° quadrant)					
Belgium	1	19 562	208,2	9 778	101,6
Denmark	2	20 416	217,3	12 809	133,1
Schleswig-Holstein	3	16 701	177,7	10 327	107,3
Hamburg	4	9 407	100,0	20 928	217,6
Lower Saxony	5	14 586	155,2	10 521	109,3
North Rhine-Westphalia	6	13 754	146,4	12 112	125,9
Rhineland-Palatinate	8	10 351	110,1	11 051	114,9
Saarland	11	9 744	103,7	11 161	116,0
Île-de-France	13	19 939	212,2	16 933	176,0
Champagne-Ardenne	14	25 037	266,5	10 800	112,2
Picardy	15	17 523	186,5	9 889	102,8
Upper Normandy	16	13 956	148,5	12 146	126,2
Centre	17	17 101	182,0	10 704	111,2
Lower Normandy	18	12 740	135,6	9 779	101,6
Burgundy	19	16 691	177,6	9 902	102,9
Nord-Pas-de-Calais	20	13 965	148,6	9 337	97,0
Lorraine	21	12 410	132,1	9 636	100,1
Alsace	22	12 587	133,9	11 532	119,9
Franche-Comté	23	11 144	118,6	10 102	105,0
Luxembourg	55	14 461	153,9	11 453	119,0
Netherlands	56	24 248	258,1	10 503	109,2
East England	59	17 224	183,3	10 302	107,1
Average value		15 616	166,1	11 441	118,9
Central-southern (vertex B, IV° quadrant)					
Hesse	7	8 147	86,7	13 921	144,7
Baden-Württemberg	9	9 523	101,3	13 119	136,4
Bavaria	10	7 987	85,0	12 380	128,7
Aquitaine	27	10 692	113,8	10 991	114,2
Midi-Pyrénées	28	7 830	83,3	9 354	97,2
Limousin	29	7 019	74,7	8 827	91,7
Rhône-Alpes	30	10 565	112,4	11 306	117,5
Auvergne	31	9 421	100,2	8 915	92,6
Languedoc-Roussillon	32	13 982	148,8	8 757	91,0
Provence-Alpes Côte d'Azur	33	13 000	131,4	10 410	108,2
Valle d'Aosta	35	5 868	62,4	11 444	118,9
Piedmont	36	6 682	71,1	10 765	111,9
Lombardy	37	15 514	165,1	12 101	125,8
Trentino-Alto Adige	38	8 867	96,9	10 821	112,5
Veneto	39	8 991	95,7	10 439	108,5
Friuli-Venezia Giulia	40	8 419	89,6	10 230	106,3
Liguria	41	6 796	72,3	10 819	112,4
Emilia-Romagna	42	11 859	126,2	11 463	119,1
Tuscany	43	6 396	68,0	10 451	108,6
Marche	44	5 729	60,9	9 683	100,6
Umbria	45	5 674	60,4	8 702	90,4
Lazio	46	8 186	87,1	10 234	106,4
Average value		8 965	95,6	10 688	111,1

	Regional code	FNVA/AWU (ECU)	% of EUR 12 average	GVA/INH (ECU)	% of EUR 12 average
		Regions with intermediate rural areas			
		Northern Atlantic (side A-C, II° quadrant)			
Loire Region	24	12 756	135,7	9 743	101,3
Brittany	25	11 789	125,4	9 213	95,7
Poitou-Charentes	26	12 412	132,1	9 229	95,9
North England	58	16 370	174,2	8 689	90,3
West England	60	15 938	169,6	8 530	88,9
Wales	61	14 117	150,2	8 642	89,8
Scotland	62	11 689	124,4	8 799	91,4
Northern Ireland	63	10 131	107,8	6 997	72,7
Average value		13 150	139,9	8 730	90,7
		Regions with declining or marginal rural areas			
		Southern and Ireland (vertex A, III° quadrant)			
Greece	12	4 839	51,5	3 932	40,8
Ireland	34	8 786	93,5	6 157	64,0
Abruzzi	47	5 191	55,2	7 938	82,5
Molise	48	8 479	90,2	6 605	68,6
Campania	49	5 260	55,9	6 413	66,6
Basilicata	50	6 959	65,2	5 663	56,7
Apulia	51	8 675	92,3	6 438	66,9
Calabria	52	6 134	74,0	5 461	58,8
Sicily	53	7 107	75,0	6 215	64,6
Sardinia	54	9 566	101,8	6 918	71,9
Portogallo	57	2 837	32,2	2 629	27,3
Galicia	64	5 184	55,1	4 791	49,8
Asturias	65	4 087	43,5	5 641	58,6
Cantabria	66	4 528	48,1	5 737	59,6
Basque Country	67	7 191	76,5	6 836	71,0
Navarre	68	13 430	142,9	6 390	66,4
Rioja	69	10 858	115,5	8 939	92,9
Aragon	70	8 020	85,3	5 974	62,1
Catalonia	71	7 106	75,6	6 306	65,5
Balearic Islands	72	8 708	92,7	7 796	81,0
Castile-Leon	73	7 777	82,7	5 322	55,3
Madrid	74	8 384	88,2	6 209	64,5
Castille-La Mancha	75	7 121	75,8	4 592	47,7
Valencia	76	7 576	80,6	5 558	57,7
Murcia	77	5 072	53,9	4 944	51,4
Extremadura	78	7 334	78,0	3 778	39,2
Andalusia	79	7 556	80,4	4 345	45,1
Canary Islands	80	11 589	123,3	4 923	51,1
Average value		7 334	78 0	5 802	60,2
EUR 12		9 391	100,1	9 624	100,0

Source: Eurostat (1991); FADN, (1990).

Annex 2

Agricultural structures of the European regions (EUR 12)

	Regional code	AAA[1] (ha)	AWU	MAA[2] (%)	Type of farming[3] (%)			
					1	2	3	4
Regions with rural areas under the pressure of modern life								
Northern-central (vertex C, I° quadrant)								
Belgium	1	14,70	1,09	0,0	11,30	8,60	3,20	43,60
Denmark	2	32,20	1,20	0,0	43,60	2,00	0,00	1,80
Schleswig-Holstein	3	35,80	1,43	0,0	1,60	1,00	2,60	55,80
Hamburg	4	9,90	2,20	0,0				
Lower Saxony	5	25,00	1,25	0,0	19,30	1,30	2,10	36,90
North Rhine-Westphalia	6	17,50	1,24	0,3	17,40	4,30	1,50	30,10
Rhineland-Palatinate	8	12,10	1,21	0,0	15,60	1,70	39,40	0,00
Saarland	11	18,60	1,14	0,0	28,50	2,80	5,70	25,70
Île-de-France	13	64,00	2,23	0,0	0,70	11,10	5,50	2,20
Champagne Ardenne	14	47,00	1,60	0,0	34,40	0,30	33,80	16,70
Picardy	15	61,60	1,94	0,0	48,80	0,90	3,20	21,60
Upper Normandy	16	32,20	1,31	0,0	18,60	1,60	0,80	53,50
Centre	17	47,70	1,55	0,0	45,80	1,50	8,30	15,70
Lower Normandy	18	25,10	1,36	0,0	7,00	0,50	0,30	80,00
Burgundy	19	48,60	1,67	0,0	19,70	2,70	12,70	40,80
Nord-Pas-de-Calais	20	29,50	1,68	0,0	39,80	3,10	3,40	22,30
Lorraine	21	43,90	1,43	0,0	10,50	0,80	2,80	46,50
Alsace	22	16,20	1,35	2,1	10,40	3,30	24,20	15,70
Franche Comté	23	35,30	1,42	23,7	5,80	0,50	3,70	70,00
Luxembourg	55	25,80	1,59	0,0	6,10	2,00	14,20	44,87
Netherlands	56	15,30	1,77	0,0	13,10	14,30	4,30	45,20
East England	59	67,00	2,65	0,0	39,40	6,80	3,50	31,30
Average value		32,95	1,56	1,3	20,82	3,38	8,34	33,34
Central-southern (vertex B, IV° quadrant)								
Hesse	7	14,70	1,10	0,0	28,90	2,00	3,00	19,80
Baden-Württemberg	9	11,80	1,09	7,2	16,60	2,00	14,20	32,50
Bavaria	10	14,40	1,21	6,3	19,70	0,90	1,60	48,60
Aquitaine	27	19,30	1,64	0,0	23,10	1,40	17,00	20,00
Midi-Pirénées	28	27,80	1,48	0,0	23,80	1,00	4,70	33,60
Limousin	29	30,50	1,34	0,0	6,90	0,30	1,30	81,40
Rhône-Alpes	30	18,50	1,32	2,6	10,60	1,50	16,00	39,60
Auvergne	31	33,50	1,33	0,0	7,90	0,40	1,30	71,30
Languedoc-Roussillon	32	15,25	1,29	0,0	4,10	2,90	73,50	8,10
Provence-Alpes Côte d'Azur	33	14,90	1,59	12,7	8,70	15,60	44,30	11,70
Valle d'Aosta	35	11,30	0,66	100,0	11,60	0,00	10,40	63,90
Piedmont	36	6,20	0,90	34,3	20,10	0,30	32,80	18,90
Lombardy	37	8,20	1,05	19,2	29,10	0,60	17,10	32,90
Trentino-Alto Adige	38	8,20	1,00	63,7	2,00	0,40	46,80	43,30
Veneto	39	4,20	0,83	15,9	39,60	1,20	16,10	15,30
Friuli-Venezia Giulia	40	4,90	0,76	29,6	54,30	0,50	5,30	9,40
Liguria	41	2,10	0,93	83,0	9,50	18,70	34,10	8,90
Emilia-Romagna	42	7,90	1,05	29,4	39,20	0,60	25,10	17,80
Tuscany	43	7,50	0,93	36,4	23,70	2,70	40,30	5,90
Marche	44	6,90	0,82	29,5	58,20	0,00	8,70	5,40
Umbria	45	7,60	0,84	32,0	33,40	0,00	15,90	6,30
Lazio	46	4,40	0,70	35,3	18,50	2,20	42,70	9,50
Average value		12,72	1,08	24,4	22,25	2,50	21,46	27,45

	Regional code	AAA[1] (ha)	AWU	MAA[2] (%)	Type of farming[3] (%)			
					1	2	3	4
Regions with intermediate rural areas								
Northern Atlantic (side A-C, II° quadrant)								
Loire Region	24	27,60	1,56	0,0	8,70	2,20	6,00	57,30
Brittany	25	19,20	1,44	0,0	13,00	1,20	0,40	51,70
Poitou-Charentes	26	33,20	1,39	0,0	20,40	0,90	13,50	23,30
North England	58	60,40	2,17	0,0	19,80	4,20	0,70	58,10
West England	60	48,60	2,09	0,0	8,70	3,00	0,80	64,10
Wales	61	48,40	1,7	0,0	2,60	0,60	0,00	87,60
Scotland	62	31,40	1,97	0,0	19,40	1,50	0,60	63,20
Northern Ireland	63	122,70	1,13	0,0	4,20	0,40	0,90	66,80
Average value		48,90	1,68	0,0	12,10	1,75	2,86	59,01
Regions with declining or marginal rural areas								
Southern and Ireland (vertex A, III° quadrant)								
Greece	12	4,00	0,89	39,6	29,20	1,60	42,10	5,90
Ireland	34	22,60	1,17	0,0	4,20	0,00	0,00	90,40
Abruzzi	47	5,20	0,70	57,6	31,90	0,00	26,70	6,70
Molise	48	6,10	0,63	50,3	37,40	0,00	14,10	2,90
Campania	49	2,60	0,92	53,2	31,30	1,40	37,50	4,70
Basilicata	50	3,90	0,65	50,7	17,60	0,00	54,80	3,60
Apulia	51	4,50	0,59	8,3	16,90	0,00	72,00	1,00
Calabria	52	8,10	0,65	46,5	33,80	0,00	22,00	7,20
Sicily	53	4,30	0,50	35,7	21,60	2,90	57,10	6,00
Sardinia	54	13,40	0,71	15,5	17,30	0,10	43,90	19,20
Portogallo	57	5,20	1,54	31,2	8,20	1,70	11,00	4,60
Galicia	64	3,10	1,41	33,3	9,80	0,83	1,30	33,90
Asturias	65	6,50	1,30	90,3	0,17	0,71	2,30	72,60
Cantabria	66	7,20	1,17	77,5	1,00	36,70	0,00	77,00
Basque Country	67	7,20	1,34	72,5	6,40	6,80	3,90	41,70
Navarre	68	16,20	0,78	42,5	30,10	11,10	0,90	12,30
Rioja	69	10,10	0,96	28,8	19,70	10,70	15,90	8,90
Aragon	70	23,00	0,81	25,7	29,50	2,90	31,80	8,90
Catalonia	71	10,40	1,02	27,1	20,90	9,50	36,60	6,20
Balearic Islands	72	10,90	0,75	11,7	13,70	7,30	37,60	6,80
Castile-Leon	73	23,00	0,90	29,6	39,20	1,50	1,60	27,40
Madrid	74	20,50	0,73	22,4	42,40	6,40	14,50	20,90
Castile-La Mancha	75	24,40	0,65	28,2	29,30	3,30	32,60	8,00
Valencia	76	3,50	0,50	27,2	1,70	5,50	82,80	1,10
Murcia	77	8,90	0,79	17,5	10,10	9,10	61,70	2,20
Extremadura	78	31,00	0,81	5,1	23,60	2,10	29,00	15,70
Andalusia	79	14,00	0,87	29,9	19,50	7,30	45,40	5,20
Canarias y Islands	80	2,40	1,22	78,2	11,20	18,20	26,30	7,00
Average value		10,79	0,89	37,0	19,91	5,27	28,76	18,14

1 Average agricultural area per farm.
2 Mountain agricultural area.
3 Type 1 — Cereals and other crops.
Type 2 — Vegetables and flowers.
Type 3 — Orchards and vineyards.
Type 4 — Animals.

Sources: Eurostat(1991); FADN(1990).

Agricultural support and structural development

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1. Introduction

The farm size structure in the European Community (EC) is a central problem for the CAP. In order to secure 'a fair standard of living' for the predominantly small farms, agricultural prices have been set at levels that have induced unwanted production levels. In spite of this, agricultural incomes have lagged behind incomes in other sectors inducing pressures to create larger and economically more viable farms. However, the level of agricultural support has reduced the pressure for change and left the EC with a farm structure in need of considerable changes in order to cope with more market-oriented prices.

The problem has been accentuated by the large increases in economies of scale over the last decades, making it increasingly difficult to finance 'reasonable incomes' for small farmers, who with a reasonable production efficiency are underemployed with their present factor endowment.

The conflict between agricultural support and structural development has received some attention in agricultural policy discussions in the EC, but generally to little avail. The most prominent attempt in this respect is undoubtedly a Commission memorandum (European Commission, 1968) which was later named the Mansholt Plan. It suggested a reform of the agricultural policy with strong emphasis on structural development as the problems of 'oversupply' and the need for basic changes were fully recognized. The plan was to support the creation of economically viable farm units by freeing sufficient resources to do so. Through early retirement or retraining some 5 million people should be helped to leave agriculture, and the land thereby set free should be used to increase the size of remaining farms as well as remove about 5 million ha from agricultural production. The better farm structure should make it possible to move towards market-oriented prices while maintaining reasonable incomes.

Thus, the plan attacked the core problem of the CAP, which is superfluous resource-use in agriculture caused by the high price level and consequently huge budget expenses. The plan recognized that the CAP expenses, which are basically of a social nature, would be better used to correct the problem at hand than to continue price support, with very progressive benefits (Brown, 1989), and further resource misallocation. However, the plan did not receive the necessary political support, and only some elements of it were carried out in a very watered down form. Consequently, it has had little impact on agricultural structure and policy.

A series of later reform proposals by the Commission have also intended to put more emphasis on structural reform, but they have never resulted in any substantial change of the CAP. Through quotas and stabilizer policies, some lid has been put on the costs of the CAP, but the essential problem of resource misallocation has never been seriously addressed.

In the political discussion, the employment issue has played a considerable role, the argument being that resource adjustment in agriculture would increase unemployment. This was also the case in the discussion of the Mansholt Plan, although the unemployment level in the EC then was considerably lower than in recent years. However, this argument may equally well be used as support for any sector in the economy — as it also is. There is hardly a sector where organizations, entrepreneurs and labourers cannot agree that public support for their particular sector is of public interest. Agriculture, however, has succeeded better than most other sectors. The result of supporting a contracting sector has undoubtedly hampered development of expanding sectors — directly by extracting tax transfers and indirectly through (unfair) competition for resources. Structural adjustment support, on the other hand, would be expected to have increased total growth by furthering the development of expanding industries.

The basic reason for farm support is to support income levels with a given agricultural structure, i.e. to shield agriculture from the adjustments necessary to cope with price decreases/productivity gains. However, as the productivity gains are readily available, the support will tend to be capitalized into agriculturally fixed assets, and structural development may only be hampered temporarily. In order to maintain the income and structural effects, agricultural protection has to be continually increased, which, however, is prevented by the costs involved. Thus, a given level of protection can only deter structural development temporarily, but the 'loss' in structural development is maintained unless protection is reduced. Consequently, decreased protection would be expected to bring about a temporary increase in structural development.

Structural development may be affected by a number of other factors such as risks due to price variability, product specialization, legislation concerning, for instance, inheritance, limitations on farm size and tenancy laws. However, a major aim of this paper is to investigate the impacts of farm support on structural development.

2. Agricultural structures in the European Community

There is considerable variation in the farm size structure among EC Member States (Table 1). In terms of output per

farm, the biggest holdings are found in the Netherlands, Denmark and the United Kingdom, while Portugal has the smallest average holding size, a size which is less than one twentieth of that in the Netherlands. Greece, Spain and Italy also have small average size farm units. Apart from the United Kingdom, the change in average size since 1975 has tended to aggravate the unequal structure in the EC. Thus, the biggest increases in size came about in Denmark and the Netherlands, while the smallest increase among EUR 9 was found in Italy.

Table 1

Farm size in the European Community and Member States, 1987 and annual % changes since 1975

	Per holding					
	Final output		Agricultural area		Labour input	
	1 000 ECU	% change[1]	ha	% change[1]	AWU[2]	% change[1]
Belgium	57,9	5,0	15,1	3,0	1,06	0,4
Denmark	71,8	6,3	32,4	3,1	1,31	- 0,2
Germany	36,6	3,5	17,0	1,8	1,21	- 1,0
Greece	7,2	—	6,0	—	0,89	—
Spain	11,8	—	15,1	—	0,91	—
France	42,9	4,8	31,9	3,0	1,51	0,1
Ireland	16,9	2,5	26,1	1,3	1,17	- 1,6
Italy	12,5	1,4	6,3	0,1	0,76	- 2,7
Luxembourg	42,3	4,2	31,8	3,1	1,75	- 1,1
Netherlands	105,7	5,1	15,3	1,5	1,77	1,1
Portugal	4,8	—	7,1	—	1,47	—
United Kingdom	64,4	2,7	71,5	1,7	2,00	- 0,9
EUR 9	28,3	2,8	17,4	1,3	1,08	- 1,5
EUR 12	20,8	—	14,9	—	1,05	—

[1] Annual % change since 1975.
[2] Annual work units.
Source: Statistical yearbook of agriculture, Eurostat, and *The agricultural situation in the Community*, European Commission (several years).

Due to the different composition of farm output, primarily among animal husbandry and crop production, the farm size according to area gives a somewhat different ranking among Member States. The largest farm area per holding is found in the United Kingdom followed by Denmark, France and Luxembourg, while the smallest farms, also using this measure, are found in Greece, Portugal and Italy.

The average farm area and consequently the composition of farms in different area groups is changing quite quickly. The total number of agricultural and horticultural holdings fell in EUR 9 from 5 835 to 5 264 million between 1975 and 1987 corresponding to an annual decline of 0,9%. The average farm size increased from 14,8 to 17,4 ha and the volume of output per holding increased by 2,8% annually. The increase in farm-size area results from a decrease in the number of small farms and an increase in the number of large farms (Table 2).

Table 2

Number of holdings and agricultural area by size of holdings in EUR 9

		Under 10 ha	10 to 20 ha	20 to 30 ha	30 to 40 ha	50 to 100 ha	100 ha and over	All sizes
Number of holdings (1 000)	1975	3 763	888	469	392	229	94	5 835
	1985	3 548	698	405	394	260	103	5 408
Agricultural area (% of total)	1975	13,8	14,7	13,2	17,2	17,8	23,3	100,0
	1985	11,5	11,9	11,7	17,9	20,9	26,1	100,0

Source: Statistical yearbook of agriculture, Eurostat.

Another measure of farm size is that of labour input per unit (Table 1). Although there is considerable variation in labour input per holding among the Member States, this measure shows a much more even size than the other measures.[1] This is not surprising, as the labour input in relation to output reflects the productivity levels, and, consequently, the wage-level variations among Member States. The price relations among inputs would in low-income countries favour the use of more labour than the use of other inputs.

Apart from this general observation, the change in use of labour per farm unit may also reflect other difficulties in changing the farm structure. The biggest drop in labour input per unit is in Italy. As the Italian farm size according to the other measures shown has hardly changed at all since 1975, the adjustment in labour input in order to take advantage of productivity gains may suggest restrictions on area-size adjustments. Adjustments in Ireland, and to a lesser degree in Germany, have also to a large extent come about through decreased labour input per unit. A considerable downward adjustment in labour input has also occurred in the United Kingdom and Luxembourg, but from a rather higher level. The Netherlands, on the other hand, has had a considerable increase in labour input per unit together, however, with a strong increase in output per unit.

An example of the factors hampering structural development is provided by Knerr (1991) in an analysis of transfers to agriculture through the German tax system. She shows that such transfers are not neutral with regard to the structure of inputs, as the system through favouring smallholdings impacts on structural development. The discontinuity in support may increase incentives to part-time farming when the marginal product of labour declines rather than to put more effort into farming. This may to some extent explain why a considerable part of the German adjustment took place through a decrease in the labour input per holding. The resulting depressed farm income per holding may, however, be more than compensated by off-farm income.

In Italy the labour input per unit is on average considerably below one, suggesting part-time farming to be predominant. For the EC as a whole, the average labour input is about 1 unit per holding, which indicates extensive part-time farming. While consistent data on the extent of part-time farming and off-farm income are not generally available, Danish data may give some further insight into this area. Of a total of 76 400 farmholdings (with more than 5 ha) in Denmark in 1990/91, only 35 200 were full-time farms requiring a labour input of at least 1 unit (Table 3).

More than half of the holdings were part-time farms. On average, the gross profit from agriculture together with the imputed value of dwellings is less than the net interest payments on the part-time farms. However, income from wages, pensions, etc., amounted to about ECU 23 000 per farm. Thus, off-farm income is, in general, by far the most important income component for part-time farm families. The farming operations on these farms are generally extensive and inefficient, but the differences in living standards between full and part-time farmers are small, particularly when farm-family size is taken into consideration.

Table 3

Full and part-time farms in Denmark, 1990/91

	Full-time[1]	Part-time
Number	35 200	41 200
Average farmer age	48	54
Average farm size (ha)	55,8	17,9
Percentage of:		
Agricultural production	84,6	15,4
Animal products	91,7	8,3
Agricultural area	73,0	27,0
Labour input in agriculture	76,1	23,9
Capital input in agriculture	73,8	26,2
Per holding (DKR 1 000)		
Gross profit from agriculture	339	21
Surplus, dwelling (imputed)	28	26
Wages from other occupations	63	141
Pensions	15	35
Net interest and rent payments	228	55
Private consumption	166	137
Farm-family size	3,00	2,37
Agricultural efficiency measures[2]		
Rate of return (%)	3,3	– 6,9
Family remuneration (DKR/h)	87	– 14
Ratio of cost to production value	1,02	1,54

[1] A full-time farm requires at least 1 710 working hours per year.
[2] Rate of return is calculated on the basis of full payment at the going wage rate for family labour, and family remuneration figures are residual after 4% interest on capital.
Source: Heltidslandbrugets økonomi 1990/91. Serie E. No 10. Institute of Agricultural Economics. Copenhagen. 1992.

It is also interesting to note that the number of part-time farms has only decreased by 1% annually, while the number of full-time farms decreased by 4,6% (Table 4). Thus, the

[1] As there may be some question as to the uniformity of measurements concerning labour inputs, such data should be interpreted with some caution, particularly where the actual level is important rather than the changes.

part-time farms have become an increasing part of the total number of farms, but their part of total agricultural production has only increased slightly to 15,4%. Consequently, statistics covering all agricultural holdings have become increasingly unreliable as an expression of structure and income in the agricultural sector proper.

There is hardly any doubt that a similar situation exists in most of the EC's agriculture. This suggests that most farmers might not be dependent on farming activities for their income, and that farming to a very large extent is a residual occupation for families living on farms. It also suggests that the social nature of the farm-price policy to ensure a 'fair standard of living' for the predominantly small farms is highly questionable, not only because of its highly progressive benefits, but also because off-farm income is generally the more important income component on small farms. It also suggests that if the EC, through its price policy, were to maintain a fair standard of living from farm income on small farms, the costs would be exorbitant.

Table 4

Change in size and number of full and part-time holdings in Denmark, 1980/81 to 1990/91

(annual % change)

	Full-time	Part-time
Production per holding	6,8	5,1
Area per holding	3,8	1,9
Number of holdings	– 4,6	– 1.0

Source: Derived from *Heltidslandbrugets økonomi*, Serie E, 1980/81 and 1990/91, Institute of Agricultural Economics, Copenhagen.

Another aspect of structural development is the tendency to greater product specialization. An indication of this is given in Table 5, which shows the decline in percentages of farms producing a certain product in 1985 as compared with 1975. Only sheep production has maintained its dispersion on 10% of all farms over the 10-year period. This may be related to the strong increase there undoubtedly has been in part-time farming, where sheep production may easily be combined with off-farm work. The percentages of farms producing wine and sugar show only slight declines, which probably reflects the profitability of established production rights.

Table 5

Indication of product specialization in EUR 9

(percentage of holdings)

	1975	1985	Ratio 1985/75
Cereals	61	52	0,85
Potatoes	34	18	0,53
Sugar beets	6	5	0,83
Forage roots and tubes	22	10	0,45
Wine	31	30	0,97
Livestock	74	59	0,79
Cattle	51	38	0,75
Dairy cows	37	24	0,65
Sheep	10	10	1,00
Pigs	38	22	0,58
Breeding sows	13	7	0,54
Poultry	55	36	0,65

Source: Statistical yearbook of agriculture, Eurostat.

The specialization tendencies must be viewed as a means to rationalize production through limiting the required upkeep and development of managerial skills to fewer products. Also, the rational use of more advanced farm equipment will often require a greater volume of a given product and, consequently, tend to further product specialization.

Price policy might also be important for product specialization as one reason for product diversification is the reduced vulnerability to adverse price developments for single products. Thus, one might expect the CAP to lead to increased specialization due to the greater price stability it ensures. While there might be such a tendency, it does not seem very strong, and other factors seem to have overruled it. Therefore, the strongest move towards specialization in animal husbandry is found for pigs, a product which has not been protected from huge price variations. Apart from compensation due to the high cereal prices in the EC, the prices of pigmeat have generally been allowed to be determined by market forces. Profitability of specialization has undoubtedly been a much more important factor than the adverse effects of price risks involved in product specialization.

3. Economic forces and structural change

Throughout history, farm structure has been influenced by a number of political and economic forces with a different mix in different periods and geographical locations. While the main emphasis in this section will be on the economic forces behind structural changes, they are clearly interlinked with political forces, which often attempt to prevent changes.

As already mentioned, the major factor behind agricultural policy intervention — as with political intervention in other declining industries — is the alleviation of the social problems connected with the adjustments required by economic changes. To the extent such policies succeed in hampering structural development, the subsequent adjustment problems are aggravated.

In this connection, it might be useful to take a brief historical view of the development in the EC countries. The general liberalistic tendencies in the middle of the 19th century were, for a number of the EC countries, brought to an end in the last part of the century. The major force behind this development was the drop in grain prices following technological advances in production and transport facilities, which made it possible to market North American grain in Europe at price levels well below the hitherto existing prices. This development led to protectionism in most European countries, spurred by the owners of large farms, who, in the first instance, were most affected and also had the political influence to have protectionism accepted. The protection for grain producers soon led to protection of other products for which grain was an essential input. A few countries — the United Kingdom, Denmark and the Netherlands — chose a liberal attitude to the changes, and Denmark and the Netherlands changed the production emphasis from grain to animal husbandry, in which they were internationally competitive. However, the pattern of grain protection being the pivotal element in European protectionism was maintained, and was subsequently accepted by the CAP.

While data scarcity and the influence of a number of other factors make it difficult to relate developments in farm structures to historical protectionism, the fact remains that the countries choosing liberalistic policies were left with considerably better farm structures than the protectionist countries. Although it may be argued that political factors such as, for instance, inheritance legislation and tenancy laws might also play a major role in farm structure development, there can be little doubt that changes in such factors would be interlinked with the economic forces had they been allowed to play their role.

3.1. Economies of size

Economies of size are usually cited as a major cause of farm size growth in Western countries since World War II. At the same time, however, there is also evidence that economies of size in agriculture in most cases do not extend beyond holdings employing 2 to 3 persons. Nevertheless, as has been indicated above, only a small fraction of the farmholdings in the EC employ labour to that extent.

An indication of the extent to which economies of size exist in EC agriculture may be obtained through comparing total costs with the total production value on different sized farms (Table 6). Total costs include remuneration of the farm family, but are — due to lack of information — net of rents and interest charges. However, data from Danish farms indicate that the inclusion of these charges does not alter the relative position of the different size groups (Table 8). In fact the economies of size are slightly strengthened (relatively).

Table 6

Economies of size, 1986/87: Ratio of total costs to total production value for increasing farm size

	Standard gross margin (ECU 1 000)						
	Under 4,4	4,4 to 8,8	8,8 to 17,6	17,6 to 44	44 to 110	110 and over	All sizes
Belgium	—	—	0,93	0,85	0,75	0,68	0,79
Denmark	—	1,56	1,21	0,99	0,90	0,83	0,95
Germany	—	—	1,27	0,97	0,87	0,80	0,96
Greece	1,05	0,89	0,78	0,67	0,56	—	0,86
Spain	0,97	0,92	0,81	0,74	0,78	0,80	0,84
France	—	2,02	1,40	1,04	0,90	0,81	1,02
Ireland	2,18	1,51	1,21	0,91	0,82	0,78	1,06
Italy	2,15	1,64	1,30	1,00	0,81	0,72	1,17
Luxembourg	—	—	—	0,87	0,82	—	0,85
Netherlands	—	—	—	0,97	0,86	0,80	0,86
Portugal	1,03	0,94	0,85	0,78	0,75	0,75	0,89
United Kingdom	—	2,08	1,29	1,04	0,92	0,82	0,90

NB: The holdings are classified by the size of the standard gross margin as defined by the farm accountancy data network. Total costs include labour costs calculated as total labour input multiplied by wages paid per annual work unit of hired labour for each country. Costs are net of rent and interest charges.
Source: Own calculations based on *Economic results of agricultural holdings*, No 5, 1986/87, farm accountancy data network.

The ratio of costs to value of production falls markedly with increasing size, although at a decreasing rate. This indicates that there are substantial economies-of-size gains to be had from structural changes towards larger farms. While the major gains generally are realized for medium-sized and large farms, the data indicate that economies of size might not, be fully realized for most countries by the largest farm types represented. It should be noted that the average labour input on large farms ranges from 1,8 to 2,9 annual work units, except in Spain and Portugal, where the labour input is considerably larger.

Due to definitional uncertainties, the figures cannot without qualification be compared among countries. As would be expected, however, low-wage — low labour productivity — countries show less spectacular economies-of-size gains. Indeed, the data might indicate that large farms in Spain and Portugal have realized the gains to be had, as no further gains are indicated for very large farms in these countries. In Spain, Portugal and Greece, the cost of hired labour per annual work unit ranges from ECU 2 100 to 4 500, while, in the other countries, the range is from ECU 9 000 to 16 700. With increasing labour productivity, the gains from and the pressure for structural changes increase, and attempt to hamper the process will be extremely costly.

3.2. Changes in economies of size over time

The strength of economies of size varies over time and seems to have been strongly increasing since World War II, where there have been huge technological advances in agriculture and real wage levels have increased rapidly. The real-wage-level increase is based on productivity increases in the economy at large. The change in relative prices brought about by the increasing real wages makes it profitable to substitute capital for labour, a substitution which generally embodies further productivity and real wage gains. For agriculture this development makes it profitable to invest in more advanced capital, which in turn increases labour productivity in agriculture. The technological advances embodied in agricultural capital have, in fact, ensured a higher labour productivity increase in agriculture than in most other industries. Generally, labour productivity in the economy at large — including the services sector with lower average productivity increases — has increased by 2 to 3% annually, while labour productivity in EC agriculture has increased by more than 4% annually (Table 7).

Table 7

Increases in labour productivity in agriculture, 1975-85

	Percent/year
Belgium	4,5
Denmark	6,5
Germany	4,5
France	4,6
Ireland	4,2
Italy	4,2
Luxembourg	5,3
Netherlands	4,0
United Kingdom	3,6
EUR 9	4,4

Source: Statistical yearbook of agriculture Eurostat, and *Agriculture in the Community*, European Commission.

The increase in labour productivity may come about by production increases or by decreases in the use of inputs. Some productivity increases may have less direct effect on structure than others. Yield increases, for instance, may tend to bring about less immediate pressure on input adjustments than productivity gains from more effective machinery. However, in both cases, the productivity gains will result in decreasing real agricultural prices. This will put pressure on structural development, as the marginal returns on fixed (land) and semi-fixed (labour) resources are higher than the average return on farms which are not large enough to reap the benefits. Economies of size create, in general, a situation where the total revenue can only cover part of the total costs on farms of less than optimal size, but where the marginal revenue of size exceeds marginal costs. Thus, the low average earnings on small and medium-sized farms put pressure on their owners either to leave farming or to expand the farm size. Farm support may temporarily ease the pressure.

From 1975-87, agricultural production per holding increased by 2,8% annually and labour input was reduced by 1,5% annually (Table 1). At the same time, farm size area increased by 1,3% annually. The production (and budgetary) pressure, however, would undoubtedly have been less if the price conditions had caused further reductions in the total areas grown, while a large farm size adjustment could have alleviated income pressures.

It is often argued that faster adjustment in agriculture would contribute to unemployment. Over time the argument has been put forward independently of the level of unemployment. The argument implies a static line of thought and might be used for any industry. It is essentially an argument for subsidies and against adjustments and inherent welfare

gains. Although the EC unemployment level has been high for a long period, there is no a priori reason to believe that further farm adjustments would have aggravated the problem as wage and price levels in the economy at large would have had to adjust, an adjustment which in view of the welfare gain should be rather easily absorbed. Indeed, it might as well be argued that failure to adjust sufficiently in agriculture (and other industries) has contributed to maintaining the rather inflexible labour market structures in the EC.

The productivity (and wage-level) changes as well as the available technological improvements vary over time. An indication of the change over the last decades is provided by the Danish data (Table 8). In the early 1960s, there was only a modest pressure for structural change. However, in the subsequent decades, the advantage of larger units has become increasingly clear as the cost coverage on small farms has fallen drastically, making them more and more unfavourable in relation to larger farms (last column).

Table 8

Change in the strength of economies of size, Danish agriculture: Ratio of total costs to total production value for increasing farm size

	Under 10 ha	10 to 20 ha	20 to 30 ha	30 to 40 ha	50 to 100 ha	100 ha and over	All sizes	Under 10 ha/ 100 ha and over
1962/63 to 1964/65	1,19	1,14	1,12	1,10	1,06	1,05	1,13	1,13
1970/71 to 1972/73	1,30	1,23	1,15	1,11	1,05	1,03	1,16	1,26
1978/79 to 1980/81	1,52	1,38	1,26	1,20	1,10	1,00	1,22	1,52
1987/88 to 1989/90	1,64	1,43	1,23	1,12	1,03	0,96	1,13	1,71

NB: Total costs include remuneration to farmers and family workers as well as real estate taxes and interest charges. The latter is calculated as 4% of the total value of farm assets.
Source: Landbrugsregnskabsstatistik, Serie A, Institute of Agricultural Economics, Copenhagen, various issues.

The ratio between costs and production value is close to unity for the larger farms throughout the period. The same would undoubtedly be the case for other Member States if rent and interest charges were included (Table 6). The fact that all costs are met on the larger farms implies that the value of land is determined by the residual return on land on holdings which are large enough to achieve economies of size. In other words, the price of agricultural land is determined by the land rent on large farms (the price of holdings, particularly of the dwelling, close to towns may be affected by other factors). The fact that all costs are met on the large farms indicates that their earnings are comparable with earnings in other sectors of the economy.

For the total Danish farming sector, the cost coverage has remained rather steady (all sizes, Table 8) over time, the divergence around 1980 being the result of serious adjustment problems in the Danish economy and in Danish agriculture. The figures indicate that there is a temporary structural balance at a level where costs exceed income by 10 to 15%. The costs are absorbed by low remuneration for farm work of the farm families on smaller farms, where, as shown, the major income is attained by off-farm activities. For these farm families, it is probably to a large extent the result of unforeseen technological developments leaving them with a factor endowment mix, which makes survival on farm income alone untenable. This would seem to be a common situation in the EC agricultural sector.

As shown above, the pressure for structural change varies among the Member States, not least because of varying productivity levels. Similarly, the pressure may change over time. However, the change in pressure is undoubtedly closely correlated with the change in labour productivity. Although the pressure for structural change in lower-income Member States is less pronounced, the change in pressure might be as fast or faster than in higher-income Member States, as faster growth would require a faster changing structure.

The pressure for change is likely to continue. Labour productivity increases in agriculture have continued at a fast pace in recent years, although the emphasis on technical change may have shifted somewhat from plant to animal production (Hansen, 1990).

3.3. Influence of support

It is interesting to note that the cost/income ratio has not been affected by the Danish entry into the EC and the adjustments to the CAP in 1973 (Table 8). Thus, as far as farm profitability is concerned, the CAP has had no (lasting)

influence. However, it has without doubt increased production considerably, yielded heavy capital gains to the owners of land at the time of entry and provided the Danish society with considerable net rent transfers, due to its relatively large agricultural sector.

The steady ratio of cost/income shows that agriculture quickly adjusts to a new situation, an adjustment which is carried to the point where profitability is unaltered. The adjustment to higher product prices at the time of EC entry improved the terms of trade for agriculture temporarily in the mid-1970s[1], but after a few years there was, as in the pre-EC years, an annual fall of about 2% in the terms of trade.

Agricultural production, which had stagnated in the 1960s, started growing at about 2,5% per year following EC entry (Table 9). The increase in area per holding and the fall in number of holdings were reduced in connection with EC entry. The strong increase in production helped to maintain total factor productivity increases in the mid 1970s at about the same level as in the 1960s, at 1,8% annually. Subsequently, it has increased to 2,7% annually (Melgaard, 1982; Hansen, 1990).

Table 9

Change in agricultural production and structural variables in Denmark before and after EC entry

(annual % change)

	1963-71	1971-79	1979-88
Total production	0,0	2,5	2,4
Production per holding	3,5	4,7	5,8
Area per holding	3,0	2,0	2,8
Number of holdings	- 3,4	- 2,1	- 3,2

NB: Each end year is a three-year average, including the previous and the subsequent year.
Source: Landbrugsstatistik, Danmarks Statistik, various years.

EC entry brought about a temporary slowdown in structural developments and a strong increase in production. The economic gains for agriculture were expended on production at higher marginal costs and increased rents, while the structural slowdown briefly alleviated social problems connected with the adjustment process. This was no doubt preferable to the adjustment process required in order to compete on the world market with subsidized products from the EC and other industrial countries. However, future adjustment problems are likely to have been increased.

In an eventual adjustment of the CAP with falling support, more rapid structural developments in the EC would be expected, as the farmers would increasingly attempt to reap the benefit from economies-of-size gains. However, the question arises whether these benefits will change due to lower support. As the large producers benefit more — in absolute terms — from the CAP than small producers, they will also lose more due to support reduction. However, this does not imply that lower prices would reduce economies of size.

The rate of return on resources is likely to remain unchanged on the larger farms following adjustments of land values, which, as argued, are essentially determined by the residual return on large farms. On smaller farms, however, land is generally less important in relation to other factors than on larger farms. This would imply that land price adjustments would have relatively less effect on small farms, and, consequently, economies of size would tend to increase with lower product prices. Thus, the incitation to exploit economies of size would be further increased. The fall in land rents would also bring about a decrease in the area grown, as some areas would be withdrawn from production due to negative rents.

Occasionally, it has been argued that farm support with less price variation would be helpful in creating better structures. However, if there is such an effect, available data suggest that it is minor compared with the tendency of support to deter structural development. Nevertheless, the effect of decreasing support is not necessarily one of increasing land area per farm. The liberalization of agricultural policies in New Zealand has brought about a shift from pastoral agriculture to horticulture, which has resulted in a larger economic farm size without much change in the average area per holding. Whether alternative opportunities might appear for the EC farming sector remains uncertain.

4. Effects of the reform proposal

The agricultural policy reform in 1992 is unlikely to have much effect on structural developments. The price decreases are largely offset by direct payments related to acreage and number of animals, and the compensation for set-aside would generally be expected to cover the loss of rent from set-aside. Thus, in contrast to the adjusted reform proposal from the Commission (European Commission, 1991), which through compensated set-aside for small farms only would have changed profitability slightly in favour of small farms, the

[1] International prices also increased strongly at the same time, but the CAP absorbed the subsequent price fall on the world market.

final reform extended compensation for set-aside to all farm sizes. In fact, the reform would seem to result in a somewhat higher total return (price plus compensation) from grain than would have been the case if the previous stabilizer system had been maintained.

Although compensation for beef production may have an effect on profitability in more intensive production areas in the Community, the structural effect is unlikely to be very significant. In areas where the possibility exists, it might increase demand for poor land so as to comply with the extensification requirements.

The general impact of the reform on economies of size is evaluated for Danish farms in Table 10. It shows a rather similar development for all farm sizes. The ratio of costs to production value is shown to increase slightly for all farm sizes. However, the possible fixed-cost adjustments would over time probably more than compensate for the increase shown.

Future decisions on crop production would be based on the new price levels. Although this might give negative land rents on the poorest land, production would be maintained in order to attract the compensation payment. Nevertheless, the set-aside requirement and the decreased production intensity would create unemployed fixed resources. The adjustment of the fixed resources might temporarily lead to some additional farm enlargements. However, with the semi-production-related direct payments, the overall impact is likely to be limited.

Table 10

Reform proposal and economies of size in Danish agriculture, 1990/91

Size group	Ratio of costs to production value		
	Before reform	After reform[1]	
		With compensation	Without compensation
0 to 10 ha	1,74	1,76	1,99
10 to 20 ha	1,46	1,49	1,65
20 to 30 ha	1,24	1,26	1,40
30 to 50 ha	1,11	1,14	1,25
50 to 100 ha	1,00	1,02	1,12
over 100 ha	0,92	0,94	1,07
All sizes	1,10	1,13	1,25

[1] Including variable cost savings but without fixed cost adjustment. Animal support is limited to two heads per hectare.

Source: Rasmus Kjeldahl, internal notes, Institute of Agricultural Economics, Copenhagen, 1992.

5. Conclusion

The farm size structure in the EC is often mentioned as a major problem for the common agricultural policy. The social nature of the CAP, expressed as the aim to secure a fair standard of living for the agricultural population, involves large expenses as a major part of the farmholdings are below an economically viable size. While the support level is due to a large extent to farm structure, this is, in turn, undoubtedly mainly a result of protectionism, which also prevailed in most EC Member States before the establishment of the CAP.

The basic reason for farm support is to shield agriculture from the adjustments needed to cope with price decreases/ productivity gains. Although a major part of the support is channelled into the creation of rents and resource misallocation, it also makes structural development less urgent. The effect, however, is temporary, as the costs involved in preventing continual productivity increases from affecting structures are prohibitive.

The problem has been recognized by the Community, notably in the Mansholt Plan. However, the efforts to improve structures in order to create economically viable farms with less support have been weak, and the problem remains largely unsolved. There has been substantial changes in the EC farm structure recently. Over the period 1975-87, there was an increase in farm size of 1,3% annually and a fall in the total number of farms of 0,9%. At the same time, production increased by 2,8% and labour input fell by 1,5% annually per holding. Had price conditions favoured further increases in farm size area and reductions in areas grown, production and budgetary pressures would no doubt have lessened.

There is strong reason to believe that the generally available statistics for the EC are rather misleading as far as both structure and income for the agricultural sector proper are concerned. A large part of the agricultural sector consists of small economically unviable farms, where off-farm income plays a major role. Thus, detailed Danish data show that 54% of the farms, which produced only 15% of total agricultural production, were run by 'part-time families', who on average had little farm income, but substantial incomes from off-farm work and pensions resulting in a living standard not much different from full-time farm families. The agricultural activities on part-time farms, which had an average area of 18 ha against 56 ha for full-time farms, were generally highly inefficient. Also, structural developments on part-time farms are much slower than on full-time farms. Although there is a considerable variation within the EC, there is little doubt that a similar situation exists in a large part of the Community. Thus, statistics for agriculture proper would undoubtedly

present a quite different picture concerning structure and income from what is generally shown.

An important factor in structural development is economies of size. Data from the Member States indicate large possible but unexploited economies-of-size gains. The possible gains are largest for the smallest holdings, but generally the optimal size does not seem to have been reached even by the group containing the largest farms, except in Spain and Portugal.

On the larger farms, all costs are met, which implies that the value of land is determined by the residual return on holdings which are sufficiently large to utilize the available economies of size. In other words, the price of agricultural land is determined by the land rent on large farms. The factor earnings on these farms are comparable with the earnings in other sectors of the economy.

Economies of size are essentially determined by the productivity level (wage level) in the economy at large and by agricultural labour productivity. Thus, the optimal farm size varies geographically and over time. An example from Northern Europe shows that economies of size only gave modest pressure for structural changes in the early 1960s, while in subsequent decades the advantage of larger units has become increasingly clear.

Although large farms in absolute terms gain most from price support, a decline in price support is not expected to decrease economies of scale, as the associated land-rent adjustment results in a corresponding adjustment in land values. The reform proposal by the Commission (European Commission, 1991), which favours smaller producers, would tend to reduce economies of size slightly, but the effect is small. However, the proposed modulation of support and possible increases in the modulation would affect the structural adjustment process negatively. Furthermore, the modulation would particularly favour part-time farmers with considerable off-farm incomes, making the social argument of the modulation rather obscure.

A reduction in agricultural support would decrease rents and undoubtedly improve factor allocation within agriculture as well as among agriculture and other sectors. Farm structures are likely to be improved considerably as the farmers would increase the attempts to exploit economies of size and adjust to decreased rents.

References

Bowler, I. R. (1985), *Agriculture under the common agricultural policy — A geography,* Manchester University Press.

Brown, C. (1989), 'Distribution of CAP price support', Report No 45, Copenhagen, Statens Jordbrugsøkonomiske Institut.

European Commission (1991), 'The development and future of the common agricultural policy', COM(91) 258.

Hansen, J. (1990), 'Udviklingen i produktivitet og byttefor-hold i landbruget 1973/74-87/88', Report No 56, Copenhagen, Statens Jordbrugsøkonomiske Institut.

Knerr, B. (1991), 'The impact of transfer to agriculture through the German tax system', *Review of Agricultural Economics,* Vol. 18, No 2.

Larsen, A. (1985), 'EF's landbrugspolitik og landbrugets strukturudvikling, Landbrugets økonomiske og strukturelle udvikling — en foredragssamling', Landbrugsøkonomiske Studier nr. 17, Copenhagen, Økonomisk Institut, Den kgl. Veterinær- og Landbohøjskole.

Melgaard, P. (1982), 'Produktiviteten i landbruget 1958/59-1979/80', Report No 7, Copenhagen, Statens Jordbrugsøkonomiske Institut.

SJI (1992), *Heltidslandbrugets økonomi 1990/91,* Serie E, No 8, Copenhagen, Statens Jordbrugsøkonomiske Institut.

Tracy, M. (1982), *Agriculture in Western Europe, Challenge and Response 1880-1980,* London, Granada.

Assessment of the effects of a reform of the common agricultural policy on labour income and outflow

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1. Introduction

As stated in its proposal of the CAP (or Mac Sharry) reform, the Commission seeks to improve the competitiveness of agriculture, bring the level of production closer to that of demand, curb budget outlays, solve the farm income problem and improve the environment.[1]

In pursuing these objectives, it proposes a combination of policy changes. An important one is the reduction of prices affecting commodities which comprise 75% of the value of all those products which are subjected to common market organizations. Additional policy changes include lowering production quotas, providing compensations as lump-sum transfers to all farmers for cutting prices and reducing quotas, and suggesting accompanying measures to improve the environment.

This paper seeks to evaluate these policy changes with regard to their impact on agricultural labour. Another scenario, called the decoupled Mac Sharry scenario, representing modifications of the Mac Sharry reform, will also be analysed. These modifications are suggested to improve some of the impacts implied by the Mac Sharry reform.

The paper is organized as follows. Section 2 provides an overview of the composition of the agricultural labour force in the EC. Empirical evidence of the labour mobility is summarized in Section 3. The last section contains the analyses of the two scenarios.

2. The composition of the agricultural labour force in the European Community

The objective of this section is to indicate the diversity of the agricultural labour force within and between Member States. For that purpose several attributes of farm labour will be provided. In addition, changes in levels of farm employment over the last two decades are discussed.

As with all other primary industries, the importance of agriculture has steadily declined over the last decades in the EC Member States. Evidence is provided by the first three columns of Table 1. Columns 1 and 2 indicate the share of agriculture in total value-added for the years 1973 and 1987, respectively. In 1987, Greece and Ireland had the highest shares, reaching 15,6 and 10,3%, respectively, while in Germany and the UK agriculture provides the smallest contribution to gross value-added. The third column shows the average annual change in this share between these two years. In most Member States the average decline was between 2,3 and 4,9 percent per annum. It was especially large in Portugal (9,8%) and relatively small in Greece (1,4%).

Large differences between Member States exist also with regard to the level of and annual changes in, net value-added per annual work unit (AWU) in agriculture. An AWU is defined as 2 200 hours of work per year by a male between 18 and 65 years of age. Reductions are applied for women and for men under 18 years. Columns 4 and 5 of Table 1 show real net value-added at factor cost in 1 000 ECU per AWU for the years 1980 and 1990, respectively. The figures are deflated with the implicit GDP price deflator taking 1980 as base year. In 1990, the Netherlands had the highest real net value-added per AWU of all Member States of about ECU 18 000. It exceeded that of Portugal, the country with the lowest, by a factor of approximately 20. A relatively high real net value-added per AWU was also reached in Denmark. The same figures for Belgium, Germany, France, Luxembourg, and the UK were slightly above and below the EC average, which was 6 630. In addition to Portugal, Spain, Greece, Ireland and Italy are all found at the lower end of the scale.

These considerable differences among Member States are, to a large extent, reflections of differences in their economic development. With the exception of Ireland, all northern Member States make up the group with high values of real net value-added at factor cost per AWU, while the southern Member States (Greece, Italy, Portugal and Spain) and Ireland constitute the group with low values. Annual changes in real net value-added per AWU over the last decade provide a somewhat different picture to their corresponding levels (see last column of Table 1). Denmark, Luxembourg and Spain are the countries with the highest growth rates, the Netherlands, Greece, Germany and Ireland are ranked in the middle while Belgium and Italy experienced only a small growth over the last decade. The UK shows no growth and Portugal even a decline.

The changes in agricultural value-added during the 1980s were by no means a smooth process. The level of protection due to CAP during the first part of this decade was relatively high until 1984 and was reduced considerably beginning in that year. Annual changes in net value-added per AWU differ substantially between these two periods. From 1980 to 1984, net value-added per AWU increases in all Member States except Greece, Italy and Portugal where it decreases. During the second period, i.e. from 1984 to 1988, it decreases in Belgium, Denmark, Germany, Greece, Portugal and the UK. The only exception to this rule is Spain where the growth in net margins per AWU increases, an outcome of joining the EC.

[1] European Commission (1991), p.3.

Table 1

Gross value-added by agriculture as a share of total gross value-added and real net value per annual work unit (AWU) in agriculture

	Share of agriculture in gross value-added of the total economy			Net value-added[1] per AWU in agriculture, in real terms		
	1973	1987	Average annual change 1973-87	1980	1990	Average annual change 1980-90
	%			1 000 ECU		%
B	4,2	2,2	- 4,5	11,77	13,23	1,2
DK	6,7	4,0	- 3,6	10,19	18,04	5,9
D	3,0	1,5	- 4,8	6,47	8,00	2,1
GR	19,0	15,6	- 1,4	4,28	5,78	3,1
E	8,8	5,2	- 3,7	3,61	5,89	5,0
F	7,1	3,5	- 4,9	8,05	9,59	1,8
IRL	18,2	10,3	- 4,0	3,87	4,71	2,0
I	8,6	4,5	- 4,5	4,46	4,64	0,4
L	3,8	2,4	- 3,2	6,49	10,92	5,3
NL	5,7	4,1	- 2,3	13,27	19,88	4,1
P	27,2	6,4	- 9,8	1,03	0,85	- 1,9
UK	2,9	1,7	- 3,7	9,86	9,74	- 0,1
EUR 12		3,2				
EUR 10	5,4					

[1] At factor cost, deflated using the GDP price deflator with 1980 as base year.
Source: European Commission, *The agricultural situation in the Community*, various issues, Brussels.

The figures on real net value-added at factor costs are to be seen more as a measure of labour productivity than as an indicator of the income obtained by those working in agriculture since possible other income sources like non-farm activities, non-farm assets and transfer payments are not accounted for. Also the movement over time of this indicator does not necessarily reflect the changes in income of farm labour.[1] An accurate measure of income obtained by agricultural labour must contain all sources of income, including those outside agriculture. To ensure compatibility of total agricultural household income with that of other households, an additional question arises. What is a suitable denominator on which the analysis can be based? Many studies and data sources report income per head or per AWU. Another and perhaps even more suitable way for using income as an indicator of standard of living is to base it on an agricultural household unit. The problem with this approach is that the number of persons belonging to a household and its demographic structure may differ in comparison to non-agricultural households, leading to other kinds of bias. Using equivalence indices, which provide adjustments for these differences, can mitigate this problem. However, calculation of these indices requires information which is not readily available. Not all income earned is available for spending due to taxes, contributions to social security and other transfers. Disposable income per farm household adjusted for differences in demographic structure is the most appropriate way of assessing the impact of policy changes on farmers' standard of living.

Eurostat initiated the total income of agricultural households (TIAH) project which aims at harmonizing the information on the income situation of agricultural households in Member States. From this project some first data on income of agricultural households for Member States are published.[2] The figures in Table 2, which are collected from this publication, provide an indication of the composition of agricultural households' income. In Denmark, Germany, Spain and Italy, agricultural households obtain less than 50% of their total income from farming. In the other Member States (no data are reported for Belgium) this amount exceeds 50% while in the Netherlands and Ireland, it is approximately three quarters. In Italy, about one third of the income of agricultural households originates from agriculture. In most Member States, wages are the second or third most important source of income for agricultural households followed by income from property.

[1] Eurostat, 1992a, pp. 61 and 82.

[2] Eurostat, 1992a.

Table 2

Composition of total income (gross) of agricultural households (in %)[1]

Income source	DK	D	GR	E	F	IRL	I	L	NL	P	UK '
Farming	39,2	46,6	57,3	45,0	62,2	77,5	30,8	65,9	75,5	60,6	56,9
Wages[2]	38,2	27,2	22,5	12,0	8,2	7,2	17,1	8,8	7,3	15,6	16,1
Property[3]	11,6	7,4	7,9	5,0	8,2	2,5	11,7	2,9	6,5	5,7	n.a.
Others[4]	11,0	18,8	12,3	38,0	21,6	12,8	40,4	22,4	10,7	18,1	27,0
Years[5]	1988	1988	1985	1981	1989	1987	1988	1989	1985	1989	1986

[1] No data are reported for Belgium.
[2] Income from dependent activities.
[3] Includes mainly actual interest paid, imputed interest accruing to insurance policyholders, income from land and other tangible assets, dividend and other income from corporate enterprises.
[4] Includes other independent activities, owner dwellings, insurance claims, social benefits and a 'rest'.
[5] Year for which the figures are reported.
Source: Statistical Office of the European Communities, *Total income of agricultural households*, 1992 report, 5 C, Luxembourg.

It should be noted that not all farms are operated by persons classified in the TIAH project as members of an agricultural household. At least one person of a household must be mainly engaged in farming in order to classify as an agricultural household. This requirement leads, for example in Denmark, to a ratio of agricultural households to farms of 0,8; i.e. only 80% of the farms are operated by at least one person classified as meeting the conditions for establishing an agricultural household.[1]

Table 3 provides an income comparison between agricultural and all other households of an economy. The first two columns of this table indicate that deductions for taxes, social contributions and insurance are smaller for the average agricultural household than for the average of all households. This holds for all Member States for which data are reported by the TIAH project. Columns 4 and 5 of Table 3 provide evidence that income of the average agricultural household exceeds that of the average of all households in all Member States reported apart from Portugal. In the Netherlands, income of an agricultural household is twice as high as that of the average household.

A comparison of averages does not take into account the deviations which are likely to exist in the data. Though the TIAH report does not provide information on variations in income per household unit, it can be expected that substantial variations exist with regard to both level and source. In 1981, 4% of all agricultural households in Germany had incomes less than half and 5% more than twice the average income of all households.[2] This is a rather small percentage but it indicates the spread of income among farm households.

[1] Eurostat, 1992b.
[2] Bedau, 1985, Table 6.

Table 3

Income comparison between agricultural households and all households of the country[1]

	Disposable income as a percentage of total income		Total income of an agricultural household as a percentage of that of all households		Year[3]
	Agricultural households	All households	Income Total	Disposable	
DK	75,3	n.a.		114,8	1988
D	65,6	62,1	104,6	110,3	1988
GR	92,7	n.a.		108,1	1985
E	90,0	77,0	n.a.	n.a.	1981
F	n.a.	n.a.		108,0	1989
IRL	92,7		112,0		1987
I	81,8	71,3		144,8	1988
L	87,7			143,0[2]	1985
NL	76,6	53,6		227,9	1989
P	94,6	72,9		81,2	1986

[1] Figures for Belgium and the UK are not reported.
[2] Figures for 1985.
[3] Year for which numbers are reported
Source: Statistical Office of the European Communities, *Total income of agricultural households*, 1992 report, 5 C, Luxembourg.

Large deviations also exist in terms of income source if one considers that a large share of farms in the EC are run as part-time farms. These differences are especially important when considering changes in agricultural policies since an agricultural household which receives all the income from farming is, of course, more affected than one which gets only a small share.

Changes in the agricultural labour force are given in Table 4. At the average of the 12 Member States the reduction of agricultural labour measured as AWUs reached 3% per annum in both decades of the 1970s and the 1980s (Table 4, columns 3 and 4). However, the decline of the labour force varies between Member States, and also between the two decades for a single country. The Netherlands experienced the smallest reduction in the labour force among all Member States between 1970 and 1990 and also between 1980 and 1990, which might be an outcome of relative favourable economic conditions for agriculture in this country. During the period from 1970 to 1990 the decline exceeded the EUR-12 average in Spain, Luxembourg, Denmark, Germany, Belgium and Portugal. In these countries, the labour force shrank by 50% and more, over these two decades. The remaining Member States experienced reductions below EC average. As will be pointed out in Section 3.2, changes in the agricultural labour force also vary considerably between different age classes, for a variety of reasons.

A comparison of annual growth rates of real net value-added at factor cost per AWU in Table 1 (column 6) with the annual decline in the labour force in Table 4 (column 4) over the 1980s indicates that real net value-added at factor costs generated by agriculture declined over this period in Belgium, Germany, France, Italy, Portugal and the UK. It increased in Denmark, Greece, Luxembourg and the Netherlands and was stagnant in Spain and Ireland.

The share of the total labour force absorbed by agriculture differs among Member Countries as can be seen from Table 4 which presents the share of the agricultural labour force in total civilian employment in 1988. In the four southern Member States and in Ireland, this share reached 10% and over in 1988. Among these countries, Greece has by far the highest share (25%). With the exception of Ireland, the decline in agricultural labour is positively correlated with the share in total civilian employment in the Member States. The share itself also decreased from 1970 to 1988 in all Member States. Interestingly, this decrease is considerably more uniform across Member States than is the decline in the agricultural labour force.

Table 4

Changes in the agricultural labour force from 1970 to 1990

	Agricultural labour force measured in equivalent full-time labour (AWU)				Share of agricultural employment in total civilian employment		
	Size		Average annual change		Shares		Average annual change
	1970	1990	1970 to 1990	1980 to 1990	1970	1988	1970 to 1988
	in 1 000	in 1 000	in %	in %		in %	
B	181,2	93,2	– 3,27	– 2,10	4,8	2,7	– 3,15
DK	216,1	96,1	– 3,97	– 3,49	11,5	6,3	– 3,29
D	1 527,0	762,5	– 3,41	– 2,54	8,6	4,3	– 3,78
GR	1 192,4	781,8	– 2,09	– 2,00	40,8	26,1	– 2,45
E	3 566,5	1 400,7	– 4,57	– 4,94	29,5	14,4	– 3,91
F	2 369,0	1 473,8	– 2,35	– 2,16	13,5	6,8	– 3,74
IRL	365,2	238,4	– 2,11	– 1,92	27,1	15,4	– 3,09
I	3 653,8	2 156,7	– 2,60	– 3,04	20,2	9,9	– 3,88
L	14,6	6,0	– 4,37	– 3,97	9,4	3,4	– 5,49
NL	303,3	235,1	– 1,26	– 0,77	6,3	4,8	– 1,50
P	1 630,5	867,6	– 3,11	– 3,21	30,0	20,7	– 2,04
UK	615,0	456,4	– 1,48	– 1,47	3,2	2,2	– 2,06
EUR12	15 634,6	8 532,3	– 2,98	– 3,00	13,8	7,4	– 3,40

Source: European Commission, *The agricultural situation in the Community*, various issues, Brussels.

Table 4 provides information on country averages which do not reveal the importance of agriculture in some regions of the EC. Especially in southern Member States and in Ireland, agriculture is still a major source of employment in many rural areas where its contribution to GDP exceeds 10%. Furthermore, some regions in France, Germany, Italy and the UK experienced an increase in agricultural employment during the late 1980s.[1] These regions are located in the south-east and centre of France, in the northern parts of Germany and Italy, in the south-west of England, and in Wales and Scotland.

Tables 1 and 4 illustrate that agriculture becomes less important in the economies of all Member States and that considerable differences between Member States exist with regard to the relative size of their agricultural labour force. Tables 5 to 7 point to differences in the structure of the agricultural labour force among Member States; i.e. type and length of employment, gender and age. The survey on farm structure in the EC conducted in 1987[2] is taken as the main source for the latter. It is supplemented by other survey data as reported in various issues of *The agricultural situation in the Community.*

Columns 1 to 4 of Table 5 refer only to persons working mainly in agriculture; i.e. persons whose major occupation is outside agriculture are not considered in this structural comparison. As column 1 of this table indicates, at the average of the EUR 12 three quarters of this part of the agricultural labour force are self-employed. This figure differs substantially among Member States, ranging between 50% in the UK and up to 96% in Greece.

The gender composition of those working mainly in agriculture is predominantly male; 65% at the EC average. The share of women mainly working in agriculture is highest in Portugal, Germany and Greece, reaching about 50% in these countries. In all other Member States this share is considerably smaller. In Ireland only about 10% of the agricultural labour force are women which is the smallest share of all Member States.

Considerable differences among Member States also exist with regard to the time spent in agriculture. Of those persons mainly employed in agriculture, 86% are full-time workers at the EC average (Table 5). With 73%, the Netherlands has the lowest share of full-time workers, and Belgium, Spain and Ireland the highest (93%).

At the EUR-12 average, about 45% of those mainly employed in agriculture are farm operators. Due to its relatively large average farm size, the UK has the smallest share of farmholders among those persons (31%) while Belgium and Denmark have the largest share (around 60%). Most other Member States have a share close to the EUR 12 average.

Rather than using the number of farm operators, one can also look at the share of the total work carried out in agriculture by farmholders. A measure for this is the ratio of full-time equivalents (AWUs) of farm heads to total AWUs in agriculture (column 5, Table 5). This offers a picture similar to that obtained by comparing the number of persons. Adding the shares of farm heads and of other family members the total contribution of farm families is obtained. At the EUR 12 average, 80% of the work carried out in agriculture is done by family members, indicating that EC agriculture is dominated by family workers. This share is rather similar to the average for most Member States. Countries with a higher share (90%) are Belgium and Denmark. The UK has a rather low share of 60%.

The last column of Table 5 indicates how much of the annual working time of a person engaged in agricultural activities is spent in this sector. This is expressed as the average AWU per person employed in agriculture. These figures range from 0,41 in Greece up to 0,80 in the Netherlands. Over time, this indicator has changed only slightly, but not in the same way across Member States. From 1980 to 1987 it increased slightly in Belgium, Denmark, France, Italy and the Netherlands, remained unchanged in Germany and Ireland, and declined in Greece, Luxembourg and the UK. For Spain and Portugal, no such information exists for periods prior to 1987.[3] Since the conversion of a full-time working person into an AWU has not altered over the years, changes in this indicator mainly reflect differences in the ratio of full-time to part-time workers. In general, farm labourers work more hours than employees in other sectors of the EC economy. In 1989, the average farm worker spent 47 hours a week at work.[4]

[1] European Commission, 1991, map 87.
[2] Eurostat, 1991.
[3] European Commission (1990), pp. T/100.
[4] Eurostat, 1991, p.93.

Table 5

Structure of the agricultural labour force in 1987

	Share of ... in total number of persons employed in agriculture[1]				Share of ... in total AWU[2] of agricultural labour force		
	Self-employed	Males	Full-time workers	Farm heads	Farm heads	Other family members	Average AWU per person employed in agriculture
B	88,7	72,0	93,5	62,6	69,5	25,3	0,68
DK	66,1	75,0	80,3	57,5	62,3	13,7	0,77
D	78,1	54,5	79,6	42,5	49,4	40,4	0,52
GR	96,1	55,0	90,8	45,8	43,5	42,4	0,41
E	69,4	74,5	93,2	46,6	42,8	36,0	0,47
F	85,1	64,8	85,0	45,3	46,2	28,7	0,73
IRL	87,1	90,0	93,4	52,4	58,1	29,9	0,64
I	63,8	66,4	83,8	53,3	49,3[3]	36,7[3]	0,41[3]
L	86,3	68,6	90,2	39,7	45,7	45,2	0,69
NL	63,5	74,6	73,8	43,9	48,5	31,3	0,80
P	83,8	49,8	88,5	37,2	38,2	49,6	0,56
UK	49,8	79,2	82,8	30,8	32,3	27,4	0,73
EUR 12	74,9	64,9	86,1	46,7	44,5	36,0	

[1] Persons who work mainly in agriculture.
[2] AWU = annual work unit (the equivalent of 2 200 hours of work a year).
[3] Values are for 1985.

Source: European Commission, *The agricultural situation in the Community*, 1989 report, Brussels.

The age structure of the workforce is an important characteristic which determines future development in employment independently of economic factors. It differs substantially among major economic sectors in the EC. Compared to industry and services, agriculture has a considerably larger portion of its workforce above 55 years old and a relatively small share in the age brackets between 15 and 39 years.[1] Also, the age structure of farmholders is biased towards 55 years and older, as can be seen in Table 6. In all 54% of EUR 12 farm operators are above 55 years of age. This bias differs somewhat between Member States. In Germany only 27% of all farm heads are older than 55 years while in the southern Member States these percentages are at, or near 60% with about half of them being above 65 years. In the latter country group and in Ireland and the UK a small portion (less than 8%) of all farm operators are below the age of 35. The remaining countries, i.e. Belgium, Denmark, France, Luxembourg and the Netherlands have a somewhat more balanced age distribution of farm operators: 10% and more are under 35 years and less than 50% are above the age of 55. Germany has an exceptionally high share of farm operators between 35 and 55 years old.

[1] Eurostat, 1991, map 105.

Table 6

Age distribution of all farmholders in 1987 by age class

(in %)

	Age class				
	below 35	35 to 55	55 to 65	above 65	above 55
B	13,3	42,5	31,2	13,0	44,2
DK	11,7	43,1	25,7	19,4	45,1
D	12,3	60,5	22,2	5,0	27,2
GR	5,6	38,4	27,9	28,1	56,0
E	4,5	37,2	32,4	25,9	58,3
F	10,2	41,2	33,5	15,1	48,6
IRL	6,1	43,2	27,9	22,7	50,6
I	5,5	34,8	31,7	28,9	60,6
L	12,0	42,0	26,0	18,5	44,5
NL	10,7	48,1	28,0	13,1	41,1
P	5,3	36,4	28,5	29,8	58,3
UK	7,5	43,6	26,5	22,4	48,9
EUR 12	6,9	38,8	30,6	23,7	54,3

Source: Eurostat (1991), *Farm structure, 1987 survey: main results*, Theme 5 C, Luxembourg.

The age distribution varies not only between Member States but also by farm size. Table 7 provides some insight in this respect. For the age class under 35 years, the share of farm operators generally increases with the size of the holding. The highest proportion of young farm operators is usually found in the largest farm size. The opposite is noticeable for high-age brackets; i.e. above 55 years and above 65 years. For these brackets, the proportion of farm operator declines with the increase in farm size. The share of farmers between 35 and 55 years of age also increases somewhat with the farm size in most Member States. In Belgium, Denmark and France, however, a considerably higher share of farm heads is found to manage larger farms.

In Greece, Portugal and Italy, the average farm size was 5,3, 7,7 and 8,3 hectares respectively for the year 1987, which was less than or equal to half of the EC average. Given the age distribution of farmholders in these countries, a large proportion of elderly farmers are, therefore, found on rather small holdings. Of the farmers over 55 years old 30% work on holdings with less than 5 hectares in these countries.[1]

In summary, this section indicates that the agricultural labour force is rather heterogeneous making it quite difficult to analyse the impact of a CAP reform on agricultural labour without differentiating between its various social and demographic classes. Yet, as the next section makes clear there exists only scattered knowledge on how these various classes respond to policy changes.

3. Empirical evidence of labour response to changes in economic conditions

At first glance, there is nothing special about markets for agricultural labour. They seem to function as any other labour-market. Farms supply job opportunities and agricultural labour demands a certain level and type of job characteristic. Looking at the market in an alternative way, farms demand agricultural labourers for work and labour supplies these services. The latter description is used in this paper.

There are aspects which are specific to the agricultural labour-market or — more precisely — to the farm household-production unit. The farm labourer usually lives at the place of work while non-agricultural workers spend time commuting.

As shown above, many farmers and/or members of the farm household have multiple jobs. For 77% of part-time farmers work off-farm accounts for more time than work on the farm.[2] Usually, multiple job opportunities are more widespread on smaller farms than on larger ones. Also the number of members of farm households with multiple job activities increase. Being engaged in more than one gainful activity is relatively rare among non-farm workers.

Part-time farming is more than just having a supplementary income. The findings of the Arkleton Trust survey indicate that in particular, those households who set up a farm enterprise for the first time or enlarge the size of their operation engage in part-time farming because it offers them a certain income security.[3] Part-time farming is more prevalent in multi-generational households than in those consisting of a single generation because it suits the former more than the latter. Job opportunities outside agriculture can be filled easily by multi-generational households because they can choose from more diversified members. Usually the young members will try to get jobs off-farm while the older ones continue farming.

Holding multiple jobs is largely influenced by economic conditions. That means that pluriactivity depends on the economic size of the operation as measured for example, by the standard farm income. Age and training of the farm operator also influence the possibility of farm households having multiple jobs.

Another striking difference between farm and non-farm households is the type of assets they possess. Non-farm households own a considerably diversified portfolio while farm households concentrate the investment of their assets to a large extent in one sector — agriculture. This leaves them rather exposed to events in this sector. Farmers, therefore, may suffer from negative shocks in agriculture more than they would if their assets were more diversified. Liquidity problems may arise if the income of farm households declines relatively strongly. In addition, some of the farm assets may become economically obsolete when farmers leave agriculture either for good or only on a part-time basis.

Farmers often cite reasons other than purely economic ones for their participation in agriculture. These include being independent, working with nature, having agriculture as a hobby and staying close to the family.[4]

[1] Eurostat, 1991, p. 95.

[2] European Commission, 1991, p. 99.

[3] Hermann and Uttitz (1989).

[4] Arkleton Research (1989), chapter 17.

Table 7

Age distribution of farmholders by farm size in 1987 (% of farmholders in age class)

		Age class				
	Farm size	Below 35	35 to 55	55 to 65	Above 65	Above 55
	< 10 ha	11,0	36,3	31,4	21,3	52,7
B	10 ≤ < 30 ha	15,4	47,3	33,2	4,0	37,2
	30 ≤ <100 ha	17,5	54,2	25,9	2,5	28,4
	> 100 ha	14,3	57,1	28,6	0,0	28,6
	< 10 ha	10,3	33,9	24,2	31,5	55,7
DK	10 ≤ < 30 ha	10,3	37,4	30,0	22,3	52,3
	30 ≤ <100 ha	14,4	53,8	21,7	10,0	31,7
	> 100 ha	12,9	61,3	16,1	9,7	25,8
	< 10 ha	12,3	48,3	28,9	10,6	39,5
D	10 ≤ < 30 ha	17,7	54,2	26,3	1,9	27,2
	30 ≤ <100 ha	17,4	59,1	22,1	1,4	23,5
	> 100 ha	13,2	58,5	24,5	3,8	28,3
	< 10 ha	5,6	37,5	27,7	29,2	56,9
GR	10 ≤ < 30 ha	5,5	49,1	29,8	15,5	45,3
	30 ≤ <100 ha	6,5	53,3	28,3	12,0	40,3
	> 100 ha	11,1	55,6	22,2	11,1	33,3
	< 10 ha	3,9	35,0	32,2	28,9	61,1
E	10 ≤ < 30 ha	6,1	42,3	33,8	17,8	51,6
	30 ≤ <100 ha	7,7	47,8	31,9	12,6	44,5
	> 100 ha	8,1	47,7	28,7	15,5	44,2
	< 10 ha	5,8	31,4	33,9	28,8	62,7
F	10 ≤ < 30 ha	11,1	40,6	38,1	10,1	48,2
	30 ≤ <100 ha	14,6	53,0	28,6	3,8	32,4
	> 100 ha	11,0	60,4	24,3	4,3	28,6
	< 10 ha	4,2	38,5	28,5	28,8	57,3
IRL	10 ≤ < 30 ha	6,5	44,0	28,1	21,4	49,5
	30 ≤ <100 ha	7,9	48,4	26,8	16,9	43,7
	> 100 ha	8,8	47,1	26,5	17,6	43,1
	< 10 ha	5,3	34,2	31,6	28,8	60,4
I	10 ≤ < 30 ha	6,8	39,4	32,8	21,0	53,8
	30 ≤ <100 ha	8,2	42,9	30,1	18,8	48,9
	> 100 ha	7,6	41,9	29,5	21,0	50,5
	< 10 ha	6,9	33,3	28,5	31,3	59,8
L	10 ≤ < 30 ha	6,0	34,5	34,5	25,0	59,5
	30 ≤ <100 ha	18,8	53,0	22,7	5,5	28,2
	> 100 ha	28,6	57,1	14,3	0,0	14,3
	< 10 ha	13,1	45,2	26,3	15,3	41,6
NL	10 ≤ < 30 ha	8,7	48,5	30,9	11,9	42,8
	30 ≤ <100 ha	9,2	56,5	26,1	8,2	34,3
	> 100 ha	0,0	66,7	33,3	0,0	33,3
	< 10 ha	5,2	36,2	28,8	30,3	59,1
P	10 ≤ < 30 ha	5,8	38,2	32,1	24,0	76,1
	30 ≤ <100 ha	7,4	39,5	32,1	21,0	53,1
	> 100 ha	9,4	43,8	25,0	21,9	46,9
	< 10 ha	7,5	42,3	23,0	27,2	50,2
UK	10 ≤ < 30 ha	7,0	39,2	28,3	25,5	53,8
	30 ≤ <100 ha	7,8	46,0	28,5	17,7	46,2
	> 100 ha	8,2	49,2	27,0	15,7	42,7

The above is indicative of the fact that decisions on the supply of agricultural labour take place at the household level. Farm households decide on the optimal level of employment (hours of work) by taking a rather complex system of considerations into account. Any attempt to describe these decision processes, therefore, requires that these complexities also be included in the model to the largest extent possible.

In modelling markets for agricultural labour, many studies emphasize the demand for labour only. Among others, models of this kind yield a demand 'function' for agricultural labour. They either exclude the question of labour supply entirely and hold the amount of labour available constant or assume that supply is completely elastic at the level of remuneration found by the analysis. Obviously, the latter assumption is too simplistic. There is good reason to assume that the supply of agricultural labour is sloped upwards. But the assumption of fixed labour is also rather restrictive if the time for adjustment is sufficiently large.

While most partial equilibrium models of agriculture only consider commodity markets and leave out factor markets entirely, general equilibrium models provide relations for analysing factor markets as well. Recently, household models were employed more often to analyse total supply of labour by the farm family as a utility maximization problem. These models investigate the decisions a farm family has to make as producer, consumer and as supplier of labour. In addition, they determine whether the household seeks employment at the own-farm and/or at non-farm job opportunities level.

At the beginning of the discussion, the demand for labour by agriculture is examined. Thereafter, models analysing supply of agricultural labour services are described. None of these approaches integrates the decisions of demand, for and supply of, agricultural labour. These approaches, i.e. household models, are discussed in the last section.

3.1. Determining demand for labour by agriculture

The models employed for determining labour demand by agriculture can be best categorized by referring to the kind of model used. Primal models, duality models and mixed models will be considered.

3.1.1. Primal models

Opportunities of finding work in agriculture were first studied in a comprehensive way using activity analysis.[1] This method offers the possibility of distinguishing different employment opportunities according to seasonal and regional breakdowns as well as by type of work. Though the method is well established and does not require further explanation, its advantages and disadvantages may be briefly summarized for comparison with competing approaches. Activity analysis at sectoral level allows inclusion of many technical details into the model if the necessary information is available, it can accommodate various ways of looking at the agricultural sector; for example, as a pure supply model or as a partial or general equilibrium model. Activity analysis models are most often used for comparative static analyses but recursive-dynamic and full dynamic analyses are also carried out. Their main disadvantages are the substantial data requirements, the possibility of getting rather unstable solutions, the problem of aggregation errors and the impossibility of hypothesis testing. The quality of the results of these models depends to a large extent on how well the technical coefficients and the constraints are specified and on how well the objective function depicts reality. The problem of having a set of multiple objectives can be handled in various ways in activity analysis and does not cause any unnecessary restriction.

As for any other input and for outputs as well, the response of activity analysis models in labour demand to changes in exogenous variables is characterized by a stepped function. The elasticity of demand between two consecutive steps typically varies in these models which distinguishes them especially from those specifying a constant-of-elasticity function.

If supply of agricultural labour (labour availability) is variable these models easily accommodate such conditions. Under those circumstances the model generates the equilibrium quantity of labour and its equilibrium remuneration. In most developed countries, total costs of a unit of labour incurred by the firm considerably exceed the net salary received by the worker. Farm operators do not usually pay supplementary salary and other contributions for family workers so that the marginal value product of labour in an off-farm job must be larger than that of the same person when employed in agriculture.

3.1.2. Mixed models

To avoid some of the instability problems arising in activity analysis, one can represent agriculture as a smooth transformation surface, the parameters of which can be econometrically

[1] See for example, Hazell and Norton (1986).

estimated. This approach is followed for the agricultural sector of the European Community agricultural model (ECAM).[1] A non-linear programming model is specified in this case. While activity analysis follows a primal approach, ECAM includes both primal and dual features. However, the approach makes it considerably more difficult to investigate labour demand by agriculture according to the type of labour and season. ECAM, therefore, considers only one labour variable with the implicit assumption that this labour type is homogenous. Labour together with capital is mapped into a capacity index which represents the capacity of production. The CES function is used for this purpose. Total output is related to this capacity index with decreasing returns to scale. Labour and capital are recursively included in the model. In other words, the levels of employment for both factors are determined prior to making the decisions about the quantity of output for each commodity.

3.1.3. Duality models

Duality models are increasingly used for sectoral analysis. Among others, these models also provide information on how employment opportunities in agriculture change with alternate economic conditions. Similar to ECAM, labour is embedded into those models in a highly aggregate way. Some of the models distinguish between family labour and hired workers. Many of the studies, however, use only a single aggregate of all types and kinds of labour.

Similar to the other two model types the treatment of labour in duality models may also differ with regard to whether it is assumed to be a fixed or a variable production factor. If the former assumption holds then the amount of labour cannot adjust to changing economic conditions but its remuneration does. If at all, this assumption is made only for family labour, while hired labour is considered a variable input.

By the envelope theorem, the derivative of the restricted profit function with regard to labour costs gives the labour demand function, and with regard to labour yields, the shadow price for labour. Obviously, the former can be used in the case where labour is a variable factor and the latter when labour is considered fixed. This shadow price indicates the remuneration of labour and is a function of the amount of labour, all output and variable input prices and of remaining fixed factors. A host of flexible functional forms exists to accommodate the different needs in fitting the data.

The main advantages of duality models is that they follow microeconomic theory, can be estimated efficiently and allow consideration of a variety of exogenous variables that influence farmers' decisions on production, demand for farm inputs (including labour if not fixed) and the remuneration of fixed factors.

Empirical results exist from duality models about demand for labour by agriculture. Becker and Guyomard (1991) estimated long-run cost functions for French and German agriculture and derived compensated price elasticities from the estimates (see Table 8). The own-price elasticity of labour in this study is – 0,28 for France and – 0,86 for Germany. In addition, the estimates indicate that labour substitutes for all other inputs in France. In Germany, labour is complementary to land and capital and a substitute for intermediate input.

Table 8

Compensated factor price elasticities in France and Germany

	Intermediate consumption[1]	Labour	Land	Capital
		France		
Intermediate consumption	– 0,315	0,241	0,087	– 0,013
Labour	0,170	– 0,284	0,035	0,079
Land	0,255	0,145	– 0,270	– 0,130
Capital	– 0,023	0,195	– 0,077	– 0,095
		Germany		
Intermediate consumption	– 1,737	1,263	0,129	0,344
Labour	1,159	– 0,863	– 0,020	– 0,276
Land	0,674	– 0,114	– 0,345	– 0,215
Capital	1,315	– 1,149	– 0,158	– 0,008

[1] Including feed consumption.
Source: Becker, H. and Guyomard, H., 1991.

Frohberg (1992) used a restricted profit function to determine the price responsiveness of aggregate EC agriculture. The results indicate that agricultural labour (aggregated over all EC Member States) has a rather inelastic demand with an own price elasticity of – 0,158 and that it is a substitute for all other variable inputs (see Table 9). Since land is considered a fixed factor in this study, labour response to different wages reflects changes in factor use per hectare of land. In addition, the estimates are to be interpreted as short-term responses because of the presence of fixed factors.

[1] Merbis (1989).

Table 9

Uncompensated factor price elasticities in the EC, with land considered a fixed factor

	Intermediate consumption[1]	Labour	Capital
Intermediate consumption[1]	– 0,282	0,124	0,001
Labour	0,095	– 0,158	0,011
Capital	0,002	0,056	– 0,006

[1] Excluding feed consumption.
Source: Frohberg, 1992.

3.1.4. Dynamic specifications for labour demand

So far, all models covered are static which also reflects the frequency with which dynamic analyses are carried out. Activity analysis models are sometimes used for dynamic investigations, especially in the context of analysing investment decisions. However, as other approaches become available this methodology is used less often.

Econometric studies with a dynamic specification follow two different approaches. One set of models is strongly theory oriented and specifies the dynamics from the concept of adjustment costs. Vasavada and Ball (1988) provide a study of this kind for US agriculture. The other stream of research is more oriented toward the data. It imposes fewer a priori assumptions on the model and 'lets the data speak'. The work by Friesen et al. (1992) represents a study of this kind for Canadian agriculture. These authors use an error correction model and test several hypotheses.

Their study indicates that imposing conditions like symmetry and homotheticity as maintained hypotheses is not always appropriate. Neither do the authors find support for the hypothesis that the production factors adjust instantaneously; i.e. the long-run static equilibrium model is not supported by their outcomes.

3.2. Determining supply of agricultural labour service

In comparison to demand specifications modelling supply of agricultural labour is often based on less theoretical grounds. Household models, which are covered in the next section, are almost the only ones to follow a rigorous theoretical specification. But in most cases, some reduced form models are employed to study labour supply like migration models which determine net migration out of agriculture without explicitly taking into account the number of newcomers and the total number leaving agriculture.

Migration models usually use the disparity of annual income between off-farm and farm work as a determinant for immediate adjustment possibilities in employment.[1] From a theoretical point of view, wage differentials are a more appropriate measure than income disparity. In addition to using income disparity, provision has to be made for additional costs which often arise with a new job opportunity. The justification for this approach is to be seen in the lack of reliable information on the marginal value product of the non-wage agricultural labour force. These can be outlays due to some investment in human capital to obtain additional skills for the new occupation and/or a change in residence necessary for taking up the new job.[2] The latter expenses are adjustment costs which are incurred only once with taking up a new job. They have to be distinguished from the drop in earnings which are not a one-off loss. Rather, they may be incurred over the entire time span of gainful activities. Other variables included in migration models are level of education, absorption capacity of non-agriculture, unemployment rate, level of young farmers and other demographic variables.

Migration models can be decomposed into various age classes. Since mobility of agricultural labour varies by age such a breakdown may be crucial for obtaining satisfactory results. Farmers in the lower and in the upper age-brackets show the highest rate of leaving agriculture.[3] Young farmers are rather mobile because they have not yet acquired much on the job experience or specific skills; especially those cannot be obtained through formal training. Therefore, they may not yet obtain such high returns to those specific skills as older farmers do. Older farmers leave agriculture at a relatively high rate because of sickness, invalidity and death, and not necessarily for economic reasons.

Taking up employment in agriculture also varies substantially with age. Most newcomers to farming are in the young age-bracket. This class indicates especially strong variability in employment which only gradually becomes noticeable in the total numbers of farm employment. For example, the number of trainees in German agriculture changed rather drastically during the 1980s. From 1980 to 1985, persons receiving an agricultural training declined at an annual average rate of 2,1%percent and from 1985 to 1990 at 15,7%. Though the development of the demographic structure of Germany's population may partly explain this observation, it

[1] See for example Folmer (1993), von Braun (1979).
[2] Folmer (1993), p.27.
[3] See for example Fasterding (1990).

seems that the change of the CAP in the mid 1980s also had a strong impact, at least on this category of the agricultural labour force in Germany. Comparable numbers are only available for France which shows a similar decline.

These examples indicate how important it is to divide agricultural labour appropriately into various classes for any analysis. The study by Folmer (1993) divides agricultural labour into two age cohorts; the 'young', aged over up to 65 and the 'old', aged over 65. All other studies cited in this section investigate the mobility of agricultural labour without any breakdown into several classes. It seems that this lack of refinement may explain some of the problems a number of these studies have.

Other aspects influence the agricultural labour-market as well. Investment in human capital is often cited as being one of the causes of lower earnings in agricultural jobs than in others. This implies that the education and training of farmers is below the average of the working class. The average age of the farm population exceeds that of the non-farm population. Institutional barriers exist which prevent an easy change from farming to non-farm activities. Some have strong preferences for farming and, therefore, accept a lower level of remuneration for their work.

As mentioned above, migration models do not rely rigorously on theory. However, their ability to reflect changes in agricultural labour supply is quite good due to the ability to accommodate a number of different hypotheses. They also allow for dynamic elements in the specification. In this way, they become rather suitable for agricultural supply models with a recursive dynamic structure like the ECAM model.

3.3. Simultaneity in decisions on supply of and demand for agricultural labour

The above models rest on the assumption that farmers' decisions on how much to work, what to consume and what to produce are separable (or sometimes called recursive). It is argued, however, that members of the farm family combine their decisions on demand for labour as producers and on supply of labour as consumers. The latter is cast as a utility maximization problem. Household utility is assumed to depend on the consumption bundle and on leisure. Since time available for work is limited, leisure also affects production decisions through the work hours which the farm household is willing to spend on the farm and/or on off-farm jobs.

The allocation of farm labour to the various commodities is determined by a profit maximization model which, in turn, yields income from farming to be spent for consumption. Lopez (1984) employs this approach for analysing agricultural labour-markets. The linkage between utility maximization and profit maximization in this model is the amount of work spent in agriculture. He tests the hypothesis whether these two kind of decisions are separable (or recursive) from each other. Using 1971 cross-section data of Canadian agriculture, his findings indicate that these decisions are indeed non-separable (or non-recursive).

Empirical estimates of household models for the agricultural sector are still scattered. Thijssen (1988) provides an example for European agriculture. On a conceptual basis, however, these models are extended in several directions.[1] One line of argument is that the farm household produces z-goods. These are non-marketable goods which are produced in the household. For example, this can be living comfort in the home. The presence of such goods can explain some of the 'puzzling' results sometimes obtained in supply analysis. One example is the inverse supply reaction and another one the difference between marginal value product of farm labour and its opportunity costs. The latter is especially interesting since it may rationalize the divergence of return to farm labour and to non-farm employment. If one extends the model further to also include the possibility that for example, working in agriculture results in direct utility, slow supply response to product price changes may find an explanation.

Though these models offer possibilities to test additional hypotheses they may become rather complex if other elements such as dynamic behaviour and/or risk are considered. In addition, the data adequacy may be insufficient for estimating these models. As has been mentioned above, many data on farm household income and on wages are still to be improved.

4. The impact of a CAP reform on EC agricultural labour force, compensation payments and land use

The above discussion indicates that only a limited number of quantitative analyses provide sufficient insights into the determinants of the market for agricultural labour in the EC. These studies vary considerably with regard to the main economic factors in the decisions of agricultural labour to

[1] Witzke (1993).

migrate into other sectors of the economy; some use marginal value product of labour and others gross value-added as a proxy for annual labour income.

As was shown in Section 2, the share of income of agricultural households originating from farming varies among the Member States from 30% in Italy to 77% in Ireland (see Table 2). Since part-time farming has increased in the past, and may continue to do so in the future, it is expected that these percentages will also decrease further. Though these country averages hide substantial variations within a Member State, for most agricultural households farming is not the sole income source, making them less vulnerable to changes in the profitability of agriculture. Total income of these households does not vary as extensively as adjustments in labour income from agriculture may suggest. In this respect, income as a determinant for migration may become less important.

If wage differentials are more influential in determining migration a reduction in agricultural support may narrow the gap but not close it. The opportunity costs for many full-time farmers are very low because they do not have the necessary skills, are too old or there are simply no job alternatives outside agriculture.

All the studies mentioned in Section 3 were carried out for time periods when support of agriculture through the CAP was relatively high and provided mainly through prices. Both policy scenarios analysed in this study, the Mac Sharry reform and the decoupled Mac Sharry scenario, introduce transfer payments as the core of agricultural support. This is a substantial deviation from the price measures used previously. In both scenarios, administered prices (intervention prices and threshold prices) will be reduced by about for the main products and both rely on acreage allocation and animal numbers as reference for determining compensations payments.

Applying the elasticities of some of the studies on agricultural labour quoted in the previous section for the current analysis may be hampered by the fact that they were calculated for a certain ratio of producer to input prices in the past which is substantially different from that to be applied for the current analysis. This ratio has been altered considerably due to the substantial decline in real prices observed in the second half of the 1980s and early 1990s[1] and will decrease further up to 1995 according to the specification of the policy scenarios to be analysed.

[1] Tangermann (1992), Table C4.

One of the main difference between the Mac Sharry reform and the decoupled Mac Sharry scenario is that the former uses current acreage allocation and current animal numbers as a reference system while the latter is based on a reference set observed in the past and, therefore, decouples current transfers from current production decisions. In addition, the Mac Sharry reform requires a certain percentage — currently 15% — of set-aside of the main crops (grains, oilseeds and protein crops) to be eligible for transfer payments. For the decoupled Mac Sharry scenario such a requirement is not specified.

In the Mac Sharry reform, the compensation payments per hectare are regionalized and based on average yield levels over the period 1986 to 1990. This weakens the link between production increases and policies because future yield increases are not transferred into higher acreage compensation payments. The US experience with holding the base yield constant at the 1984 level, as specified in the 1985 Farm Bill, was that annual yield increases became smaller. It is perhaps not possible to extrapolate these results to the EC. But as for US farmers beginning in 1986, the Mac Sharry reform provides less economic incentive for EC farmers to apply yield enhancing inputs. Yields of the commodities for which compensation payments will be made are, therefore, expected to show smaller growth rates in the future than they used to in the past. Similar effects are expected for the decoupled Mac Sharry scenario.

The policy changes of the two scenarios will affect agriculture in many ways. Due to changes in producer prices one may distinguish three interdependent adjustment processes which directly or indirectly impact on employment of labour:

(i) yield reductions due to extensification;

(ii) change in the product mix;

(iii) substitution between labour and other inputs.

Additional effects on labour may come about from the land set-aside requirement and the so-called accompanying measures; especially the early retirement scheme, and the agri-environmental action programme.

The former of the last two measures aims at assisting those farmers who run small units and are aged 55 years and above. The latter provides financial aid for adopting environmentally friendly farming practices.

It is also useful to differentiate between short- and long-term impacts. The former are expected to be small since primary factors are rather immobile in the short run. This holds

especially for land but also for labour and capital. Therefore, these effects will be dealt with separately in the discussion. The two scenarios will be analysed in turn since their impact is expected to differ. At first the Mac Sharry reform scenario will be described followed by the decoupled Mac Sharry scenario.

4.1. Impact of the Mac Sharry reform on labour

In the short run, the first three adjustment processes mentioned above will not be very strong and the effect on labour is expected to be minimal. Extensification will be introduced gradually since farmers have to find their new optima for input use. Optimum levels of variable inputs, especially of chemicals, were close to their maximum in the past because of the rather small ratios of the prices of these inputs to output prices. With the decline of real producer prices beginning in the mid 1980s the use of chemicals was also cut back. This process can be expected to continue further but the rate of change may alter somewhat. In regions with less-favourable natural conditions for agriculture the rate of reduction is expected to become stronger than in regions with good agro-climate conditions.

The land set-aside requirement will, of course, affect the output mix. Beyond that impact, the crop mix will not change in the short run because of the way the compensation payments are tied to production. However, those farms exceeding the limit on livestock density have to reduce the level of animal husbandry in order to receive compensation payments and, therefore, may produce less livestock products which will alter the mix of animal production.

The strongest impact on labour may be due to set-aside requirements. The land set-aside is estimated to be about 9% of the base area, i.e. the area allocated to the main crops, and 6% of the cropland for the average of the EUR 12. These shares differ between individual Member States from 2 to 15% of the base area and from 1,4 to 9,8% of cropland. In both cases, the low percentages hold for Greece and the high ones for the UK. These figures indicate that the share of set-aside acreage on base acreage and on total cropland is relatively small so that the direct impact on labour may also be limited.

The percentages listed above are also indicative of the difference in the area of total cropland eligible for compensation. This area is, for example, much higher in the UK than in Greece, pointing to the fact that support offered to temperate food crops favours central and northern Member States. Regional yield differences magnify this tendency further. This bias was already observed under the previous support scheme of the CAP which is counterbalanced by benefits provided to tobacco, wine and vegetable oils favouring southern Member States.[1]

Land which is set aside may be fallowed or used to grow non-food-use crops. It has to be kept in an environmentally adequate condition. For this purpose, fallow land requires cultivation for which labour, capital and variable inputs like energy are needed. Hence, set-aside land demands some labour input. Furthermore, the share of set-aside land on total crop area is rather small which also diminishes the impact on labour.

The early retirement scheme aims at increasing land mobility to foster structural adjustment. It is difficult to assess how many farmers will participate in this scheme. Any farmer aged 55 years or over is eligible. A fixed amount of ECU 4 000 per year is paid plus a variable part of ECU 250 per hectare up to a total maximum of ECU 10 000 a year. In addition, the farmer earns a rent from leasing the land. Altogether, the scheme may be financially interesting for those who farm in less-favourable areas and who have only a small land base. However, regions with marginal farmland frequently lack alternative employment opportunities, making the early retirement payment insufficiently attractive to induce farmers in these areas to leave agriculture. If at all, the impact of the early retirement scheme on labour will be felt without much delay.

In the long run, some stronger effects on labour due to the Mac Sharry reform can be expected. Depending on the development of input prices and biological technical progress, extensification may lead to more-pronounced yield reductions. The crop mix can still be expected not to change drastically because of the coupling of compensations to production. A change in the output mix of animals may take place since cheaper feedgrains will make pork and poultry production more profitable. On the other hand, return to pasture is likely to decline which will improve the competitiveness of ruminants and will counterbalance the feedgrain effect to some extent. If it changes at all, return to cropland may decline slightly, inducing substitutions between land and other inputs except perhaps machinery. Altogether, these effects may lead to an increase in labour outmigration from agriculture.

In summary, the Mac Sharry reform scenario may lead to only small changes in the agricultural labour force. This

[1] Brown (1989).

does not come as a surprise since the policy measures of this scheme are not designed to increase farmers' mobility. An exception is the early retirement scheme. A crucial role in future developments may be played by technical progress. In the past, technical progress was mainly land and labour saving. Future innovations farmers may look for will perhaps be less land saving but more cost cutting.

The upper part of Table 10 provides results of the analysis of the Mac Sharry reform carried out by the Centre for World Food Studies, Amsterdam with the ECAM model.[1] This model does not include Greece, Portugal or Spain. The results indicate that the Mac Sharry reform affects labour in Member States only marginally in comparison to an extrapolation of the price support scheme (reference scenario). Agricultural labour in the UK faces a small decline while it increases in Ireland. In all other Member States, the impact is negligible. The numbers in Table 10 are reported for the year 2002; i.e. for a medium-time horizon. They should not be interpreted as if the agricultural labour force will not decline between 1993 and 2002. All they indicate is by how much the change in employment as it would occur under the reform scenario deviates from that in the reference run in that year. The reference scenario predicts a declining labour force for all Member States up to the year 2002.[2]

The value-added in agriculture, including the compensation payments, increases in all Member States according to ECAM results. With the exception of the Netherlands value-added rises especially in those countries in which the average agricultural household earns the largest share of its income from agriculture. At least in those countries, agricultural households may enjoy an increase in their income which is not too large but still noticeable. This shows that the lump-sum transfers of the Mac Sharry reform may make up for the losses incurred by the price reductions.

The downstream and upstream industries are also affected by these changes in agricultural producer prices. Among the downstream firms the impact will be most noticeable for the chemical industry, including fertilizer manufacturers, since fertilizer application levels may be reduced and some of the cropland is idled. For manufacturers of machinery and equipment small reductions in sales could also occur since these inputs may be slightly less-demanded by farmers.

[1] Folmer et al. (1993).
[2] Folmer et al. (1993), Table 6.9.

Table 10

Changes in real value-added, farming population and real value-added per annual work unit for the year 2002 (in percent)

	Mac Sharry scenario over reference scenario		
	Real value-added	Annual work unit	Real value-added per annual work unit
	2002	2002	2002
B/L	8,4	0	8,4
DK	1,0	0	1,0
D	6,3	0	6,3
F	7,4	0	7,4
IRL	13,9	2,1	11,6
I	2,0	0	2,0
NL	2,0	0	2,0
UK	6,3	- 1,0	7,4
EUR 9	4,1	0	4,1
	Mac Sharry decoupled scenario over reference scenario		
	Real value-added	Annual work unit	Real value-added per annual work unit
	2002	2002	2002
B/L	11,7	- 1,0	12,8
DK	12,7	- 3,1	16,3
D	17,5	- 1,0	18,7
F	11,8	- 7,1	20,3
IRL	19,7	- 2,1	22,3
I	6,2	- 2,1	8,5
NL	2,0	0	2,0
UK	12,9	- 4,0	17,6
EUR 9	10,6	- 3,0	14,0

Source: Calculated from Table 6.9, Folmer et al. (1993).

Among the upstream firms, the food-processing industry of the EC is going to gain from the reform. It will become internationally more competitive due to lower raw material prices. The significance of this effect can also be seen from the observation that the share of processed goods in agricultural trade increases. How much this change in raw material prices will lead to production and trade expansion, and hence higher employment, is difficult to assess. However, the impact should not be overstated since farm gate prices only account for less than 50% of retail prices, with the remaining component being value-added by the food industry and the distribution system. In addition, the danger exists that these price changes will not be passed on to retailers, given the concentration of food processing into a rather small number of companies.

4.2. Impact of the decoupled Mac Sharry scenario on labour

The decoupled Mac Sharry scenario will have a stronger impact on labour mobility since production is not a precondition for receiving compensations. As stated in the scenario description, the transfers are based on some reference acreage and animal husbandry levels of the past. Eligibility for these compensations does not even depend on being actively engaged in farming. Farmers' decisions on production and input use in this scenario depend much more on relative prices and hence on market conditions than in the Mac Sharry reform scenario. The milk quota is, however, still maintained in this scenario.

The lower part of Table 10 provides the ECAM results with regard to employment and value-added for this scenario.[1] Clearly, its impact on labour is considerably stronger than that of the Mac Sharry reform. In France and the UK the labour force in 2002 is 7 and 4% respectively, smaller than in the reference situation. In other countries of the EUR 9 this difference is considerably narrower. No change is simulated for the Netherlands. Since ECAM contains national models it cannot depict the regional impacts discussed above. Therefore, the simulation results may underestimate the impact of this policy regime on labour; especially if one considers that ECAM projects more acreage being planted in the decoupled scenario than in the Mac Sharry reform. The land which was already voluntarily set-aside in the reference run according to ECAM results remains fallowed under decoupled conditions. Beyond that, no more land will be idled, suggesting that all the other land may be profitably used for production. In addition, the authors assumed that slightly more land is taken for non-agricultural purposes than in the reference situation.[2]

According to ECAM, value-added by agriculture of the EUR 9 is 10% higher in 2002 in the decoupled scenario than in the reference situation. This change also compares favourably with the Mac Sharry reform scenario. The explanation for this considerable increase may be found in the fewer restrictions imposed on farmers with regard to land allocation. Primary factors may be used more efficiently. Certainly, the increase in cropland will also contribute to the rise in value-added by agriculture.

The stronger impact on outmigration of labour caused by decoupled transfer payments is due to the expected reduction of the marginal value product of labour or the reduced value-added generated in agriculture. The immediate effects may still not be large since farmers must first find alternative jobs and acquire necessary skills. But in the medium to long term, labour outmigration is expected to exceed that of the reform and/or reference scenario.

The regional impacts of this scenario may be of more concern than the country effects. The strong decline in producer prices will put agriculture under severe economic pressure in regions with less-favourable growing conditions. It can even be expected that in some areas crop production will be abandoned altogether because of lack of profitability. In the short term, these are the regions where revenues no longer cover variable costs. Over the long term, returns to primary factors must be competitive, otherwise farming will be given up.

Table 11 provides some indications about those regions in the Member States where crop production may be under threat due to lack of profitability. The calculations are carried out for only (some of the) main crops since it is specified in the decoupled scenario that prices of these crops will be reduced substantially while the remaining crops are not affected.[3] Table 11 provides information for two different spatial extensions; the entire country and the provinces. Regions rather than provinces are used for reporting, only in those cases in which a further subdivision of the regional data into those for provinces is not available; for example Namur in Belgium. The first column of Table 11 indicates the total area allocated to the crops under consideration; i.e. to wheat, barley, maize, rape-seed and sunflower. Columns B to F show how much of the land allocated to each individual crop may be idled due to the reduction in producer prices. The ratio of the sum of the land idled to the sum of the land allocated to the main crops in 1989 is given in percentages in the last column of this table. The acreage allocation at the country level was taken for 1989 which was then distributed to the various regions and further to the provinces according to the shares observed for 1986. Crop prices for 1992 were extrapolated to 1996 according to the policy specification of the scenario. Assumptions were made also regarding the reduction in input use and input prices and the increase in crop yields.

The calculations represent a long-term view since a crop is considered profitable as long as its gross margin calculated in this exercise, which is based on the decoupled policies, exceeds a region specific minimum level. The latter reflects competitive returns to the primary factors land, capital and labour. For determining these minimum gross margins, input use of capital and labour per hectare is based on rather extensive production conditions for the corresponding crops.

[1] Folmer et al. (1993).
[2] Folmer et al. (1993), Table 6.1.
[3] The data used for the analysis were obtained from the SPEL system (Eurostat, 1993) and the REGIO data system (Eurostat, 1986). SPEL data were used for yields, for quantities and prices of variable inputs and for gross margins.

Table 11

Acreage reductions

Country and region	Total area allocated to crops considered (in 1989) (1 000 ha)	Area fallowed of:										Sum of columns B to F relative to column A (in %)
		Barley		Maize		Rapeseed		Sunflower		Wheat		
		(1 000 ha)	(in %)	(1 000 ha)	(in %)	(1 000 ha)	(in %)	(1 000 ha)	(in %)	(1 000 ha)	(in %)	
	A	B		C		D		E		F		
Belgium	**477,5**	**7,6**	**6,2**	**6,0**	**100,0**	**3,8**	**97,4**			**48,7**	**25,1**	**13,8**
Vlaams gewest	186,3											
Région wallonne	290,9											
Bruxelles	0,3	0,0	0,0	n.a.		n.a.				0,0	0,0	0,0
Antwerpen	4,3	1,0	100,0	0,4	100,0	n.a.				40,8	100,0	51,2
Brabant	90,5	0,0	0,0	0,8	100,0	n.a.				0,0	0,0	0,9
Hainaut	111,1	0,0	0,0	0,2	100,0	0,5	100,0			0,0	0,0	0,6
Liège	52,6	0,0	0,0	0,2	100,0	0,1	100,0			0,0	0,0	0,6
Limburg	24,4	0,0	0,0	0,5	100,0	n.a.				0,0	0,0	2,0
Luxembourg	13,6	6,6	100,0	0,1	100,0	0,1	100,0			6,0	100,0	94,1
Namur	67,4	0,0	0,0	0,1	100,0	3,1	100,0			30,7	100,0	50,3
Oost-Vlaanderen	38,0	0,0	0,0	1,7	100,0	n.a.				11,2	100,0	33,9
West-Vlaanderen	75,4	0,0	0,0	2,0	100,0	n.a.				0,0	0,0	2,7
Denmark	**1 686,9**	**0,0**	**0,0**			**0,0**	**0,0**			**0,0**	**0,0**	**0,0**
Hovedstads-regionen	89,3	0,0	0,0			0,0	0,0			0,0	0,0	0,0
Ost for Storebaelt	373,8	0,0	0,0			0,0	0,0			0,0	0,0	0,0
Vest for Storebaelt	1 223,9	0,0	0,0			0,0	0,0			0,0	0,0	0,0
Former FR of Germany	**4 725,1**	**0,0**	**0,0**	**194,5**	**100,0**	**428,4**	**100,0**			**748,5**	**44,8**	**29,0**
Schleswig-Holstein	408,9	0,0	0,0	0,4	100,0	108,3	100,0			0,0	0,0	26,6
Hamburg	3,7	0,0	0,0	0,1	100,0	0,9	100,0			0,0	0,0	27,0
Niedersachsen	1 049,3											
Braunschweig	272,1	0,0	0,0	0,4	100,0	12,7	100,0			0,0	0,0	4,8
Hannover	284,6	0,0	0,0	5,1	100,0	18,6	100,0			0,0	0,0	8,3
Lüneburg	259,9	0,0	0,0	5,0	100,0	21,3	100,0			0,0	0,0	10,1
Weser-Ems	232,7	0,0	0,0	31,6	100,0	7,8	100,0			0,0	0,0	16,9
Bremen	1,0	0,0	0,0	0,0	0,0	0,2	100,0			0,0	0,0	20,0
Nordrhein-Westfalen	754,3											
Düsseldorf	110,1	0,0	0,0	2,7	100,0	1,7	100,0			0,0	0,0	4,0
Köln	156,3	0,0	0,0	0,6	100,0	1,0	100,0			0,0	0,0	1,0
Münster	190,7	0,0	0,0	38,8	100,0	2,4	100,0			0,0	0,0	21,6
Detmold	187,1	0,0	0,0	11,5	100,0	15,7	100,0			0,0	0,0	14,5
Arnsberg	110,3	0,0	0,0	4,5	100,0	10,8	100,0			0,0	0,0	13,9
Hessen	354,2											
Darmstadt	114,9	0,0	0,0	5,0	100,0	6,2	100,0			0,0	0,0	9,7
Gießen	81,6	0,0	0,0	0,7	100,0	8,5	100,0			0,0	0,0	11,3
Kassel	157,7	0,0	0,0	0,5	100,0	22,2	100,0			0,0	0,0	14,4

Table 11 *(Continued)*

Country and region	Total area allocated to crops considered (in 1989) (1 000 ha)	Area fallowed of:										Sum of columns B to F relative to column A (in %)
		Barley		Maize		Rapeseed		Sunflower		Wheat		
		(1 000 ha)	(in %)	(1 000 ha)	(in %)	(1 000 ha)	(in %)	(1 000 ha)	(in %)	(1 000 ha)	(in %)	
	A	B		C		D		E		F		
Rheinland-Pfalz	290,3											
Koblenz	112,0	0,0	0,0	0,4	100,0	11,8	100,0			42,2	100,0	48,6
Trier	46,3	0,0	0,0	0,2	100,0	3,2	100,0			12,2	100,0	33,7
Rheinhessen-Pfalz	131,8	0,0	0,0	2,3	100,0	6,9	100,0			49,4	100,0	44,5
Baden-Württemberg	532,7											
Stuttgart	206,5	0,0	0,0	3,8	100,0	19,0	100,0			86,0	100,0	52,7
Karlsruhe	94,8	0,0	0,0	7,4	100,0	9,6	100,0			40,4	100,0	60,5
Freiburg	98,3	0,0	0,0	19,1	100,0	8,6	100,0			37,8	100,0	66,6
Tübingen	122,3	0,0	0,0	3,4	100,0	15,1	100,0			55,9	100,0	60,8
Bayern	1 311,3											
Oberbayern	239,8	0,0	0,0	9,2	100,0	21,3	100,0			96,2	100,0	52,8
Niederbayern	251,6	0,0	0,0	30,0	100,0	14,0	100,0			110,1	100,0	61,2
Oberpfalz	168,0	0,0	0,0	3,0	100,0	14,0	100,0			49,8	100,0	39,8
Oberfranken	142,5	0,0	0,0	0,6	100,0	15,8	100,0			39,8	100,0	39,4
Mittelfranken	151,7	0,0	0,0	0,7	100,0	9,0	100,0			60,7	100,0	46,4
Unterfranken	224,7	0,0	0,0	1,9	100,0	33,9	100,0			0,0	0,0	15,9
Schwaben	133,4	0,0	0,0	5,4	100,0	6,3	100,0			61,0	100,0	54,5
Saarland	19,2	0,0	0,0	0,2	100,0	1,6	100,0			7,0	100,0	45,8
Westberlin	0,0	n.a.		n.a.		n.a.				n.a.		
Greece	**1 571,3**	**0,0**	**0,0**	**0,0**	**0,0**			**0,0**	**0,0**	**0,0**	**0,0**	**0,0**
Spain	**8 642,4**	**1 512,6**	**34,4**	**142,3**	**26,2**	**6,6**	**97,1**	**994,2**	**100,0**	**609,4**	**27,4**	**37,8**
Noroeste	285,4											
Galicia	269,7	1,9	100,0	134,0	100,0	n.a.		n.a.		34,8	100,0	63,3
Asturias	10,3	n.a.		3,9	100,0	n.a.		n.a.		0,5	100,0	42,7
Cantabria	5,5	0,4	100,0	1,5	100,0	n.a.		n.a.		0,0	0,0	34,5
Noreste	1 337,7											
Pais Vasco	60,5	0,0	0,0	1,8	100,0	n.a.		n.a.		0,0	0,0	3,0
Navarra	233,6	0,0	0,0	0,0	0,0	2,3	100,0	2,3	100,0	0,0	0,0	2,0
Rioja	89,6	0,0	0,0	0,0	0,0	n.a.		0,1	100,0	0,0	0,0	0,1
Aragón	954,1	0,0	0,0	0,0	0,0	0,5	100,0	19,7	100,0	0,0	0,0	2,1
Madrid	101,4	0,0	0,0	0,0	0,0	0,1	100,0	3,5	100,0	41,1	100,0	44,1
Centro	4 756,1											
Castilla-León	2 489,3	0,0	0,0	0,0	0,0	1,1	100,0	108,5	100,0	0,0	0,0	4,4
Castilla-La Mancha	1 831,1	1 038,2	100,0	0,0	0,0	0,8	100,0	309,5	100,0	376,9	100,0	94,2
Extremadura	435,6	0,0	0,0	0,0	0,0	0,0	0,0	90,3	100,0	123,0	100,0	49,0
Este	482,9											
Cataluna	389,0	0,0	0,0	0,0	0,0	1,2	100,0	7,3	100,0	0,0	0,0	2,2
Comunidad Valenciana	57,0	0,0	0,0	0,0	0,0	n.a.		6,5	100,0	0,0	0,0	11,4
Baleares	36,9	23,1	100,0	0,0	0,0	n.a.		0,0	0,0	7,9	100,0	84,0

Table 11 *(Continued)*

Country and region	Total area allocated to crops considered (in 1989) (1 000 ha)	Area fallowed of:										Sum of columns B to F relative to column A (in %)
		Barley		Maize		Rapeseed		Sunflower		Wheat		
		(1 000 ha)	(in %)	(1 000 ha)	(in %)	(1 000 ha)	(in %)	(1 000 ha)	(in %)	(1 000 ha)	(in %)	
	A	B		C		D		E		F		
Sur	1 663,6											
Andalucia	1 544,0	360,8	100,0	0,0	0,0	0,6	100,0	445,8	100,0	0,0	0,0	52,3
Murcia	119,8	87,7	100,0	0,0	0,0	n.a.		0,7	100,0	24,1	100,0	93,9
Ceuta y Melilla	0,0	n.a.		n.a.		n.a.		n.a.		n.a.		
Canarias	14,6	0,5	100,0	1,1	100,0	n.a.		n.a.		1,1	100,0	18,5
France	**11 050,0**	**0,0**	**0,0**	**28,3**	**1,6**	**657,8**	**89,3**	**32,9**	**3,1**	**0,0**	**0,0**	**6,5**
Ile-de-France	511,4	0,0	0,0	0,0	0,0	0,0	0,0	32,9	100,0	0,0	0,0	6,4
Bassin parisien	4 825,2											
Champagne-Ardenne	868,8	0,0	0,0	0,0	0,0	93,6	100,0	0,0	0,0	0,0	0,0	10,8
Picardie	947,6	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Haute-Normandie	374,0	0,0	0,0	0,0	0,0	24,8	100,0	0,0	0,0	0,0	0,0	6,6
Centre	1 655,7	0,0	0,0	0,0	0,0	113,0	100,0	0,0	0,0	0,0	0,0	6,8
Basse-Normandie	227,2	0,0	0,0	0,0	0,0	7,0	100,0	0,0	0,0	0,0	0,0	3,1
Bourgogne	749,7	0,0	0,0	0,0	0,0	107,1	100,0	0,0	0,0	0,0	0,0	14,3
Nord-Pas-de-Calais	507,2	0,0	0,0	0,0	0,0	5,6	100,0	n.a.		0,0	0,0	1,1
Est	741,3											
Lorraine	428,4	0,0	0,0	10,3	100,0	83,0	100,0	0,0	0,0	0,0	0,0	21,8
Alsace	174,0	0,0	0,0	0,0	0,0	14,4	100,0	0,0	0,0	0,0	0,0	8,3
Franche-Comté	138,9	0,0	0,0	0,0	0,0	19,1	100,0	0,0	0,0	0,0	0,0	13,8
Ouest	1 930,6											
Pays de la Loire	623,4	0,0	0,0	0,0	0,0	21,7	100,0	0,0	0,0	0,0	0,0	3,5
Bretagne	459,8	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Poitu-Charentes	847,3	0,0	0,0	0,0	0,0	44,0	100,0	0,0	0,0	0,0	0,0	5,2
Sud-Ouest	1 639,5											
Aquitaine	619,5	0,0	0,0	0,0	0,0	8,5	100,0	0,0	0,0	0,0	0,0	1,4
Midi-Pyrénées	850,6	0,0	0,0	0,0	0,0	49,1	100,0	0,0	0,0	0,0	0,0	5,8
Limousin	69,4	0,0	0,0	10,2	100,0	1,1	100,0	0,0	0,0	0,0	0,0	16,3
Centre-Est	634,7											
Rhône-Alpes	421,4	0,0	0,0	0,0	0,0	37,7	100,0	0,0	0,0	0,0	0,0	8,9
Auvergne	213,2	0,0	0,0	0,0	0,0	15,8	100,0	0,0	0,0	0,0	0,0	7,4
Méditerranée	260,7											
Languedoc-Roussillon	127,0	0,0	0,0	7,8	100,0	4,9	100,0	0,0	0,0	0,0	0,0	10,0
Provence-Alpes-Côte d'Azur	130,0	0,0	0,0	0,0	0,0	6,8	100,0	0,0	0,0	0,0	0,0	5,2
Corse	3,7	0,0	0,0	0,0	0,0	0,6	100,0	0,0	0,0	0,0	0,0	16,2
Ireland	**406,0**	**0,0**	**0,0**			**5,7**	**100,0**			**0,0**	**0,0**	**1,4**

Table 11 *(Continued)*

Country and region	Total area allocated to crops considered (in 1989) (1 000 ha)	Area fallowed of:										Sum of columns B to F relative to column A (in %)
		Barley		Maize		Rapeseed		Sunflower		Wheat		
		(1 000 ha)	(in %)	(1 000 ha)	(in %)	(1 000 ha)	(in %)	(1 000 ha)	(in %)	(1 000 ha)	(in %)	
	A	B		C		D		E		F		
Italy	**4 868,6**	**264,6**	**59,5**	**24,4**	**3,2**	**1,7**	**6,1**	**0,4**	**0,4**	**842,4**	**27,3**	**23,3**
Nord-Ovest	325,4											
Piemonte	317,3	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Valle d'Aosta	0,6	n.a.		n.a.		n.a.		n.a.		n.a.		
Liguria	7,4	0,2	100,0	0,0	0,0	n.a.		n.a.		0,0	0,0	2,7
Lombardia	324,7	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Nord-Est	425,5											
Trentino-Alto Adige	2,9	0,7	100,0	0,2	100,0	n.a.		0,0	0,0	0,0	0,0	31,0
Veneto	341,0	0,0	0,0	0,0	0,0	n.a.		0,0	0,0	0,0	0,0	0,0
Friuli-Venezia Giulia	81,6	16,4	100,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	20,1
Emilia-Romagna	495,3	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Centro	932,1											
Toscana	422,6	35,3	100,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	8,4
Umbria	192,3	11,0	100,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	5,7
Marche	317,3	21,0	100,0	0,0	0,0	0,7	100,0	0,0	0,0	0,0	0,0	6,8
Lazio	278,9	21,4	100,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	7,7
Campania	220,4	11,6	100,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	5,3
Abruzzi-Molise	279,5											
Abruzzi	153,5	16,7	100,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	10,9
Molise	125,9	7,8	100,0	0,0	0,0	0,2	100,0	0,0	0,0	0,0	0,0	6,4
Sud	951,5											
Puglia	523,3	34,9	100,0	0,0	0,0	0,8	100,0	0,0	0,0	429,3	100,0	88,9
Basilicata	271,8	31,0	100,0	15,4	100,0	n.a.		0,0	0,0	214,9	100,0	96,1
Calabria	156,3	13,6	100,0	8,8	100,0	n.a.		n.a.		116,9	100,0	89,1
Sicilia	494,6	13,6	100,0	0,0	0,0	n.a.		0,4	100,0	0,0	0,0	2,8
Sardegna	122,3	29,4	100,0	0,0	0,0	n.a.		n.a.		81,3	100,0	90,5
Luxembourg	**26,1**	**0,0**	**0,0**			**0,9**	**100,0**			**0,0**	**0,0**	**3,4**
Netherlands	**464,1**	**0,0**	**0,0**			**5,8**	**59,8**			**0,0**	**0,0**	**1,2**
Noord-Nederland	164,2											
Groningen	90,3	0,0	0,0			5,3	100,0			0,0	0,0	5,9
Friesland	16,8	0,0	0,0			0,2	100,0			0,0	0,0	1,2
Drenthe	57,1	0,0	0,0			0,1	100,0			0,0	0,0	0,2
Oost-Nederland	85,7											
Overijssel	9,6	0,0	0,0			n.a.				0,0	0,0	0,0
Gelderland	13,7	0,0	0,0			n.a.				0,0	0,0	0,0
Flevoland	62,4	0,0	0,0			0,0	0,0			0,0	0,0	0,0

Table 11 *(Continued)*

Country and region	Total area allocated to crops considered (in 1989) (1 000 ha)	Area fallowed of:										Sum of columns B to F relative to column A (in %)
		Barley		Maize		Rapeseed		Sunflower		Wheat		
		(1 000 ha)	(in %)	(1 000 ha)	(in %)	(1 000 ha)	(in %)	(1 000 ha)	(in %)	(1 000 ha)	(in %)	
	A	B		C		D		E		F		
West-Nederland	142,7											
Utrecht	0,5	0,0	0,0			n.a.				0,0	0,0	0,0
Noord-Holland	31,9	0,0	0,0			n.a.				0,0	0,0	0,0
Zuid-Holland	39,0	0,0	0,0			0,1	100,0			0,0	0,0	0,3
Zeeland	71,2	0,0	0,0			0,1	100,0			0,0	0,0	0,1
Zuid-Nederland	71,6											
Noord-Brabant	40,9	0,0	0,0			n.a.				0,0	0,0	0,0
Limburg	30,7	0,0	0,0			n.a.				0,0	0,0	0,0
Portugal	**781,0**	**88,0**	**100,0**	**184,0**	**100,0**			**43,0**	**100,0**	**0,0**	**0,0**	**40,3**
United Kingdom	**4 591,2**	**528,1**	**28,8**			**0,9**	**0,2**			**362,3**	**18,2**	**19,4**
North	173,5	0,0	0,0			0,0	0,0			0,0	0,0	0,0
Yorkshire and Humberside	527,4	0,0	0,0			0,0	0,0			0,0	0,0	0,0
East Midlands	738,2	0,0	0,0			0,0	0,0			0,0	0,0	0,0
East Anglia	730,0	0,0	0,0			0,0	0,0			343,4	100,0	47,0
South-East	864,0	0,0	0,0			0,0	0,0			0,0	0,0	0,0
South-West	438,0	0,0	0,0			0,0	0,0			0,0	0,0	0,0
West-Midlands	341,0	0,0	0,0			0,0	0,0			0,0	0,0	0,0
North-West	77,0	44,5	100,0			0,0	0,0			18,9	100,0	82,3
Wales	68,3	51,4	100,0			0,0	0,0			0,0	0,0	75,3
Scotland	565,3	386,8	100,0			0,0	0,0			0,0	0,0	68,4
Northern Ireland	64,0	45,4	100,0			0,9	100,0			0,0	0,0	72,3
Total EUR 12	39 290,2	2 400,9	19,6	579,5	15,3	1 111,6	59,9	1 070,5	46,7	2 611,3	16,5	21,6

Source: Own calculations.

At the province level, a crop is either considered profitable or has to be given up for production. Therefore, the percentage of area fallowed is either 0 or 100 for individual crops. This points to another shortcoming of the database. Each province had to be assumed to be homogeneous with regard to growing conditions which, of course, is an oversimplification. The rather large spatial extension of many of the provinces makes fulfilling this requirement difficult, leading perhaps to an over or underestimation of the impact. For this reason and for the other shortcomings mentioned above, the outcome of these calculations should be interpreted with great care. All that is intended by this exercise is to point to the rather large regional disparities which may occur as a result of completely decoupling the compensations. For Denmark and Greece, regional delineations are either rather crude or missing entirely, making it almost impossible to measure any impact at the province level.

As the results of Table 11 indicate, the Member States are expected to be differently affected regarding the profitability

of crop production. Portugal, Spain, Germany and Italy seem to have the largest shares of land on which main crops may no longer be profitably grown, under decoupled policies. The percentages of these countries are 40, 37, 29 and 23% respectively. The UK and Belgium rank in the middle with 19 and 13% respectively, while France, Luxembourg and the Netherlands are at the bottom of the scale having 6, 3 and 1% respectively. In a few provinces with a relatively large area allocated to main crops the percentage of land not considered profitable for producing these crops reaches 80% and more; for example Luxembourg in Belgium, Castilla-la Mancha in Spain or all three provinces of the South region in Italy. In most provinces, this share, however, is substantially smaller.

At the average of the EUR 12, the portion of the main crop acreage which can be expected to be fallowed is estimated at 21%. Given the lack of data for Denmark and Greece the average may increase if these two countries are properly included in the exercise. This is a considerably higher share than the set-aside requirement of the Mac Sharry reform scenario. But since the land idled in the decoupled scenario mainly concerns areas with less-favourable growing conditions, EUR 12 production would not be reduced by a similar percentage as would acreage taken out of production.

The primary concern with regard to these possible outcomes is not the high share of land likely to be idled but the unequal spatial distribution of this acreage. The reform scenario amounts to a considerably more equal distribution of set-aside land. Since only small farms are exempted from the set-aside requirement, the distribution of land idled in the reform scenario is determined by the share of small to large producers and by the portion of land allocated to main crops. Under decoupled transfer payments, profitability which is not influenced by transfer payments determines the distribution of set-aside land.

Those provinces with a high share of cropland likely to be retired will need additional policy measures for keeping this land in environmentally sound conditions. Abandoning the land is not an option in the case where the public wants to continue enjoying a certain landscape amenity to which a diverse farming system belongs. Such positive externalities generated by agriculture would justify compensations. Furthermore, rural development in these areas could also become an issue if agriculture retreats on a large scale. This may increase migration from rural to urban areas with all its associated difficulties. In an extreme case, depopulation and deserted settlements could be the result. Social problems may also arise. In all, it could be necessary to supplement the decoupled Mac Sharry scenario by policy instruments which would eliminate or, at least alleviate the possible problems arising for a number of regions. Paying compensations differentiated according to environmental and rural objectives would be one possibility. The transfer payments as designed for the Mac Sharry reform and the decoupled scenario do not contain an environmental component.

The decoupled scenario is likely to lead to falling land prices since the transfer payments are not linked to current acreage allocation and because of lower returns per hectare caused by the reduction of producer prices. This loss is compensated through the lump-sum transfers which, as currently assumed, are not restricted to a certain time limit. In this way, the compensations are transferrable from generation to generation. Such an intergenerational transferability may be neither politically feasible nor wanted, and economically unnecessary. Those farmers who are directly affected by such a new policy scheme may not have sufficient alternatives to adjust in the short term. However, the adjustment possibilities increase with the passage of time. The farm's production structure and input use may be adjusted according to the modified comparative advantage of the products. In addition, off-farm employment opportunities may become available. Future generations of would-be farmers are not directly affected by the reform of past policies and do not face restrictions regarding job alternatives. They will decide on the basis of future economic prospects. Therefore, it is conceivable to limit the payments to those persons who farm at the time when the policy change is introduced. Decreasing the payments over the years as adjustment possibilities improve may even be considered.

Tables 12 and 13 provide information about the impact of such time restrictions on transfer payments. Table 12 shows how many farmers who operated a farm in 1992 will retire in each year up to 2002. These calculations are based on the 1987 farm survey.[1] The data, therefore, had to be extrapolated to the year 1992. Since simplifying assumptions with regard to age distribution in each age class had to be made for this purpose, the demographic structure obtained for 1992 may deviate slightly from reality. The strong differences in age observed for 1987 among the Member States was levelled out somewhat by this extrapolation.

The annual average fall due to age, bad health conditions and mortality in the number of farmholders operating a farm in 1992 is about 4,2 to 5,2 %. In 2002, roughly 40% of these farmers will have retired (see Table 12). It is assumed for the calculations that those farmers who operated a farm in 1992 are eligible for transfers but their successors are not. The differences in the demographic structure among the Member States as shown in Tables 6 and 7 are still noticeable in these

[1] Eurostat, 1991.

data. The countries with a high share of elderly farmers have the largest annual retirement rate.

The fall in numbers of farm operators was calculated for each of the nine farm size classes reported in the survey of 1987 by Eurostat. This approach also allows us to determine how much total acreage and base acreage each retiring farmer hands over to a successor. From this information, one can determine the annual reduction in the compensation payments to base acreage, assuming that a farmholder is entitled to these transfers as long as he or she farms.

Table 13 shows the cumulative reduction in transfer payments to cropland according to these conditions. Two additional assumptions were made; the annual payment per hectare base acreage does not fall and the first year in which payments may be terminated is 1996. It should be stressed that these calculations include only the reductions in land compensations. Those transfer payments which are based on animal numbers like beef cattle and ewes are not included in the reductions. Total fall in compensation is, therefore, larger than the numbers shown in Table 13. The reduction in compensations to base acreage in 2002 amounts to approximately a quarter of what would have to be paid as total acreage compensation in that year. The differences among the Member States are not very pronounced. They reflect deviations in annual retirements of 1992 farmholders and of the area which would change hands as a result of these retirements. The differences in the annual fall in numbers of farm operators (Table 12) and in compensations (Table 13) reflect the fact that the larger share of elderly farmers operates relatively smaller farms allowing less land to change hands.

Table 12

Projection of the decline due to age, bad health conditions and mortality in the number of those farmers who operated a farm in 1992[1]

(in %)

	B	DK	D	GR	E	F	IRL	I	L	NL	P	UK
						Decline from previous year						
1993	– 4,34	– 4,42	– 3,67	– 5,13	– 5,39	– 4,55	– 4,81	– 5,43	– 4,39	– 3,95	– 5,31	– 4,59
1994	– 4,38	– 4,40	– 3,82	– 5,03	– 5,33	– 4,58	– 4,75	– 5,33	– 4,38	– 4,01	– 5,19	– 4,54
1995	– 4,43	– 4,40	– 3,95	– 4,96	– 5,29	– 4,62	– 4,73	– 5,26	– 4,38	– 4,08	– 5,10	– 4,52
1996	– 4,47	– 4,42	– 4,07	– 4,92	– 5,27	– 4,66	– 4,73	-5,21	– 4,40	– 4,15	– 5,05	– 4,52
1997	– 4,52	– 4,45	– 4,19	– 4,91	– 5,27	– 4,70	– 4,74	– 5,18	– 4,44	– 4,22	– 5,01	– 4,54
1998	– 4,57	– 4,49	– 4,29	– 4,91	– 5,27	– 4,75	– 4,77	– 5,17	– 4,48	– 4,30	– 5,00	– 4,57
1999	– 4,62	– 4,55	– 4,40	– 4,92	– 5,29	– 4,80	– 4,81	– 5,17	– 4,53	– 4,37	– 5,01	– 4,62
2000	– 4,67	– 4,60	– 4,49	– 4,95	– 5,31	– 4,84	– 4,86	– 5,18	– 4,58	– 4,45	– 5,02	– 4,67
2001	– 4,73	– 4,67	– 4,59	– 4,99	– 5,34	– 4,89	– 4,92	– 5,20	– 4,64	– 4,53	– 5,05	– 4,73
2002	– 4,78	– 4,74	– 4,68	– 5,03	– 5,37	– 4,95	– 4,98	– 5,22	– 4,70	– 4,61	– 5,08	– 4,79
						Decline over the period 1992 to 2002, annual average						
	– 4,56	– 4,52	– 4,22	– 4,98	– 5,32	– 4,74	– 4,82	– 5,24	– 4,50	– 4,27	– 5,09	– 4,61
						Decline over the period 1992 to 2002, total						
	– 37,27	– 37,03	– 35,02	– 40,00	– 42,10	– 38,47	– 38,95	– 41,62	– 36,87	– 35,38	– 40,67	– 37,65

[1] It was assumed that farmers retire after the age of 70.

Source: Own calculations with initial data used from Eurostat (1991), *Farm structure, 1987 survey*.

Table 13

Annual reduction in compensation payments to cropland, in million ECU and in % of total payments in 1995

(%)

	1996	1997	1998	1999	2000	2001	2002
Belgium	4	8	12	15	19	23	26
Denmark	4	8	11	15	19	22	26
Germany	4	8	11	15	19	22	26
Greece	5	10	14	18	22	26	30
Spain	5	9	13	18	22	26	29
France	4	8	12	16	19	23	26
Ireland	4	9	13	17	21	24	28
Italy	5	10	14	19	23	27	30
Luxembourg	4	8	11	15	19	22	25
Netherlands	4	8	12	16	20	24	28
Portugal	5	10	14	18	22	26	30
UK	4	8	13	16	20	24	28
							(million ECU)
Total for EUR 12	516	1020	1511	1988	2452	2902	3339
							(%)
Total for EUR 12	4	8	12	16	20	24	27

Source: Own calculations.

5. Conclusion

A comparison of the level of income of the average agricultural households with that of the average of all households indicates that no income gap exists in any of the Member States except Portugal. No such data are reported for Belgium. For both household types, however, deviations from the average occur, pointing to an income disparity of some agricultural households.

With regard to income sources the average agricultural household — defined as a household in which at least one person is mainly engaged in agricultural activities — receives a substantial share of income from non-farming sources. This share varies considerably among Member States, reaching 70% in Italy and 30% percent in Ireland. As becomes obvious from these shares, reduction in agricultural prices affects total income of a farm household relatively less than income from farming.

The compensation payments of both the Mac Sharry reform and the decoupled Mac Sharry scenario are able to offset the impact the price reductions of these scenarios have on income. As the results obtained with ECAM indicate, farm income in both scenarios are even higher than in the reference situation.

Though only scattered empirical evidence exists, the impact of the two scenarios on the agricultural labour force is expected to be rather minor; at least over a 10-year horizon. This is due to many factors of which the demographic structure and off-farm job opportunities are the more important. In all Member States, the age structure of farm operators is biased towards higher age-brackets. This reduces the adjustment possibilities of the entire farm population considerably since farmers in only the low age-brackets have a relatively high response to changes in economic conditions. Additionally, of course, would-be farmers might be discouraged from entering agriculture. Based on country averages, only the decoupled Mac Sharry scenario is seen to lead to minor additional increases in intersectoral mobility of labour. The Mac Sharry reform is expected to have no noticeable impact on agricultural labour because of the linkage of the lump-sum transfers to current production.

The decoupled scenario may lead to a rather unequal spatial distribution of cropland being idled. Policy measures may have to be introduced counteracting the consequences of these regional impacts.

References

Bauersachs, F. and Niebuhr, J. (1980), 'Perspektiven der längerfristigen Einkommensentwicklung', *Landwirtschaft-Angewandte Wissenschaft,* No 235, Landwirtschaftsverlag GmbH, Münster-Hiltrup.

Becker, H. and Guyomard H., 'Messung technischer Fortschritte und globaler Faktorproduktivitäten für die Agrarsektoren Frankreichs und der BRD', *Berichte über Landwirtschaft,* Vol. 69(2), pp. 223-244.

Bedau, K. (1985), 'Die Einkommenslage der Familien in der Bundesrepublik Deutschland im Jahre 1981', *Vierteljahreshefte zur Wirtschaftsforschung,* Year 1985, pp. 292-305.

Brown, C., (1989), 'Distribution of CAP price support', Report No 45, Statens Jordbrugsokonomiske Institut, Kopenhagen.

European Commission (1991), 'Employment in Europe', COM(91) 248 final, Brussels.

European Commission, *The agricultural situation in the Community,* various issues, Brussels.

Eurostat (1993), *SPEL/EC Data: User manual, revised version' 1993,* Luxembourg.

Eurostat (1992a), *Total income of agricultural households,* Luxembourg.

Eurostat (1992b), 'Gesamteinkommen landwirtschaftlicher Haushalte - Bericht 1992', *Schnellberichte Land- und Forstwirtschaft, Fischerei,* Luxembourg.

Eurostat (1991), *Farm structure, 1987 survey: main results,* Luxembourg.

Eurostat (1988), *Total income of agricultural households,* Luxembourg.

Eurostat (1986), *Statistical yearbook,* Luxembourg.

Fasterding, F. (1990), 'Sozioökonomischer Strukturwandel in der Landwirtschaft als Folge von Berufswahlentscheidungen', *Agrarwirtschaft,* Vol. 39, No 2, pp. 37-42.

Folmer, C. (1992), 'Labour migration out of the agricultural sector in EUR 9 Member States, research memorandum No 104, Central Planning Bureau, The Hague.

Folmer, C. (1989), 'Occupational migration out of agriculture: A diffusion approach for the EUR 9 (1962–86)', ECAM report, No 10, Centre for World Food Studies, Vrije Universiteit, Amsterdam.

Folmer, C., Keyzer, M. A., Merbis, M. D., Stolwijk, H. J. J. and Veenendaal P. J. J. (1993), 'CAP reform and its differential impact on Member States', Background paper for the report on reform of the European common agricultural policy, European Commission, Brussels.

Frohberg, K. (1992), 'Output and input responses in European agriculture to price changes', unpublished paper, Institute for Agricultural Policy, University of Bonn.

Gardner, B. (1992), 'Changing economic perspectives on the farm problem', *Journal of Economic Literature,* Vol. XXX (March 1992), pp. 62-101.

Gardner, B. (1993), 'Demythologizing farm income', *Choices,* first quarter 1993, pp. 22-23.

Gebauer, R.H. (1988), 'Sozioökonomische Differenzierungsprozesse in der Landwirtschaft der Bundesreplik Deutschland: Dimensionen, Determinanten, Implikationen', *Volkswirtschaftliche Schriften,* No 380, Duncker&Humblot, Berlin.

Grings, M., (1985),' Ein Angebotsmodell für den Agrarsektor der Bundesrepublik Deutschland: ökonometrische Schätzung auf der Grundlage der Dualitätstheorie', *Schriftenreihe zur angewandten Ökonometrie,* No 15, Haag+Herchen Verlag, Frankfurt am Main.

Haase, F. (1990), 'Agrarstrukturelle Entwicklung in der Bundesrepublik Deutschland bis zum Jahre 2000', *Berichte über Landwirtschaft,* Vol. 68(1), pp. 64-81.

Hermann, V. and Uttitz P. (1989), 'Farming is not just a profession', in 'Arkleton Research, Rural change in Europe: research programme on farm structures and pluriactivity', proceedings of the second review meeting, Braemar, Scotland, 16-20 July, 1989.

Holtmann, T. (1987), 'Analyse der Arbeitskräftemobilität in Nordrhein-Westfalen', unpublished thesis, Institut für Agrarpolitik, Bonn.

Lopez, R. E. (1984a), 'Estimating substitution and expansion effects using a profit function framework', *American Journal of Agricultural Economics,* Vol. 66, pp. 358-367.

Lopez, R. E. (1984b), 'Estimating a labour supply and production decisions of self-employed farm producers', *European Economic Review,* Vol. 24, pp. 61-82.

Merlo, M. and Manente M. (1992), 'Consequences of CAP reform for rural development and the environment', background paper for the report on reform of the European Common agricultural policy, European Commission, Brussels.

Plankl, R. (1986), 'Untersuchung der personellen Einkommensverteilung in der Landwirtschaft der Bundesrepublik Deutschland anhand von Daten des Testbetriebsnetzes', *Sonderheft 78,* Landbauforschung Völkenrode, Bundesforschungsanstalt für Landwirtschaft, Braunschweig-Völkenrode.

Schmitt, G. (1988), 'What do agricultural income and productivity measurements really mean?', *Agricultural Economics,* Vol. 2, pp. 139-157.

Schmitt, G. (1989), Warum ist Landwirtschaft eigentlich überwiegend bäuerliche Familienwirtschaft?, *Berichte über Landwirtschaft,* Vol. 67(2), pp. 161-219.

Schultze, C. (1985), 'Microeconomic efficiency and nominal wage stickiness', *American Economic Review,* Vol. 75, No 1, pp. 1-15.

Tangermann, S. *Agricultural price trends in the EC,* Eurostat, 1992.

US Department of Agriculture, 1986, 'Economic indicators of the farm sector' *Farm sector review, 1984,* Economic Research service, US Department of Agriculture, Washington, D.C.

von Braun, J. (1979), 'Analyse und Projektion der Arbeitskräfteentwicklung in der Landwirtschaft der Bundesrepublik Deutschland', *Agrarwirtschaft, Sonderheft,* No 77, Alfred Strothe Verlag, Hannover.

Wilstacke, L. (1990), 'Berufs- und Hofnachfolgeentscheidungen im Kontext betrieblicher Gegebenheiten in Niedersachsen', *Agrarwirtschaft,* Vol. 39, No 1, pp. 17-24.

Market stabilization and the reform of the common agricultural policy

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1. Introduction

It is often argued that a virtue of the common agricultural policy (CAP) of the European Community (EC) is the degree of stability that it brings to markets as compared with unfettered free trade. The relation of the CAP tools to stabilization objectives is far from simple, however. The tools of the CAP alter the incentives of economic actors, both within and outside the European Community, in ways that can indirectly affect stability of prices, farm incomes, consumer expenditure, and EC budgets. For example, public storage schemes may largely substitute for private storage that would take place in the absence of such schemes. And the system of export promotion through variable export subsidies shifts some of the effect of supply shocks within the EC onto foreign markets, making those markets more unstable than they might otherwise be. Furthermore, the effectiveness of CAP stabilizers may be sensitive to changes in other CAP objectives such as income support.

The purpose of this paper is to assess the basic stabilization tools of the CAP by analysing the following issues:

(i) what is the relation of CAP stabilization to the economic welfare of agents interested in the EC's agricultural sector;

(ii) how effective are CAP tools in achieving stabilization objectives as compared with the alternatives to public storage and export subsidization; and

(iii) how sensitive are the stabilization effects to changes in CAP policy parameters, in particular those significantly affected in the likely reforms.

In order to take the interaction of CAP tools with the private market into account, much of our assessment will be conducted by studying a model of price determination of an agricultural good which can be traded and stored. In this model, changes in policy parameters will affect price determination in the future, and this in turn will alter the incentives to privately store the good. Consequently, to assess CAP tools, we must model formation of expectations. One of the major strengths of the approach that we follow is that we deal with expectations formation in a manner that is fully consistent with the structure of the model we employ.

The paper is organized as follows. Section 2 reviews the possible alternative objectives of stabilization and considers their economic rationale. In this section we also review some of the private market tools for achieving stability. Section 3 analyses the price stabilizers that can be generated by the private market, in particular international trade and private stockholding. To illustrate our arguments we introduce two simple parametric models and present the results of solving these models and simulating them dynamically. In Section 4 the two separate models will be combined into one model of the determination of storable commodity prices in a world consisting of two 'countries' which we take to represent the EC and the rest of the world. We solve this model and present dynamic simulations which will clarify the important interaction of trade and storage. Section 5 integrates the basic tools of the CAP into the model and assesses the sensitivity to changing CAP parameters such as the target price. Section 6 assesses the likely stabilization effects of proposed CAP reforms. Section 7 gives the concluding remarks.

2. Market stabilization and the objectives of the CAP

2.1. Who benefits from stabilization?

In most advanced economies there is some form of public intervention in the operations of agricultural markets. As a consequence, many important decisions affecting the allocation of agricultural resources are given over to collective decision-making. The oft-quoted Article 39 of the Treaty of Rome specifically mentions the objectives of assuring the agricultural community a fair standard of living, of assuring consumers have reasonable prices, and of stabilizing markets. This seems to imply that stabilizing the agricultural markets of the European Community is in the interests of all the participants. In fact the narrow, short-term interests of consumers and agricultural producers are opposed: given outputs, producer incomes would increase principally through an increase in the prices paid by consumers. In light of this fact, it is important to consider benefits to market stabilization for consumers and producers separately.

2.2. Consumer benefits

In facing an uncertain future, most consumers would probably prefer to see uncertainty reduced, all other things being equal. If the price of an important product is equally likely to be 120 as 80, the consumer may well say that he would prefer to pay 102 for sure. When this is the case, consumers are said to be 'risk-averse'. And then there are some possible benefits to uncertainty reduction.

However, this does not mean the consumer is harmed by all price fluctuations. The consumer is averse principally to price changes that would imply fluctuations in real income. Other price variations which would leave real income unchanged may even increase consumer welfare. This fact

was first noticed by Waugh (1944) and later developed by Oi (1961) and Massell (1969), among others. To understand why it is true, consider the case where the consumer consumes two commodities that substitute for one another. Suppose that the prices of he two goods fluctuated from 80 to 120 in alternate years so that the average of the two is always 100. If nominal income is constant, real income, defined by nominal income divided by average price, is also constant. Now, if the prices of both goods were stabilized at 100 each year, the consumer would, in fact, be worse off, for he can no longer substitute away from the high-priced good in favour of the low-priced good.[1]

Consumers purchase a wide variety of food and other products which results in a highly diversified bundle where fluctuations in relative prices are to a large degree uncorrelated. As a practical matter then, consumers probably benefit very little from the stabilization of the relative price of a narrowly defined product. Consumer risk-aversion is more likely to create a need for uncertainty reduction with respect to a broad average of consumer prices. The public policy that responds to this need is macroeconomic stabilization of the inflation rate.

2.3. Producer benefits

The perspective of producers on agricultural market stabilization differs from that of consumers in a number of important respects. For one thing, it cannot be automatically assumed that all producers are risk-averse. Those producers are widely owned by a broad spectrum of shareholders, each of whom has a diversified holding of assets which can maximize the present value of shares even though this may involve yearly revenues that fluctuate substantially. In the agricultural sector, this point probably applies to the large producers of processed foods. Upstream producers are less likely to be broadly held. At the limit are the farms owned and operated by a single family. These are almost surely risk-averse. They are made worse off by the heightened uncertainty in their future real income streams.

If a producer is risk-averse, he is not necessarily adversely affected by market fluctuations. If the producer has a wide variety of products, fluctuations across markets may largely average out, leaving a relatively stable income stream. However, the secular tendency for many agricultural products has been for increased specialization of production units in order to realize economies of scale. Ownership has tended to remain very tightly held, evidently in order to avoid principal/agent problems. If a risk-averse producer is highly specialized in a small number of closely related products, market fluctuations can have a substantial impact on real incomes. If this were to force a similar fluctuation onto consumption streams, a loss of welfare would result. Thus, for many agricultural producers there is probably a strong interest in reducing risks either by buffering consumption from income fluctuations or by reducing income fluctuations.

In agricultural markets the main source of uncertainty derives directly or indirectly from yield fluctuations induced by weather changes among other reasons. This is obviously the case for cereals and other seasonal crops. Volatility in seasonal crops is conveyed to meat products and elsewhere in the food chain in the form of input-price uncertainty. Thus, primary agricultural producers face both quantity uncertainty and price uncertainty, whereas producers further along the chain primarily face price uncertainty.

Quantity and price uncertainty can combine to either offset or reinforce each other. Which case holds depends on the elasticity of the demand schedule and the correlation of an individual's crop yield with the total market supply. For example, take the case where all producers' yields fluctuate together and market demand is unit elastic. The total value of products sold will be a constant and the individual producer receives a constant share of that fixed total. Then producer incomes are riskless, even though the variance of prices may be enormous. Alternatively, it is often argued that agricultural products face relatively inelastic demands. Then increases in aggregate yields are more than offset by price decreases so that aggregate producer incomes are positively correlated with prices and negatively correlated with yields. If an individual producer's yield is highly correlated with aggregate yields, individual incomes will reflect the same pattern of aggregate incomes. If individual yields are uncorrelated with aggregate supplies, then, other things being equal, individual incomes will be more volatile since there is no specific tendency for a poor individual yield to be offset by a high market price.[2] Finally, the case of elastic demand is

[1] These points can be summarized succinctly using modern economic theory. Let V(p,m) be the indirect utility function defined as the maximum utility that can be obtained given a price vector p and income m. In general, this function is zero-degree homogeneous in all prices and income and is quasi-convex in prices (see Varian, 1978). If the consumer is risk-averse, V is concave in m, i.e. the consumer has a decreasing marginal utility of real income. Even in this case, quasi-convexity of V in p means that the consumer will be made worse off by stabilizing at mean prices. Suppose that p and p′ are price vectors such that given income they imply the same level of satisfaction (V(p,m) = V(p′,m)). Quasi-convexity of V in p means that V(ap + (1 − a)p′,m) < V(p,m) where a is a number between 0 and 1. Thus fluctuating between p and p′ with probabilities a and (1 − a) respectively, is preferable to stabilizing prices at their weighted average ap + (1 − a)p′.

[2] It is important to treat this statement with caution, for the term 'other things being equal' is very restrictive. For example, it would be wrong to conclude that farmers would necessarily face an increase in income uncertainty as a result of a change that reduced the correlation of individual yields and aggregate yields through the introduction of foreign sources of supply. As is seen below, increased foreign trade produces a tendency to reduce aggregate supply uncertainty and thus quite possibly price uncertainty.

symmetrical with the inelastic case: aggregate incomes will be positively correlated with yields and negatively correlated with price. The general importance of this discussion is that it appears unlikely that the case of unit elastic demand describes all agricultural markets. Consequently, it is likely that price fluctuations tend to translate into fluctuations of aggregate revenues of primary agriculture producers.

The situation of processors and downstream producers is significantly affected by the ability of these agents to pass price fluctuations onto the next stage of the food chain. If output and input prices are perfectly correlated, then incomes may be assured even if price levels fluctuate greatly. This is the case, for example, for a merchandiser or processor who sells services for goods owned by others. Otherwise, income risks implied by price fluctuations may be substantial. This can arise, for example, simply because of the processing time involved. Suppose a processor has an average holding period of one month. If he acquires inputs when prices are high, it is little comfort that output prices may also be high at that time, for one month later when he sells his processed goods the price may have fallen. The situation can be even riskier if the input and output price are at times inversely correlated. This can emerge for livestock producers. Here, a sharp increase in feed prices may induce an increase in slaughter rates, thus tending to cause a drop in meat prices.

In conclusion we can state that: (a) many agricultural producers have tight ownership structures which make them risk-averse, (b) crop specialization to achieve economies of scale leaves producers exposed to market fluctuations, and (c) self-insurance characteristics, either from the inverse relation of yields and price or from the correlation of input and output prices, are likely to be imperfect for most producers. As a consequence, there is likely to be strong interest from agricultural producers in managing the income risks associated with agricultural market fluctuations.

2.4. Public stabilization or private contracts?

The fact that agricultural producers may face significant market risks toward which they are averse can have important implications for total production and consumption of the goods involved. In order to reduce the risks that they face, producers may undertake actions which alter their production decisions. For the producer with a single product facing only output price uncertainty, it has been shown that under plausible circumstances there is a tendency for the output to be decreased.[1] The reason is that, in the face of uncertainty, the producer will require that his return to producing include an extra margin, the 'risk premium', that compensates him for bearing the risk involved. Thus, starting from a situation where expected output price would just cover the marginal cost of planned production, the producers would tend to cut back on production until expected prices are increased and/or marginal costs are decreased sufficiently to yield the required risk premium.

In the context of producers who can produce more than one product, the defensive actions of risk-averse producers take a different form but have a similar effect. For example, suppose farmers in two regions can potentially plant both wheat and oilseeds on their land. However, the conditions in one region favour wheat and in the other favour oilseeds. Suppose farmers specialized their production along these lines. Risk-averse farmers may find the uncertainty of fluctuating wheat and oilseed prices to be such that they would prefer to diversify their plantings to reduce the variance of their revenues even though this would also reduce their average revenues. The aggregate effect will be a reduction in the supply of both wheat and oilseeds and thus a tendency for a higher average price for both.

The public policy question that this phenomenon raises is whether the supply-deterring effect of risk and risk-aversion is socially appropriate. Or does it somehow represent a failure of the market that can potentially be improved upon by some form of public intervention? In this regard, the analysis of Arrow and Lind (1970) is interesting. They show that when the sources of risk are to some degree independent a central planner would require a lower rate of return for investment projects than would risk-averse individuals. This suggests that some form of public effort to overcome the supply-deterring effects of the avoidance of purely private risks may improve welfare.

This leaves open the issue of knowing when public intervention in markets is really called for and what form such intervention should take. It certainly does not say that risk-averse behaviour represents some form of market failure. For when risks are not independent and thus do not average out for the economy as a whole, there is genuine social risk and efficient production decisions will typically involve requiring a risk premium. Nor does it say that market institutions are incapable of shifting risks so that purely private risks no longer represent an inappropriate deterrent to production. For example, reconsider the case of wheat and oilseeds produced in two distinct regions. Suppose that wheat prices are high precisely when oilseed prices are low and vice versa. One possible form of remedy to inappropriate crop diversification might be to nationalize the farms in both areas and maintain specialized cropping as a matter of public

[1] See, Anderson and Danthine (1981) or Newbery and Stiglitz (1981).

policy. However, a less Draconian approach might be to reinforce the ability of the market to deal with the problem. Public authorities may encourage the development of insurance-type contracts which would effectively allow a payment from wheat producers to compensate oilseed producers when wheat prices are high and vice versa.

2.5. Credit markets

For family-owned farms or other narrowly held producers in the agricultural sector, there are two basic avenues open for seeking to deal with the risks created by market fluctuations. Either they may attempt to buffer consumption streams from income fluctuations or they may seek to reduce income fluctuations. It has long been recognized that credit markets play an essential role in separating consumption timing from the timing of receipt of revenues. Young families borrow to purchase their residence for years to come; and later, during their prime earning years, they save for retirement. Credit serves the same role for agricultural producers faced with fluctuating market conditions. Earnings from periods of high prices and income can be saved for later use, and, during periods of weak markets, consumption levels can be maintained by drawing on savings or borrowing against future earnings. Thus producers with access to credit can make production decisions independently of the planned timing of household consumptions. They can specialize their production or otherwise pursue high average yields, even though this may run the risk of periods of poor earnings. Thus, in the presence of credit markets, risk-aversion will impinge less on production decisions.

There is one very general obstacle to credit markets operating in this fashion: lenders may have imperfect information about the true risks faced by the producers seeking a loan. This asymmetry of information can create problems of agency and moral hazard that discourage the provision of credit. For example, earnings may be low, not because of poor market conditions but because of poor management decisions. Furthermore, protection from fluctuations may encourage producers to take greater risks than those indicated to the lender. In the credit markets, institutions have developed to overcome these problems. In particular, banks and other financial intermediaries may develop specialized expertise in evaluating loans to producers in particular regions or product sectors. Furthermore, repeated experience with the same client allows a more informed evaluation of a specific loan request. Finally, requiring the borrower to pledge productive assets as collateral ensures that the borrower has an equity interest that means risks will be shared between the lender and borrower.

These comments on the uses and potential obstacles to the operations of credit markets apply to all kinds of products. For our purposes, it is important to understand their specific relevance to agriculture. In other words, is there something particular about European agriculture which means that credit markets cannot be used to smooth household consumption in that sector and to free producers from an excessive concern with risk reduction? Cultivating and maintaining normal banking relations would seem to be well within the capabilities of the modern European farmer. Furthermore, given the availability of information on acreages, weather, and prices, the evaluation of farm performance would seem well within the competence of experienced local lending officers.

It is sometimes argued that leaving agricultural producers to rely on credit will lead to an excessively high rate of bankruptcies. Arguments in favour of a social policy to reduce bankruptcies are based either on equity or efficiency considerations. It may well be that society may have some distributional reasons for protecting small entrepreneurs from bankruptcy. However, bankruptcy rates are high for all kinds of small businesses; thus the distributional case for avoiding farm bankruptcies must rest on the farming community requiring special distributional consideration. This issue falls outside the scope of the current study.

It is far less clear that a serious efficiency-based case can be made for intervening to avoid farm bankruptcies. Liquidations involve substantial legal or organizational costs. If a producer operates efficiently but is unable to service his loan because of prolonged but transient poor market conditions, the lender has an incentive to reschedule the loan rather than incur the costs of liquidation. Only if the borrower's future prospects are poor, either because he has revealed himself to be a poor manager or because the poor market conditions are likely to reflect a permanent change, will the lender find that it is appropriate to declare a default and proceed to seize the available assets. Thus, contrary to bankruptcies representing a market failure, it is likely that a secular process of transformation of small production units into larger ones to realize economies of scale may well give rise to bankruptcies, as units that resist the change may have the process forced upon them.

In conclusion, we note that the parallel developments of agriculture and of the financial sectors mean that the Europe of the 1990s is different to that when the first outlines of the CAP were formulated. It is reasonable to expect that credit can be relied on to deal with a range of agricultural risks in a way that would have been infeasible 35 years ago. Consequently, any apparent underdevelopment of credit markets cannot be viewed as a reason for continued market stabilization.

2.6. Hedging on risk contract markets

To the extent that credit markets alone do not allow an agricultural producer to buffer his consumption stream from income fluctuations, risk aversion will create an interest in decreasing the volatility of income itself. We have already seen that this may lead to the alteration of production plans, quite possibly with the result that output is reduced or average cost increased. There may be an alternative route open to the producer, namely that the producer will seek supplementary financial contracts which insure him against income risks. Individual income insurance is not likely to be available because of reasons of agency and moral hazard. For similar reasons, as well as a lack of independent risks, crop insurance is not likely to be available to protect him from quantity uncertainty. In contrast, in a variety of economies and institutional settings, it has been shown repeatedly that the market is able to generate contracts that can insure individual producers and others involved in agricultural markets from price risks.

The principal risk-management contracts relevant to agriculture are forward, futures and options contracts. Futures contracts can be viewed as highly formalized forward contracts; both are similar in that they represent the unconditional agreement to exchange, at a later time, goods for money at a price determined at the outset. In contrast, an option contract gives the buyer the option, but not the obligation, to buy or sell a specified quantity of a commodity during a specified time period. Thus, a call option gives a potential buyer the right to buy at a specified price (the strike price) and a put option gives a seller the right to sell at the strike price specified. The owner of the option may simply let it expire without exercising the right to buy (for a call) or to sell (for a put) if it is not in the owner's interest to do so. In other words, at most, the option purchaser can only lose the premium (cost of purchase) of the option. However, if prices move in the right direction (up for a call and down for a put), there is the potential for large gains.

It is often recognized that options provide attractive hedges. For example, a farm with crops planted but not harvested may prefer to buy put options since the size of the harvest is uncertain. The problem is that there are not many natural sellers of such options, i.e., there are not many agents whose underlying risk is that they will make exceptional profits when agricultural prices are low. This need not be a problem if there are very liquid cash or forward markets for the good, for if there are, conventional option theory provides a standard method for hedging through a dynamic trading strategy. It is natural, therefore, then to think about the creation of forwards and futures as a precursor for options. This view is corroborated by the fact that in recent years organized options markets have grown rapidly for many goods where futures already exist.

For some purposes, it is possible to consider forward and futures contracts as equivalent. In practice there are a number of important differences which are relevant to our discussion. A forward contract is simply a merchandising contract adapted to allow the delivery of the good to be deferred to a later date. Generally, no money changes hands until delivery occurs. One problem with these contracts is that of default risk. If prices rise, the seller has an incentive to default; if they fall, the buyer will be tempted to default. This problem is dealt with by enquiring about the credit-worthiness of the counterparty, by requiring a collateral, or by adding a third-party credit enhancement.

Experience has shown that there are important benefits to developing standardized and formalized forward trading. Through standardization it is easy to arrange for secondary trading. For example, a producer who initially sold a good forward may have found an attractive alternative use for the good. To do so, he needs to buy back his forward contract. If there is a regular flow of sellers and buyers of the same formal contract, recontracting is easy. This liquidity of the contract means that more and more participants will want to concentrate their trading in a particular contract. If so, this liquid contract will draw upon a large pool of information about supply and demand.

One route to a liquid forward market is for a large dealer on the market to become a market-maker. This involves the dealer standing ready to buy or sell standard amounts at prices it announces. It is a principal in every trade. The matching of supply and demand is accomplished by the dealer in the process of balancing his book of trades. If he sees that forward sales are exceeding forward purchases, he will lower his forward price to bring about a balance. When purchases exceed sales, he will raise his price. Typically, in a well-developed market there will be more than one dealer who acts as market-maker. This allows them to cover their trades with one another when they find their books becoming unbalanced. Among many others, liquid dealer-operated forward markets exist in gold bullion, Brent oil, protein feedingstuffs, and foreign exchange. This last market is the biggest and deepest market in the world.

Futures markets are the alternative means of achieving a liquid market for deferred delivery contracts. The heart of futures contracting is a system of payments known as margins which are designed to control for default risks. Margins are normally arranged through an exchange or associated clearing house. In general, an initial margin is paid by both buyer and seller as the deal is struck (the initial margin may

be related to the value of the trade and the volatility of the commodity price in question), and then the buyer and seller each pay or receive a variation margin depending on price movements. On most exchanges, the margin is calculated on a daily basis such that the buyer and seller receive their winnings or post their losses on a futures transaction each day.

In recent years, futures trading has grown very rapidly worldwide, and in most cases, these new markets have adopted margin systems that were first developed in Chicago and London. Thus, there is a natural tendency to view this as the only model for trading price insurance contracts. This is incorrect. The clear, but less public, success of forward contracting in a number of areas shows that many of the benefits of risk-shifting can be realized without the specific institutions of the current most widely traded futures. Therefor, the comments that follow apply to both forward as well as futures contracts, even though, for simplicity, we refer to futures only.

It is generally recognized that futures markets serve two purposes. The first is that of price discovery. In brief, a futures market allows agents (producers, consumers, traders and speculators) to make transactions based on their expectations. Hence futures prices reflect the 'market's' view as to the likely course of future events. For instance for an agricultural good if a drought is predicted, futures prices will be high, but if a very good harvest is predicted the futures prices may be low.

When futures prices emerge from a market with wide participation, they often become a standard reference for making plans and engaging in transactions. Thus, producers will tend to produce more of the crop whose futures price is relatively high at the time of planting, or merchandisers will negotiate the price of a cash transaction in relation to the futures price. Indeed, this practice can become highly developed; for many goods, it is common to sign forward merchandising contracts with the price quoted as a specified 'basis' above or below a futures price selected as a reference. At the time of delivery, the price paid is the current reference price plus the pre-negotiated basis.

The second purpose of a futures market is risk-shifting or hedging. A farmer or other commodity producer can sell a proportion of the harvest forward using futures contracts in order to gain more certainty about future incomes. Given knowledge of the joint distribution of price and quantity, the commodity producer can calculate an optimal hedge. In special cases (e.g. no quantity uncertainty, no basis risk and no price bias), this will lead to the hedging of 100% of production. Thus, futures can reduce price uncertainty. As a consequence, futures contracts can reduce or eliminate the tendency for price uncertainty to discourage output or to sacrifice scale economies in the name of diversification. The output decision of a producer who hedges in futures may be decided by reference to the futures price and to costs alone, independently of the producer's expectations or risk aversion (see Anderson and Danthine, 1983).

Therefore, futures trading can lead to individual producers making decisions without requiring an individual risk premium. Whether or not this fully eliminates the tendency, noted in Section 2.4, for risk aversion to discourage production depends upon whether the futures price itself reflects an aggregate risk premium. The classical argument that dates back at least to Keynes is that hedgers sell forward to speculators who require a risk premium in the form of a downward bias to futures, i.e. there is a tendency for futures prices to rise during the life of a given contract in order to yield a profit to the speculator who bears the risk of buying the futures (for an elaboration of this, see Anderson and Danthine, 1983). Empirical analysis has repeatedly failed to detect a large systematic risk premium in futures prices, so there is some reason to believe that aggregate risk premiums may be small relative to what would be required by an individual unhedged risk-averse producer. Consequently, this means that hedging in futures markets can go a long way towards overcoming output-curbing tendencies of individual risk aversion.

Modern futures exchanges exist in London, Paris, Frankfurt, New York, Chicago, Singapore and Sidney, to name some prominent examples. Futures contracts are routinely used in the merchandising of grain, protein- and oilseeds, livestock, coffee, sugar, cocoa, and potatoes. Thus, in many situations, futures markets are regarded as an important and normal component of the merchandising system. Futures markets exist for certain of the agricultural products of the European Community. However, their size is rather small relative to total Community outputs. Thus, there may be a tendency within Europe to view futures markets as rather marginal institutions. It should be recognized, however, that for goods where prices have been highly stabilized through the operations of the CAP, the potential role of futures markets has been necessarily restricted. Furthermore, the lack of familiarity of the functioning of these markets can quickly be altered through experience. Thus, as in the case of credit markets, we must recognize that the current low level of development of market-based forms of risk management in European agriculture does not in itself constitute justification of continued public intervention to stabilize prices.

2.7. Goals of public stabilization

In a mixed market system such as that of the EC, direct public invervention to stabilize agricultural markets implies a belief that the market on its own would fail to develop adequate means of stabilizing producer incomes. If this view is accepted, the question arises as to what are the objectives that public intervention should achieve. This logically precedes discussions of the specific policy instruments to be used.

The statement concerning the goals of the EC's agricultural policy contained in Article 39 of the Treaty of Rome is very general. Our discussion above suggests that the best economic case can be made for stabilizing the income streams of risk-averse specialized producers who cannot pass on their risks to others. This is certainly consistent with Article 39. If the goal is to stabilize incomes, it would be natural to suppose that the appropriate policy instrument would be some form of public income insurance for qualified producers. In fact, at relatively early stages in the development of the CAP, it was determined that price policy, and not direct income insurance, would become the heart of the Community's approach (see Harris *et al.*, 1983). In part, this probably reflects the heritage of systems of administered prices which had been employed by some of the Member States. This has the additional feature that the policy would appear to be in some sense even-handed and promote stability for both consumers and producers. However, it should be understood from the discussion above that producers are probably the main beneficiaries.

Thus the CAP has evolved towards a more restrictive implicit goal of reducing the volatility of certain agricultural market prices. Even given a determination of the products covered by such a goal, it remains to define further what is meant by volatility. Probably the most widely accepted meaning would be the dispersion of the price distribution as measured by the variance or the coefficient of variation. This would imply an interest in curtailing very high prices as well as low ones. The alternative that may well be of greater interest to producers would be to truncate the left tail of the price distribution. That is, the goal may be to assure prices do not fall below some floor.

There does not appear to be an authoritative statement of CAP goals that defines its stabilization goals at this level of detail. The policy tools of target, threshold and intervention prices, in fact, can be used for either symmetric or asymmetric stabilization. If excess EC supplies are routinely accumulated in intervention stocks, they can be released later when current supplies are relatively small. This will curb price rises. If, however, excess EC supplies are routinely exported through a system of export subsidies, in a subsequent period of tight supply, no intervention stocks will be available to curb price rises. Thus the EC's increased reliance on the export mechanism seems to imply a primary concern with curbing low prices.[1]

The lack of a complete definition of CAP goals means that, in fact, the goal of market stabilization may be subsidiary to other goals, such as increasing the standard of living within the farming community. If so, the CAP is primarily a collectively negotiated, publicly sanctioned programme raising agricultural prices in the EC above long-term competitive levels. Certainly, the experience with market intervention by national marketing boards and international commodity agreements has been that they almost always serve to shift the mean price away from competitive levels (see Gilbert, 1986, and Knudsen and Nash, 1990). The importance of this for our purposes is that we should recognize that shifts in other CAP goals or the tools for implementing those goals might have important spillover effects for market stabilization proper.

3. Modelling agricultural prices

3.1. The relation between European and world prices

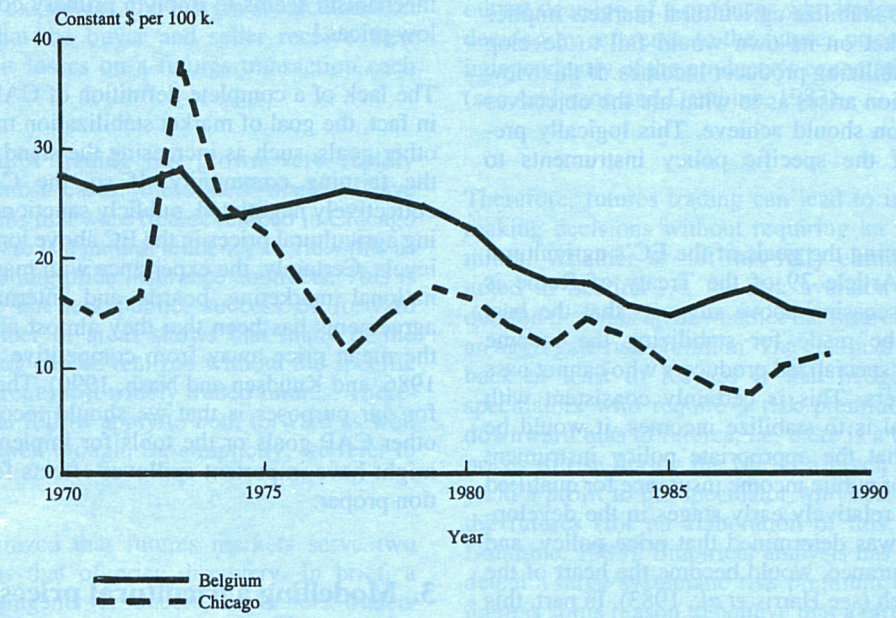
Since the creation of the common agricultural policy, agricultur in the European Community has been organized around two fundamental principles: (a) the integrated domestic market, and (b) internal preference. These have served to make EC agriculture one large trading bloc which operates to some degree independently of the world market.

This is illustrated in Graph 1, where the EC price of wheat and the world price of wheat are depicted for the period 1970 to 1989.[2] Two general tendencies are apparent. First, EC prices are usually above world prices (a mean of USD 21,04 versus USD 15,37). Second, EC prices are less variable than world prices (a coefficient of variation of 23% versus 43% for the world price). These tendencies are directly linked to the operation of the CAP cereals policy: the EC target price is defended through a variable levy on imports, a variable export subsidy and public purchases at an intervention price. Since the institutional price floors have generally been set

[1] It should be recognized that during the boom in world commodity prices in the 1970s export taxes were used to limit prices within the EC.

[2] EC wheat is represented by the average prices received by Belgian producers and world price is represented by the Chicago wheat futures price for the contract that is nearest to delivery. All prices are expressed in constant US dollars per quintal using the US GNP deflator.

GRAPH 1: Wheat prices in Belgium and Chicago



above world price levels, this system of protection has resulted in EC prices which vary principally with changes in the CAP policy prices, which have been less variable than world prices.

3.2. A simple model of price determination

The examination of historical data has its limitations for our current purposes. First, over time CAP policy parameters have changed repeatedly, so that observed price behaviour does not indicate the degree to which CAP tools serve to stabilize prices *ex ante*. Second, in order to assess the effect of possible policy reforms, we need to understand the functioning of the agricultural sector in circumstances which have not been observed previously. As a result, it is interesting to simulate a simple model that captures the notable features of agricultural price determination for a product such as a cereal or oilseed. The essential elements of this are: (a) uncertainty about the annual harvest, (b) the ability to trade the product internationally, and (c) the ability to store the product from one season to the next. We now present each of these features in turn. In Section 4, we combine these features in a single model, and then in Section 5 we model the operations of the CAP.

The simplest starting-point is a situation in which two countries (the world and the EC) face random harvests without the possibility of either trading with one another or storing. Each country has a linear demand curve of the form:

$$P_i = a - b\,Y_i$$

where P_i is price in country i and Y_i is the amount consumed in country i. The quantity produced in each country is a random variable, Z_i, which is distributed normally with mean, $\bar{Z}$, and variance, σ^2. If there is no trade between the countries, in equilibrium,

$$Y_1 = Z_1 \text{ and } Y_2 = Z_2 .$$

We can simulate this model by generating by computer a series of random harvests and calculating the resulting market equilibria. We have done this for 200 years for the model with $a = 600$, $b = 5$, $\bar{Z} = 100$, and $\sigma^2 = 10$. These parameters are chosen so as to imply a low demand elasticity (0,2) at the average harvest. The results are given in the first two columns of Table 1.

Over the 200 simulated years country 1 has a mean price of 96,15 while country 2's mean price is 102,14. The coef-

ficients of price variation (the standard deviations of price divided by the mean) are 0,5 in each country. That is, the average variability of the price level from year to year represents 50% of the mean price. This very high volatility is a direct consequence of the inelastic demand assumed. We have also calculated the variability of producer income or revenues. This ignores costs on the assumption that producer prices and yields are much more uncertain than input costs. Notice that crisis, defined as a large harvest which results in revenues of less than 80% of the mean, occurs for 30% of the time.

3.3. The stabilizing effect of trade

Countries facing random harvests can reduce price uncertainty by trading with one another. The reason is that much of the uncertainty of supply comes from factors (such as weather) which are relatively independent of one another in separate geographic areas. In order to incorporate trade between the two countries, we modify the equilibrium conditions to be:

$$P_1 (Y_1 - m)(1 + t_2) = P_2 (Y_2 + m),\ m > 0 \qquad (1)$$

$$P_1 (Y_1 - m) = P_2 (Y_2 + m)(1 + t_2),\ m < 0 \qquad (2)$$

Here the inverse demand function is written as P(Y), m is the level of exports from country 1 to country 2 ($m < 0$ implies that country 1 imports from country 2), and t_i represents the tariff imposed on imports to country i.

We have simulated the equilibria in the model using the same 200 years of random harvests used in the no trade or storage simulation. Three levels of symmetrical tariffs are used: 0% (i.e. free trade), 10%, and 30%. The results are recorded in Table 1. Over the long term, opening trade in the two-country world results in little change in mean prices since, by assumption, the countries have the same demand and the same technology. The principal effect of trade in this case is to reduce variability as indicated by the coefficients of price variation from 35 to 36% (versus 50% for the no trade or storage case). This results in a reduction of producer income variability (from 42 to 30%). Nevertheless, producers face the prospect of revenues of less than 80% of the mean for about 27% of the time, only slightly less frequently than in the no trade case. Interestingly, the results are not very sensitive to increasing the tariff parameter from zero to 30%. Thus, the principal benefits of volatility reduction accrue even in the face of a 30% flat tariff applied by both countries. The reason is that the big variance reduction occurs through trade during the extreme cases where harvest differences between the two countries are substantial.

3.4. Stabilization through storage

Incorporating the possibility of storage into the model is considerably more complex than incorporating trade. Whereas trade serves to arbitrage prices over space, storage arbitrages prices over time. Private storage takes place to the extent that the marginal costs of storage are equal to the expected increase in the price of the goods in store. Thus the model must account for the formation of expectations. In order to avoid *ad hoc* specifications of expectations, it is now generally accepted that expectations should be modelled in a way that is consistent with the structure of the model that will represent the future of the economy. This involves finding the rational expectations equilibrium in an intertemporal model of the economy.

The second complication that arises with respect to storage is that stocks cannot be held in negative amounts. This means that even in otherwise simple models there is a basic non-linearity which complicates the solution for rational expectations equilibria. There are a number of possible methods that can be employed in this case. Here we follow the method recently introduced by Deaton and Laroque (1992) which has the advantage of being an exact solution (although obtained numerically).

Incorporating storage in the model for a single country involves the supposition that consumer demand and harvest technologies are as in Section 3.2. At any given time, t, in addition to consumer demand, there may be a demand for stocks of the good, I_t. This will be carried forward one period at a cost either from physical wastage or costs of storage. We assume this cost is a constant fraction, c, of stocks held. With this modification, the basic equilibrium condition for the economy is:

$$(1 - c)\, I_{t-1} + Z_t = Y_t + I_t,$$

that is, current supply (stocks carried out from the past period plus current harvest) equals current demand (consumer demand plus inventory demand). Private agents who carry inventories face a physical storage cost and a finance cost. In addition, they must bear price risk when the price next period is unknown. As a result, the conditions for optimal inventory holdings are given by the following equations:

$$P_t = \frac{(1 - c^*)}{(1 + r)} E_t P_{t+1}, \qquad I_t > 0 \qquad (3a)$$

$$P_t = a - b((1 - c)\, I_{t-1} + Z_t), \qquad I_t = 0 \qquad (3b)$$

Here r is the rate of interest and c* is the cost of carry including physical storage costs c plus a required risk premium which depends on the degree of risk-aversion and also upon the volatility of prices. The first equation says that if positive stocks are held the current price must be equal to the discounted present value of the expected next period price. The rate of discount is a combination of all three cost factors. When current supplies are sufficiently tight, the current price will rise above the discounted expected future price, and zero stocks will be held. This is what is stated by the second condition.

In order to assess the stabilizing effect of stockholding, we have solved the model under the same assumptions on demand and harvest as were used in Section 3.2.[1] The additional parameters are the real rate of interest r which we set at 5% and the carry-out rate, (1 – c), which we set at 0,95. Given the rational expectations pricing relation, we then simulate the price histories of the two countries with the same random harvests used in Section 3.2. Now, however, there is no trade between the two countries but instead inventories are sometimes held. The summary statistics for the simulation are given in the last two columns of Table 1.

[1] The solution involves equilibrium prices as a function of the available supply. This function must satisfy simultaneously system (3). Details of the solution technique can be found in Deaton and Laroque (1992) or Anderson (1992).

Table 1

Equilibrium with and without trade or storage

	No trade or storage		Trade only						Storage only	
Country	1	2	1	2	1	2	1	2	1	2
Tariff			0	0	0,1	0,1	0,3	0,3		
Carry-out									0,95	0,95
Price										
Mean	96,15	102,14	99,15	99,15	97,70	99,66	97,85	100,42	96,42	102,15
Standard error	47,82	50,82	34,29	34,29	35,32	34,95	34,66	36,45	23,32	24,38
Coefficient of variation	0,50	0,50	0,35	0,35	0,36	0,35	0,35	0,36	0,24	0,24
Auto 1	– 0,12	– 0,21	– 0,20	– 0,20	– 0,13	– 0,21	– 0,16	– 0,17	0,29	0,17
Auto 2	– 0,06	– 0,11	– 0,06	– 0,06	– 0,03	– 0,07	– 0,05	– 0,07	0,05	0,04
Skewness	0,21	– 0,08	0,04	0,04	– 0,10	0,06	0,21	0,10	1,90	1,20
Kurtosis	– 0,19	– 0,70	– 0,63	– 0,63	– 0,36	– 0,66	– 0,26	– 0,74	4,51	1,08
Correlation (p_1., p_2)	– 0,03	—	1,00	—	0,95	—	0,86	—	– 0,01	—
Mean Inv./Mean Harvest	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,08	0,06
Producer income	9 230	9 651	9 768	9 620	9 601	9 646	9 586	9 679	9 545	9 977
Mean	3 853	4 106	2 923	2 801	2 969	2 775	2 732	2 787	1 525	1 591
Standard error	0,42	0,43	0,30	0,29	0,31	0,29	0,29	0,29	0,16	0,16
Coefficient of variation	0,30	—	0,28	0,26	0,30	0,28	0,28	0,28	0,05	0,06
Probable crisis[1]	0,30	—	—	—	—	—	—	—	—	—
Consumer expenditure	9 232	9 654	9 696	9 696	9 566	9 728	9 589	9 768	9 603	10 052
Mean	3 851	4 104	2 760	2 760	2 901	2 800	2 770	2 899	1 702	1 794
Standard error	0,42	0,43	0,28	0,28	0,30	0,29	0,29	0,30	0,18	0,18
Coefficient of variation	0,35	—	0,26	0,26	0,28	0,28	0,27	0,29	0,13	0,17
Probable crisis[2]	0,37	—	—	—	—	—	—	—	—	—

[1] Crisis defined as income less than 80% of mean income.
[2] Crisis defined as consumer expenditure greater than 120% of mean consumer expenditure.

The first thing to be noticed is that the mean prices have not changed significantly compared with the case of no trade or storage. However, now the coefficients of variation of prices in the two countries are both 0,24. Thus, we see that storage, in the parameterization chosen, has the effect of reducing price volatility much more than two-country trade alone. This is accomplished by holding stocks which are on average only about 6 to 8% of the average annual harvest. Or, in other words, average stocks are between 60 to 80% of one standard deviation of the harvest. Stockholding effectively links supplies, consumption and prices over time. This is reflected in a first order autocorrelation of prices of 0,24 for each of the two countries. Furthermore, it means that in most circumstances price realizations are relatively close to the mean values. However, occasionally, several poor harvests in a row are sufficient to exhaust stocks, which results in a brief period of very high prices. This is reflected in the high positive skewness and kurtosis of prices. It was emphasized by Deaton and Laroque that world commodity price distributions are characterized by positive autocorrelation, positive skewness and high kurtosis. The fact that the model is capable of generating similar price behaviour is one of the main arguments for using it for the study of storable agricultural commodities.

The simulations also show that storage is very effective in reducing producer income variability. The coefficients of variation are roughly half those of the no trade or storage case.

Furthermore, the probability of a crisis income falls to about 5% from 30%.

4. The interaction of trade and stockholding

4.1. A model with simultaneous trade and storage

In reality the agricultural economies of the EC and elsewhere combine international trade and the holding of stocks. Thus a stabilization analysis of such economies requires us to bring these two elements together in a single model. In this section we study the model obtained by combining the trade and storage in a single model. In Section 5 we further complicate the model to introduce features found in the CAP.

The model analized is the combination of the specifications introduced in Sections 3.2 to 3.4. That is, consumer demands are linear and harvests are independent random variables. Total demands in each country include inventory demands which must satisfy inventory arbitrage conditions similar to system (3). And supplies must be adjusted to reflect exports from country 1 to country 2, m, which must satisfy equations similar to (1) and (2). However, the analysis is now complicated by the fact that the next period price expectations must take into account the next period trade and thus carry-over and price formation in the foreign country.

The solution for a rational expectations equilibrium involves finding the pricing functions which simultaneously satisfy the entire system. This requires numerical techniques similar to those used in Section 3.4. However, in this case the complexity of the calculations involved are increased enormously by the fact that the system has a two-State variable, the available supplies (harvest plus carry-over) for each country. The details of the method are found in Anderson (1992). Once the pricing functions are found the properties of the system can be studied by stochastic simulation as before.

4.2. Results

The results for a variety of parameter values and for the same 200 years of harvests used previously are given in Table 2. The first two columns assume that the costs of storage are 5% per year and that each country applies a 10% tariff on imports. This case serves as a benchmark for comparison with the cases of trade alone (Table 1, columns 3 and 4) and storage alone (Table 1, columns 9 and 10). The first striking result is that the coefficients of price variation are 0,16 and 0,17 for the two countries. These compare with levels of about 0,24 for storage alone, 0,35 for trade alone and 0,5 for no trade or storage. Thus the combination of private storage and trade is extremely effective in reducing the price variability caused by random harvests. In fact, the two complement each other in the sense that adding trade to the storage case reduces volatility by a factor of 0,33 while adding trade to the model without storage reduces volatility by a factor of 0,3. The complementarity of trade and storage are also reflected in the fact that average inventory levels are only 4 to 5% of harvest versus 6 to 8% for the case of storage alone.

Private storage and trade also serve to decrease sharply the volatility of producer revenues. The coefficient of variation is about 11 versus 16% for storage only, 30% for trade only, and 42% for no trade or storage. Furthermore, the probability of receiving revenues less than 80% of the mean is 2% or less. In contrast, the probability that consumers will pay more than 120% of their normal food budget is 6 to 7%. This reflects the fact that the operation of storage creates an asymmetric price distribution. On occasions, when a series of poor harvests leads to a depletion of stocks, market prices rise very sharply.

Table 2

Equilibrium with trade and storage

Country	1	2	1	2	1	2	1	2
Tariff	0,1	0,1	0,3	0,3	0,1	0,4	0,1	0,1
Carry-out	0,95	0,95	0,95	0,95	0,95	0,95	1,0	1,0
Price								
Mean	99,69	101,17	99,33	101,83	96,68	104,44	98,61	99,85
Standard error	16,63	16,09	17,81	16,97	16,26	18,12	12,95	12,31
Coefficient of variation	0,17	0,16	0,18	0,17	0,17	0,17	0,13	0,12
Auto 1	0,20	0,17	0,22	0,14	0,23	0,13	0,33	0,31
Auto 2	0,00	0,06	– 0,01	0,06	0,01	0,06	0,16	0,22
Skewness	2,24	1,67	2,48	1,24	2,43	1,41	2,78	2,17
Kurtosis	7,48	3,79	9,26	1,28	9,29	1,76	14,37	8,37
Correlation (p_1., p_2)	0,88	—	0,57	—	0,66	—	0,83	—
Mean inv./mean harvest	0,05	0,04	0,06	0,05	0,06	0,05	0,10	0,08
Producer income								
Mean	9 937	9 965	9 884	10 008	9 629	10 265	9 860	9 868
Standard error	1 132	1 147	1 106	1 065	1 029	1 189	963	1 008
Coefficient of variation	0,11	0,12	0,11	0,11	0,11	0,12	0,10	0,10
Probable crisis[1]	0,02	0,01	0,01	0,01	0,01	0,01	0,02	0,01
Consumer expenditure								
Mean	9 920	10 042	9 883	10 088	9 679	10 285	9 855	9 958
Standard error	1 214	1 196	1 280	1 276	1 201	1 328	955	922
Coefficient of variation	0,12	0,12	0,13	0,13	0,12	0,13	0,10	0,09
Probable crisis[2]	0,07	0,06	0,07	0,08	0,07	0,09	0,03	0,04

[1] Crisis defined as income less than 80% of mean income.
[2] Crisis defined as consumer expenditure greater than 120% of mean consumer expenditure.

Columns 3 and 4 of Table 2 show the consequences of raising tariffs from 10 to 30% in both countries. The volatility of prices rises only slightly. The principal effect is a reduction in the correlation of prices from 0,87 to 0,57. Otherwise the principal summary statistics remain approximately the same.

Columns 5 and 6 contain the results for the case of asymmetric *ad valorum* tariffs of 10% in country 1 and 40% in country 2. Here we find that the mean price in country 1 is significantly lower than in country 2. This reflects the fact that periods of large harvests in country 2 give rise to relatively greater exports towards country 1 than it receives when country 1 has a large harvest. Furthermore, country 1 now has a noticeably higher standard deviation of prices than country 2. Still volatilities in the two countries are roughly comparable, a fact that results in approximately equal average inventory holdings across countries. Thus, the effect of asymmetrical tariffs is felt mainly in the form of a relatively high mean price, producer revenues and consumer expenditures in the high-tariff country.

The last two cases given in Table 2 show the sensitivity to changes in the costs of inventory holding. Here the carry-out parameter is 1,0 (versus 0,95 for all other cases). This could reflect a lower marginal cost of physical storage or a lower marginal risk premium required to hold inventories. A lower risk premium may be a result of making it possible to hedge inventory price risk through a futures market.

Comparing columns 7 and 8 with 1 and 2, we see that the lower cost of storage results in a slightly lower mean price in each country. More dramatic is the reduction of price volatility, which falls to about 0,125 versus 0,165. This shows that changes in storage costs can have a large impact on price stabilization. With the lower storage costs, average

inventory holding is much higher (7 to 9% of average harvests). This, in turn, results in higher first and second order autocorrelation coefficients. With these higher inventory levels, the correlation in prices across countries is somewhat reduced.

The main qualitative findings from our model which combines international trade with stockholding are as follows:

(a) Storage and trade appear to be complementary in the sense that stimulating trade for a storable good appears to have even greater volatility reduction than does stimulating trade for a perishable good.

(b) For parameter values that appear to us to be plausible, the volatility reduction achieved through storage is much greater than that attributable to trade.

(c) Trade asymmetries result in higher mean prices and somewhat high price volatility in the higher-tariff country.

(d) Price volatility is rather insensitive to the tariff rate if that rate is constant.

(e) Changes in marginal costs of storage have relatively large effects on price volatility.

(f) Making it possible to hedge inventories on futures markets can contribute significantly to stabilizing interyear price variations.

5. Stabilization analysis of the CAP

5.1. Modelling the CAP

The economic and social policies of the EC directed towards agriculture have developed into a complex framework of interaction between diverse public bodies and the private economy. The mere description of the tools of the CAP is a complex task (see, for example, Harris *et. al.*, 1983, or Teulon, 1991). However, for the simplified economic model that we have used, the tools of the CAP are correspondingly simple. The focus of the CAP is its price parameters, in terms of cereals, the target, threshold, and intervention prices. We simplify the analysis by assuming that all these prices are equal and refer to them collectively as the 'floor'.

Within the CAP, a price floor is defended first by variable import levies, export subsidies, and intervention. In recent years, the trade tools have grown in importance relative to intervention stocks. In effect, the trade tools are the genuine policy controls available to regulate the amount of supply that will pass into intervention. As a consequence, in Section 5.2 we examine in some detail the operation of variable import levies and export subsidies.

5.2. Stabilization impact of changing the CAP

Representing variable import levies and export refunds within our two-country model involves checking whether the free-trade solution would violate the floor. If so, imports are constrained until the floor is respected. If import restrictions alone are insufficient, exports are promoted until the floor is attained. The precise tariff and subsidy required are measured by calculating the resulting world price after the net world supplies are increased through the policy. We have employed this procedure in our model adapted so that country 2 (the EC) is committed to defending a price floor. Country 1 (the rest of the world) applies a constant 10% tariff. The cost of carry in country 1 is 5%. We assume that no private stocks are held in country 2. Once the rational expectations equilibrium is found, the system is studied by stochastic simulation as before.

The results for four different values of the price floor in country 2 are given in Table 3. The first two columns describe the effects of country 2 defending a price floor of 100, that is, at the approximate level of mean prices in the absence of the variable import levies and export subsidies. The benchmark that compares to this is that of symmetrical tariffs of 10% given in the first two columns of Table 2. When the price floor is imposed, it has the effect of raising the average price in country 2, approximately 5% to 105,96. The mean price in country 1 falls by 5% to 94,89. At the same time, the price volatility in country 2 drops from 0,16 to 0,11 while the price volatility in country 1 rises from 0,17 to 0,20.

This establishes the basic tendency of defending a price floor by variable import levies and export subsidies: by exporting the right tail of its harvest distribution, the country with the floor raises its average price but reduces its price variability. At the same time, it produces the opposite effect on its trading partner: lower average prices and higher volatility. The tendency to higher volatility in country 1 is softened somewhat by increased private sector stockholding. Mean inventories increase from 5 to 10%, so that for these parameters at least, country 1 holds inventories approximately equal to those held by the two countries combined in the symmetrical flat-tariff case. The higher level of inventories in country 1 means that the first order autocorrelation of prices rises to 0,22.

Table 3

Variable import levy and export subsidy

Country	1	2	1	2	1	2	1	2
Tariff	0,1		0,1		0,1		0,1	
Carry-out	0,95		0,95		0,95		0,95	
Floor		100		110		130		90
Price								
Mean	94,89	105,96	87,84	113,68	72,58	130,63	98,81	101,51
Standard error	19,14	12,12	18,67	8,99	17,35	3,74	19,08	15,90
Coefficient of variation	0,20	0,11	0,21	0,08	0,24	0,03	0,19	0,16
Auto 1	0,22	0,07	0,21	0,05	0,31	- 0,02	0,16	0,09
Auto 2	0,03	- 0,01	0,09	0,01	0,19	0,01	- 0,01	0,00
Skewness	2,05	2,99	2,56	4,09	3,06	10,97	1,91	1,96
Kurtosis	5,19	10,72	8,44	20,25	14,86	133,21	4,23	4,25
Correlation (p_1, p_2)	0,96	—	0,95	—	0,73	—	0,98	—
Mean inv./mean harvest	0,10	0,00	0,12	0,00	0,18	0,00	0,08	0,00
Producer income								
Mean	9 462	10 497	8 761	11 284	7 238	12 994	9 852	10 020
Standard error	1 483	1 180	1 476	1 154	1 402	1 309	1 451	1 271
Coefficient of variation	0,16	0,11	0,17	0,10	0,19	0,10	0,15	0,13
Probable crisis[1]	0,06	0,02	0,06	0,01	0,09	0,01	0,05	0,03
Consumer expenditure								
Mean	9 513	10 440	8 928	11 041	7 596	12 260	9 832	10 070
Standard error	1 425	854	1 412	605	1 404	223	1 401	1 166
Coefficient of variation	0,15	0,08	0,16	0,05	0,18	0,02	0,14	0,12
Probable crisis[2]	0,14	0,04	0,12	0,02	0,09	0,01	0,12	0,07

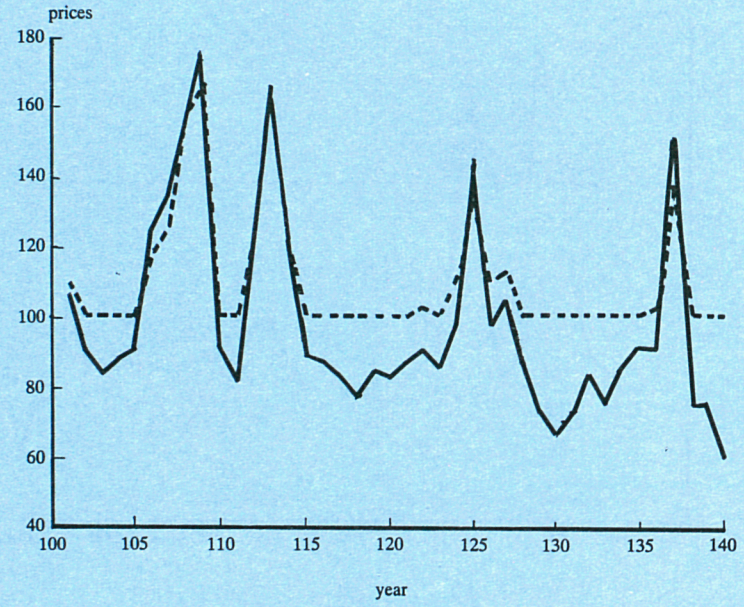
[1] Crisis defined as income less than 80% of mean income.
[2] Crisis defined as consumer expenditure greater than 120% of mean consumer expenditures.

It is also interesting to analyse the results of country 2's price floor graphically. Graph 2 shows the price history for the case of a floor at 100 over years 101 through 140 selected from the 200 simulated years. Country 2's price is the dotted line and country 1's is the solid line. Notice country 1's price rarely rises above country 2's. Periods of high price in country 2 coincide with high prices for country 1. Most of the time (more than half) country 2's price is at the floor. In light of the normality of harvests and the underlying mean without a floor of about 100, this is surprising. It is the result of the fact that country 1 accumulates large stocks and most of the time would have an incentive to export to country 2 were it not for the variable levies. In the symmetrical duty case, of course, the countries have the same mean prices and are as apt to import as to export. Thus the impression of country 1 being the overwhelming surplus area that would swamp country 2 if allowed to do so is purely a by-product of country 2 imposing the price floor. This result is especially surprising for a floor set at an apparently innocuous level of 100.

Whereas the imposition of the price floor decreases price volatility noticeably, it does not significantly stabilize producer revenues for the country attempting to stabilize. The coefficient of income variation in country 2 is 11% with a price floor of 100 in comparison with 12% without the price floor. The probability of revenues of less than 80% of the mean actually increases from 1 to 2%. The reason is that in times of abundant crops, when the floor is in effect, revenues fluctuate directly with the harvest. On the other hand, the volatility of producer revenues in the rest of the world increases sharply when country 2 imposes the price floor (coefficient of variation increases from 0,11 to 0,16 and probability of crisis increases from 0,02 to 0,06). This results from prices in the rest of the world at times being depressed by positive harvest shocks in the EC that are uncorrelated with harvest shocks in the rest of the world.

The effect of increasing the price floor by 10% (that is to a floor of 110) is seen in columns 3 and 4 of Table 3. The main effect is to shift the mean prices reflecting the fact that

GRAPH 2: Variable import levy and export subsidy: floor 100



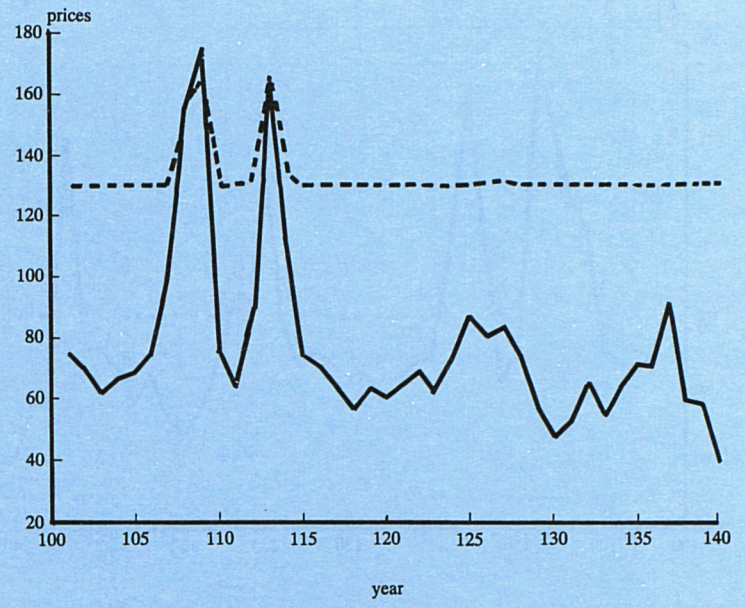
country 2 is more often exporting to country 1. The mean for country 2 rises from 106 to 114 while the mean for country 1 falls from 95 to 88. Price variation is decreased for country 2 while it is increased slightly for country 1. Again the response in country 1 in the face of highly variable imports from country 2 is to increase average stockholding (now at 12% of the average harvest).[1] Increasing the price floor to 130 (columns 5 and 6 of Table 3) results in even more extreme effects. The mean price for country 1 falls to 72,57. The mean in country 2 is 130,62, indicating that the price is almost always on the floor. Interestingly, in this case, country 2's prices are usually 80% higher than those in country 1 which corresponds approximately to the relation of EC cereals prices relative to world prices in recent years. Thus the simulation of the 130 price floor is the representation within our model of the CAP status quo. Otherwise, the effects are those we have come to expect. Price variation rises in country 1 to 23% which induces an increase in country 1's inventory holding to 18% of average harvests. Price variation in country 2 falls to 3%. With respect to producer revenues, we see that raising the price floor to progressively higher levels results in higher mean revenues but no significant decrease in volatility.

The effects of placing a price floor at a high level are seen clearly in Graph 3 which plots prices for years 101 to 140. Over 40 years prices rise off the floor significantly during two periods only. Otherwise, country 2's prices are on the floor while country 1's prices fluctuate within a relatively moderate range. The decreased price volatility in country 2 is achieved through increased volatility of quantities. Graph 4 plots trade flows. Usually, country 2 is an exporter; however, the amounts vary dramatically from year to year. In part, this volatility is absorbed by private stockholders, as can be seen in Graph 5 which gives inventory levels in country 1. The remainder is reflected in higher price volatility for country 1.

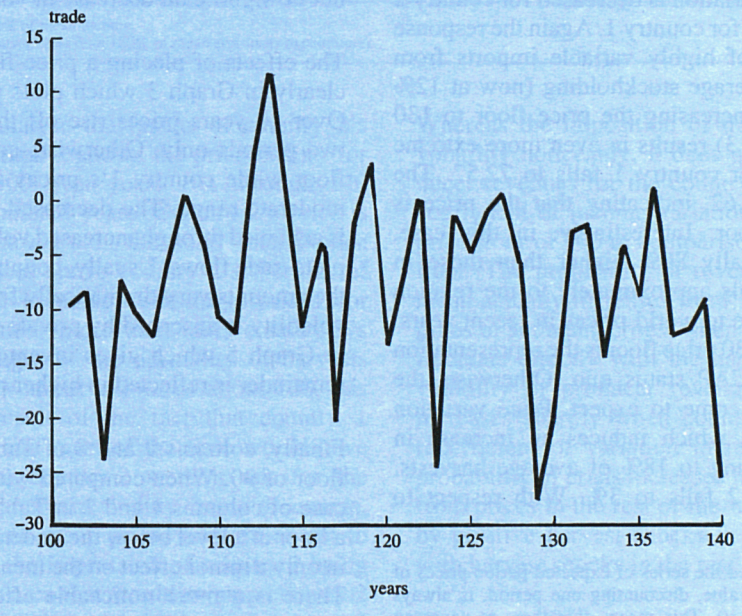
Finally, columns 7 and 8 of Table 3 give results for a price floor of 90. When compared with the symmetrical flat-tariff case of columns 1 and 2 in Table 3, we see that introducing a floor at a level below the underlying free-trade mean results in only a minor effect on the mean prices in the two countries. There is a more noticeable effect on price variation, with country 1 at 19% while country 2 has fallen to 16%. The increased price volatility induces greater stockholding in country 1 (8%).

[1] In this simulation, we calculated the series of expected period prices of country 2. Interestingly, this value, discounting one period, is always less than the price floor of 110. This means that there is never an incentive to store goods privately in country 2. That is, imposition of a relatively moderate price floor completely eliminates private incentives to store and to stabilize prices.

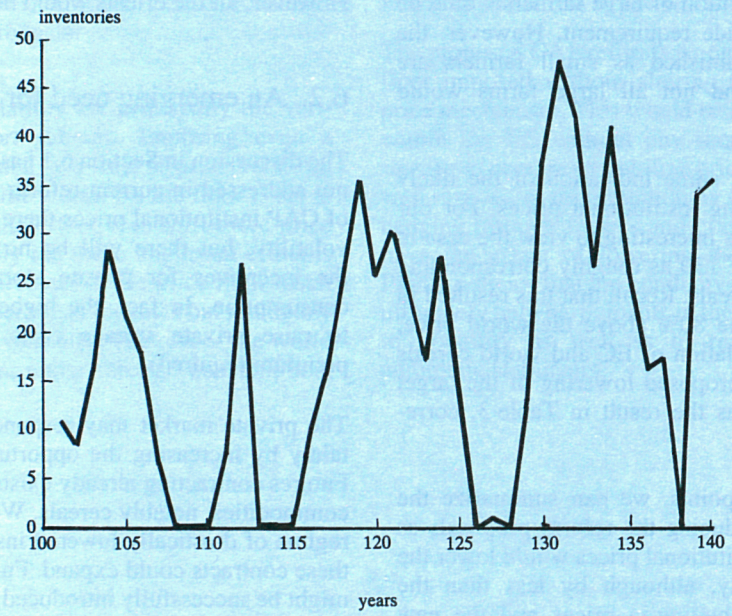
GRAPH 3: Variable import levy and export subsidy: floor 130



GRAPH 4: Variable import levy and export subsidy: floor 130



GRAPH 5: Variable import levy and export subsidy: floor 130



5.3. Summary

The main conclusions of this section can be summarized as follows:

(a) Within the CAP, market stabilization is accomplished primarily through variable import levies, export refunds, and intervention stockholding. With price floors above underlying competitive levels exports provide the ultimate control that prevents stocks from growing uncontrollably.

(b) Within the system of variable import levies and export subsidies, the degree of price stabilization achieved is closely linked to the degree of income support provided. Raising the price floor (through an increase in target price) raises the average price, reduces price variation, and raises average producer revenues within the EC. The side-effect of raising the EC's price floor is a lower mean price, higher price variation, lower mean producer revenues, and higher producer revenue variation in the rest of the world.

(c) Setting a price floor at or above the underlying free-trade mean price creates a basic asymmetry between the EC and its trading partners. Mean price within the EC will be above the floor, and the world mean will be below the floor. The EC will often be in a position of having to defend its floor against foreign imports.

(d) Using the CAP to support a price floor well above the underlying free-trade mean price eliminates private incentives within the EC to store or to export. Thus the market's automatic stabilizers are undermined. In contrast, variations in EC trade lead to higher average stockholding outside the EC.

6. Market risk and CAP reform

6.1. Assessing the implications of CAP reforms

The proposals of the Commission that would affect market stabilization are modifications to institutional prices for a number of commodity groups (see European Commission, 1991). The basic price mechanisms would be maintained. However, the institutional prices would be lowered substantially to roughly coincide with estimated world prices. Other proposed measures are to eliminate co-responsibility levies while a system of compensatory payments would be intro-

duced. The primary effect of compensatory payments would be on producer incomes. There would be some secondary effect on supplies as participation of large farmers would be contingent on a 15% set-aside requirement. However, the supply effects may be diminished as small farmers are exempted from set-aside and not all large farms would participate in compensation.

Our simulation model gives some indication of the likely qualitative effects of lowering institutional prices. For our purposes, we believe that it is interesting to view the case in Table 3 with a price floor of 130 as roughly corresponding to the CAP status quo for cereals. Recall that this resulted in a stabilized mean price some 80% above the world price, which is not far from the relation of EC and world cereals prices in recent years. The proposed lowering of the target prices may be represented as the result in Table 3, corresponding to the floor of 100.

Using these two reference points, we can summarize the stabilization effects of introducing the reform proposals as follows. The lowering of institutional prices would lower the mean EC price substantially, although by less than the difference between current buying-in prices and the new target levels. As a consequence, if farmers received compensation as the difference between average buying-in and the new target times their full acreage, their mean income may well increase under the reform.

Second, even though a new target price may be at the underlying world average, the imposition of a floor close to that target will still mean that most of the time the rest of the world would wish to export to the EC were it not for variable levies. Nevertheless, the fact that the EC would rely on export rebates less frequently would provide a strong tendency for increases in world prices.

Third, the lower institutional prices would mean that price variability within the EC would increase substantially as prices frequently rise above intervention levels. At the same time, world price variability should tend to decrease which could result in a substantial reduction in inventories in world trade. An important issue is to what extent private EC stockholding will grow and thus provide a buffer to the increased EC price variability. The answer provided by our model is that the price floor, even when setting the underlying mean price, would remove the incentives to stockholding most of the time, and, thus, private stockholding might not grow much. It may be appropriate, then, to consider what further policy actions could be used to reinforce private market stabilizers.

CAP prices may not be lowered so drastically. If so, simulations of the price floor of 110 may better represent the post-reform situation. Under this assumption, the effects of the reform would be similar to those we have described. However, all the effects would be moderated.

6.2. An emerging need for risk contracts

The discussion in Section 6.1 has revealed an important issue not addressed in current reform proposals. With a lowering of CAP institutional prices there will be an increase in price volatility, but there will be no accompanying increase in the incentives for private storage to smooth prices and consumption. In fact, the higher price volatility will tend to raise private storage costs (in the form of the risk premium required).

The private market may respond to this heightened uncertainty by increasing the opportunities to hedge price risks. Futures contracting already exists for certain EC agricultural commodities, notably cereals. We would expect that under a regime of drastically lowered institutional prices, interest in these contracts could expand. Furthermore, similar contracts might be successfully introduced for products not covered by such markets. Options contracts may prove even more attractive to some, since they would allow producers to establish price floors at the levels they choose, but only if they are willing to pay the price in the form of the premium charged for the options.

It is reasonable to expect that direct trading of futures and options will only be interesting for very large producers and for processors and merchandisers further down the production chain. Nevertheless, the development of risk contract markets can benefit other producers indirectly. For producers may be able to negotiate with their purchasers for minimal contract prices which would not require them to manage the financeing of the margins associated with futures and exchange options positions. The processors and merchandisers will be more willing to enter into such contracting if they have a means of offsetting the risks they assume by hedging in exchange futures or options contracts.

7. Conclusions

In this paper we have analysed the effect of the EC policies on the stability of agricultural prices and incomes. This has been done within a simulation model that also allows us to assess the effectiveness of the private market automatic stabilizers that operate in the absence of CAP-type market stabilization. We have seen that the basic source of uncertainty in agricultural markets is the volatility of supplies combined with inelastic consumer demand. It was seen that

the combination of trade and storage can substantially reduce market volatility arising from these sources. This is true with respect to the volatility of prices, farm incomes, or consumer expenditure on agricultural products.

CAP operations affecting volatility are principally the variable import levy and export subsidy. Imposing even a relatively low price floor results in a shift of price volatility from the EC onto the rest of the world. As the floor is set at progressively higher levels, the effect is to shift more price volatility. However, eventually the more important effect is felt on the mean price. The increases in the price floor result in significantly higher producer mean incomes but not in any decrease in producer income volatility. The rest of the world is left to absorb the excesses, either through consumption, greater inventory holding, or lower prices. The result is lower mean producer incomes and higher producer income volatility in the rest of the world.

The proposed CAP reforms would principally lower the price floor imposed without altering the basic operations of the price mechanism. This would result in greater price volatility within the EC without any increase in the incentives for storage to operate to stabilize prices. The private market may well respond to this situation by trying to increase the use of hedging through futures and options contracts which would have the effect of lowering the costs of private storage. Public policies that are conducive to this development would ultimately help participants in the agricultural sector to adjust to volatility as well as to reinforce the market's own automatic stabilizers.

References

Anderson, R. W. (1992), 'Determination of prices of storable commodities in a two-country model', unpublished.

Anderson, R. W. and Danthine, J. P. (1981), 'Cross hedging', *Journal of Political Economy.*

Anderson, R. W. and Danthine, J. P. (1983), 'Hedger diversity in futures markets: Backwardation and the coordination of plans', *Economic Journal.*

Arrow, K. and Lind, R. C. (1970), 'Uncertainty and the evaluation of public investment decisions', *American Economic Review.*

Deaton, A. and Laroque, G. (1992), 'On the behaviour of commodity prices', *Review of Economic Studies.*

Gilbert, C. L. (1986), 'International Commodity Agreements: Design and Performance', *World Development.*

Harris, S., Swinbank, A. and Wilkinson, G. (1983), *The food and farm policies of the European Community,* Wiley.

Knudsen, O. and Nash, J. (1990), 'Domestic price stabilization schemes in developing countries', *Economic Development and Cultural Change.*

Massell, B. F. (1969), 'Price stabilization and welfare', *Quarterly Journal of Economics.*

Newbery, D. and Stiglitz, J. (1981), *The theory of commodity price stabilization,* Oxford University Press.

Oi, W. (1961), 'The desirability of price instability under perfect competition', *Econometrica.*

Teulon, F. (1991), *La politique agricole commune,* Presses Universitaires de France.

Varian, H. (1978), *Microeconomic analysis.*

Waugh, F. (1944), 'Does the consumer benefit from price instability?', *Quarterly Journal of Economics.*

The Swedish food policy reform: Background, principles, and problems of transition

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1. Background of the reform

In his perspicacious discussion of the Nordic welfare States, 'How bright are the northern lights?', Mancur Olson asks the question why these countries, and Sweden in particular, are not worse off. Sweden's public sector ranks among the largest in the world, with a ratio to the gross national product of more than 50%, including transfers. This implies a substantial dead-weight loss in tax extraction. The income dispersion before taxes is low and, until quite recently, had been combined with extensive income redistribution via a progressive tax system. These factors taken together, according to economic textbooks, should place a formidable load on the Swedish economy. Yet, the Swedish standard of living, whether measured by GNP per capita or more multidimensional welfare measures, counts among the highest.

Olson distinguishes three explanatory factors behind the relatively successful economic and social policy. The first of these is a liberal trade policy. Sweden signed the General Agreement on Tariffs and Trade in 1950, and since the successful Kennedy and Tokyo Rounds, the weighted average tariff level for manufactured products is only about 3%. International comparisons among small economies indicate a strong relationship between low levels of protection and competitiveness. In other words, highly protected industrial sectors are poor exporters. The correlation is particularly strong for pure manufacturing industries, i.e. those that do not rely on domestic natural resources.

A second important feature of Swedish welfare policy is that redistribution is mainly explicit, in Olson's terminology. Transfers occur mainly over the public budgets, which makes them visible and subject to more or less permanent reconsideration. The health insurance and old-age pension systems are cases in point.

A third factor of importance is the unusual role played by encompassing corporative organizations in the political economy of the nation. Organizations can be destructive in their defence of narrow interests, but size can make a difference. Whereas a small and aggressive interest group can reap large benefits from a lobbying effort without having to pay more than a marginal fraction of concessions accorded, large organizations pay a proportionally higher price and could be expected to be more restrictive in their claims.

The price paid for the economic policy outlined above is a relatively high rate of structural adjustment. A small, open economy is sensitive to international business cycles, and non-competitive industries must continuously adapt and make room for more successful ones. In the spring of 1989, 60 000 people, or about 1,3% of the potential labour supply, were registered as unemployed, but 300 000, five times as many, were unemployed on some occasion during the year. Again, the large trade unions have played an active role in this process, in convincing their member collectives that the costs of mobility and adaptation are more than justified by gains in economic growth.

In addition to the requirements raised by a basically liberal trade policy, several internal measures aimed at increased competitiveness were taken during the 1980s. Several tax reforms were decided upon, the most radical of which was completed by the end of 1990. The US tax reform of the mid-1980s served as the model, with a substantial decrease in marginal income tax rates and a broadened base for the value-added tax as the main components.

The financial markets have been deregulated continuously since the late 1970s, resulting in a dramatic change towards freedom for capital movements and free competition in the markets for financial services. By 1985, bankers' interest rates were free and liquidity ratios had been abolished. In 1989, currency regulations were essentially dismantled. Swedish investment in equity and real estate abroad is free of all controls, and transborder trade in bonds and treasury bills will be further liberalized. As a result of these decisions, the government and the Bank of Sweden has by now deprived itself of most traditional monetary policy instruments. To counter speculation against the Swedish krona, which caused interest rates to soar in the autumn of 1990, the currency has now been linked to the ecu.

If free trade and explicit redistribution have been basic principles of Sweden's economic policy, there remain, none the less, a few conspicuous exceptions to the general rule. After the dismantling of the non-competitive parts of the shipbuilding industry in the early 1980s, the two important remaining exceptions were the agriculture and food, and textiles and clothing industries.

As in many other European countries, agricultural protectionism in Sweden came into force during the latter half of the 19th century. Advances in transportation technology made transatlantic agricultural products available at highly competitive prices. Whereas the United Kingdom, the Netherlands and Denmark opted for a liberal response to this challenge, most countries chose a protectionist policy. Sweden joined the second group by introducing tariffs on grain in 1888, after a heated political debate. After a period of liberalization following the First World War, the depression which started in the late 1920s caused a slump in both domestic and foreign markets and triggered a protectionist revival. Also, changes on the supply side lay behind the

demand for a new policy; improved transport facilities had made it possible for milk producers far from the cities to compete in these markets and thus threaten former natural monopolies.

The general socioeconomic context of the early 1930s was, of course, very different from that of today. Almost 30% of the working population was employed in the agricultural sector. More than half of the population lived in sparsely populated areas (isolated farms or hamlets with less than 200 inhabitants). The number of employees in other sectors, which had risen by 15% during the 1920s, declined during the following decade. The industrial sector was hard hit by the depression and was unable to absorb redundant agricultural manpower which was not in demand elsewhere outside the agricultural sector due to its generally low level of mechanization. The general system of social security was poorly developed at the time. Relief work projects were the main instrument of labour market policy, and the supply of such projects was inadequate to create anything near a balance in the labour market.

It was during these years that the technique of domestic market regulations and export subsidies was fully deployed. Guaranteed prices were introduced for whatever quantities were produced. The dairy products regulation was particularly intricate, amounting to a textbook application of monopoly pricing. Relatively elastic products such as butter, cheese and milk-powder were heavily subsidized, at the expense of the less-elastic consumption milk.

Because market regulations relied on fees from the producers, whether they wanted to join the system or not, the new policy assigned actual taxation authority to the commercial body in charge of the administration, and was therefore questioned on constitutional grounds. The proposal was none the less accepted, somewhat grudgingly, by the Social Democrats in exchange for support from the United Farmers' Party for a more active labour market policy.

The measures had been taken in a general atmosphere of emergency and were considered to be temporary. The risks associated with the new policy were clearly realized at the time of its introduction, and in 1938 a reform commission was formed. The Second World War altered these plans, however, and the system remained essentially unchanged during the post-war period. The number of regulations has increased over time. As late as 1971, a market regulation was introduced for potatoes, so far sheltered only by border protection.

As indicated above, the 1980s saw a number of far-reaching changes in economic policy in the direction of deregulation. In this context, it was natural to reconsider the policy in the two areas that deviated most from the baseline of free trade, agriculture, and textiles and clothing. The economic/political Government Bill of October 1988 introduced tighter antitrust legislation, the dismantling of textile quotas when the Multifibres' Agreement expired on 31 July 1991, and agricultural reform. To prepare the reform, the political parties represented in Parliament were invited to form a working party with the mandate of evaluating the current policy, investigating the possibilities of dismantling internal market regulations while keeping the level of border protection dependent on the GATT process, and developing new means to achieve the goals related to food security, environment and regional policy.

The Parliamentary Working Party on Food Policy Reform delivered its report entitled 'A new food policy', in October 1989, and the reform decision was taken in Parliament in June 1990. The Committee on New Antitrust Legislation delivered its main report in the summer of 1991, although certain particular problems related to the food sector were treated earlier and regulated by a parliamentary decision in June the same year. The textile quotas were dismantled as planned on 31 July, and the only remaining protection for the Swedish industry in this sector at present is a pure tariff of about 14%.

2. Some basic facts

The total expenditure on food, excluding alcoholic beverages, in Sweden in 1990 was SKR 137 billion or, given a population of 8,5 million people, SKR 16 000 per capita (SKR 1 = ECU 0,134[1]). This corresponds to 16,6% of total private consumption. The index of real value per capita in 1985 compared with the USA (index 100) was 77,1 for total private consumption by households and 77,3 for food (OECD, 1987). The corresponding figures for EUR 12 were 62,0 and 94,5 respectively. The noticeable difference between Sweden and the EC countries derives both from differences in general standards of living and from price differences (see below).

The variation in the ratio of the household budget spent on food with household income is rather weak and also somewhat uncertain. In 1985, low-income households were reported as spending 22,2% of their disposable income on food and high-income households, 19,7%. In 1988, the corresponding figures were 17,8% for low-income households, 19,7% for middle-income households, and 18,2% for high-income households.

[1] Before the depreciation of the Swedish krona in November 1992. (In September 1993, the exchange rate was approximately ECU 0,107).

About 60% of food consumption consists of price-regulated products. In the 1970s, budget-financed food subsidies were introduced for a range of such products, directly affecting consumer prices. They were successively dismantled during the 1980s, and the remaining ones (milk subsidies) were finally removed in connection with the tax reform in 1991.

The food industry, which employs about 60 000 people, has been heavily oriented towards the domestic market. Food exports historically account for about 2% of total Swedish exports, and a substantial part of these has been weakly processed products dependent on export subsidies. A Swedish peculiarity is the exceptionally strong role played by the producers' co-operative movement, a heritage from the intra-bellum policy changes. The cooperative movement controls the whole dairy industry, about 75% of total grain trade, and 75% of the slaughter industry. Vertical integration is also strong, although the dominance of the cooperative movement is less pronounced when it comes to more processed products.

Primary products are supplied by approximately 100 000 farms with a total acreage of between 2,8 and 2,9 million hectares. Table 1 presents certain characteristics of the agricultural sector in Sweden and EC Member States. The acreage figures refer to total agricultural land and therefore conceal rather different mixes of arable land and meadows. A general impression is that the situation in Sweden is similar to that of the most industrialized countries of the Community.

Table 1

Some characteristics of the agricultural sector in Sweden and EC Member States in 1989

	Share of GNP (%)	Share of employment (%)	Acreage per head (ha)	Acreage per person employed in agriculture (ha)
Sweden	1,5	2,1	0,34	30,4
EUR 12	3,0	7,0	0,39	13,6
Belgium	2,2	2,8	0,14	13,6
Denmark	3,8	6,0	0,55	32,2
Germany	1,6	3,9	0,19	11,2
Greece	16,4	26,6	0,57	5,9
France	3,2	6,4	0,55	22,2
Ireland	10,9	15,1	1,62	35,0
Italy	4,1	9,3	0,30	8,9
Luxembourg	2,3	3,4	0,33	0,7
Netherlands	4,2	4,7	0,14	7,1
Portugal	5,2	18,9	0,44	5,5
UK	1,8	2,2	0,32	31,4

Sources: Statistics Sweden (for Sweden); European Commission. *The Agricultural Situation in the European Community, 1990.*

In recent years, the number of farmers has decreased by about 3 000 or 3% per year. This net figure corresponds to an outflow of 5 000 and an inflow of 2 000. Part-time farming dominates. In 1987, only 23% of farm households got their entire income from farming; 20% got a small and 34% a large contribution from other sources. Almost 9%, ran small enterprises of which a farm formed a part, and 14% were old-age pensioners.

Another way of expressing the size differences is by the number of working hours needed per year to run the farm. Full-time farms (> 1 600 hours.) accounted for 38%, part-time farms (800 to 1 600 hours.) for 20%, and small farms (< 800 hours.) for 41%. These figures exclude the largest enterprises managed in the form of legal personalities (mainly joint-stock companies), often with hired labour.

3. Evaluation of previous policy

As in many other countries, the more or less regular decisions on agricultural policy in the Swedish Parliament have been coupled to explicit goals. These are embedded in political declarations and not very operative in their original form. The hard part of an evaluation, therefore, is to translate the original statements into an operative form that is amenable to analysis.

The latest statement before the reform decision of 1990 is to be found in a parliamentary decision of 1985 (the quotations below are taken from this document). Besides an overriding efficiency requirement, it contained goals connected with security, consumer objectives, farmer incomes, environment and regional policy.

3.1. Efficiency

The general efficiency requirement is that 'the goals of food policy should harmonize with general economic policy. The national resources should be used as efficiently as possible and promote economic progress.' A derived requirement is that 'agricultural market regulations should be designed so as not to hinder or preclude the development of new products or their introduction into the market'.

In an efficiency discussion, it is necessary to separate business efficiency from socioeconomic efficiency. Efficiently managed enterprises may be socioeconomically inefficient if they are given the wrong incentives. A third concept, which is widespread but of dubious value, is technical efficiency. Examples of popular indicators related to the latter category are labour productivity, yield per

hectare, or yield per cow. Indicators of this type may contain some information but may also be misleading. In general, there is no reason to concentrate on one single production factor in an efficiency analysis; total productivity is the relevant concept corresponding to the everyday notion of efficient resource use. Labour productivity in agriculture has increased rapidly during the post-war period, but at the price of heavy investment in capital stock, so labour productivity figures grossly overstate the rate of total productivity change.

In Table 2 some technical data related to cereals production in three different countries are shown. The figures are 'typical' and do not represent averages (in fact, the fertilizer input and yield per hectare for Sweden is on the low side). The table above all illustrates the great difference between European and transatlantic land use. The input per hectare of labour and fertilizer is substantially higher in Europe, which leads to higher yields but also to higher production costs. The exceptionally high machine cost in Sweden is a result of both higher intensity and higher prices due to insufficient competition. The land rent tends to smooth out differences and produces roughly the same net revenue (which happens to be around zero in all three countries, but the relative figures are more interesting than absolute values). The low specific yield is, of course, no reason for stamping North American cereals production as inefficient; in fact, the table illustrates beyond doubt that production costs per kilogram are by far the lowest in the USA. The low yield per hectare is a direct consequence of the abundance of arable land in this country.[1]

Evaluating the efficiency of a sector that has been effectively isolated from international competition for more than half a century is no easy task. At the enterprise level, a possible course of action is to calculate optimal solutions for standard management problems and to compare actual regimes with optimal ones. This yields rather precise information but is computationally cumbersome. At the macro level, indicators such as the producer subsidy equivalents give some information about competitiveness. Dynamic losses caused by an erroneous allocation of resources may be important but are notoriously difficult to estimate.

At the micro level, studies of actual versus optimal resource use have been carried out for machines, fertilizers, and labour. In a detailed study of 340 different farms, Nilsson et al. (1987) report that 30% of the farms were more than 10% away from the optimum, i.e. machine capacity was either too high or too low. Substantial gains in total system costs, between 9 and 28%, could be made through a more efficient dimensioning of the capacity.

Table 2

Some characteristics of spring wheat production in Sweden, the United Kingdom, and the USA for 1987/88: Yield, revenue, etc., per hectare (SKR 1 = ECU 0,134)

	Sweden	UK	USA
Yield	4 200	4 500	2 700
Total revenue (SKR)	5 880	4 860	1 964
Seed (kg)	240	210	100
Nitrogen (kg)	90	180	70
Fuel (kg)	82	80	67
Machine cost (SKR)	1 984	1 280	720
Labour (hours)	7,5	6,5	2,5
Land rent (SKR)	800	1 400	480
Total cost (SKR)	5 675	5 031	1 839
Net revenue (SKR)	205	– 171	125

Source: Lantbrukets Utredningsinstitut, Stockholm.

The optimal input per hectare of nitrogen is a function of the crop and several environmental factors. The protein content is affected, as is the moisture content and, consequently, the costs of drying. A higher input of nitrogen requires collateral increases in phosphate and potassium inputs. The actual use of nitrogen has been investigated by Andersson (1986). Inputs both above and below optimal use are reported. Too high inputs appear on 50% of the acreage and are most common where fertilizer is used in combination with manure, because the nutrient content of the manure is underestimated. Oversupply is particularly harmful on sandy soils, where leakage tendencies are strongest.

Labour supply in agriculture is estimated in different ways, on the basis of interviews or using empirically based models with or without compensation for variations in farm size etc. In 1987, the total labour volume estimated from interviews was 225 million hours, or 132 000 full time, assuming 1 700 hours of work per full-time person.

As regards statistics, Sweden publishes yearly estimates of the labour supply needed based on production figures, with

[1] For a discussion of the effects of such factors on resource allocation and technical change, see Hayami and Ruttan (1985).

respect to varying farm sizes and other factors of importance. Assuming 20% for overheads, the resulting volume for 1987 was 152 million hours, or two thirds of the previous figure. An alternative to the latter procedure is to base the estimate on planning data for rational enterprises using modern techniques. The figure obtained this way is 110 million hours, or one half of the original estimate. The substantial difference stems from the fact that not all enterprises use modern techniques. The difference should be considered as a potential for future rationalization.

In summary, there are clear indications of the non-optimal use of resources at the micro level. This is, of course, not unique to food production; all sectors exhibit a gap between average efficiency and frontier efficiency.

In industry, a good indicator of efficiency is capacity use. During the 1980s, capacity use in the Swedish food industry was steady at around 80%. For the manufacturing industry as a whole, the corresponding figure was 80% during the recession of the early 1980s but this rose to 90% towards the latter half of the decade. The food industry is much less independent of business cycles, and the above figures indicate a permanent overcapacity.

There is no single measure of efficiency or inefficiency at the macro level. Some of the costs associated with current policy are explicit and easy to measure, whereas others, which may be equally important, are much more implicit. A cost of the latter type is that emanating from 'directly unproductive profit-seeking activities',[1] or the fact that manpower at various management levels is directed towards the political arena rather than devoted to innovation, marketing activities, etc.

Costs associated with the export of surplus quantities are clearly visible. These are, of course, mainly transfers rather than costs in the economic sense of the word. During the second half of the 1980s, they varied between SKR 2 billion and just over SKR 3 billion. There is also a less-visible cost of transferring money from the domestically consumed consumption milk to less-profitable and/or exported products such as butter or milk-powder; this cost has been estimated at about SKR 1 billion per year. These figures can be related to the total amount of development aid, which was SKR 10 billion in 1988/89. Part of the export costs are covered by the State, others by the consumers (the milling levy), and others by the producers. The budget costs associated with overcapacity in grain production were projected in 1985 to be SKR 600 million during a five-year period, but turned out to be almost three times as high. This included a programme for stimulating other economic activities on agricultural land, for example, forest plantation, but less than 6 000 hectares were planted within this programme.

The dead-weight loss associated with border protection is the welfare loss incurred by the consumers which is not absorbed by the domestic producers. This loss was estimated at over SKR 2 billion for 1986 (Nordisk Ministerråd, 1989).

Finally, the well-known producer subsidy equivalents (PSEs) measure the total implicit or explicit transfer from consumers and taxpayers to producers by comparing the costs they would have if the same products were obtained at some reference price, normally the world market price. The methods of computation have been the subject of much discussion, but the figures convey some idea of the competitiveness of the agricultural sector in one country when compared with another. Graph 1 shows the development of the net percentage PSEs for Sweden, the EC, and the USA from the mid-1980s to 1990 (projected). Because percentage PSEs are related to domestic prices, differences are larger than indicated by a direct comparison. Thus, the nominal assistance coefficient, which is related to the common reference price, indicates a price gap of about 20% between Sweden and the EC, and 40 to 50% between Sweden and the USA.

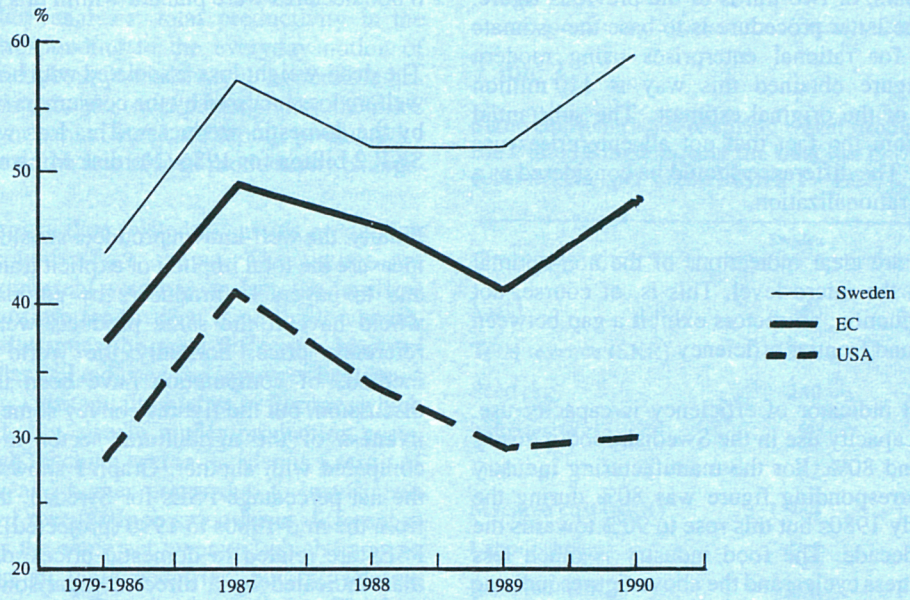
The macro-level costs presented so far are static. Dynamic costs arise because of a non-optimal allocation of resources, a higher inflation rate, and impediments and biases in technical development. If market-regulated foodstuffs had exhibited the same inflation rate as consumer prices in general, the general inflation rate would have been between 0,2 and 0,3% lower during the 1980s. Based on the macro-model used in the official recurrent mid-term economic forecasts, this is estimated to have caused a yearly loss in GNP growth of 0,1 to 0,15%, or 2 000 to 3 000 job opportunities.

The agricultural sector's own development has also been hampered by regulations. Some of these have been expressly designed to preclude technical change, for instance by stipulating that a certain raw material be used in the production of starch or alcohol. It is most likely that technical change has been biased by the high-price policy; the genetic selection for high-yield crop varieties which require large inputs of fertilizer is a case in point.[2]

[1] Bhagwati (1982).

[2] For a general discussion of the induced bias of technical change, see Hayami and Ruttan (1985, Chapter 7).

GRAPH 1 : **Net percentage producer subsidy equivalent (all products) for Sweden, the European Community and the USA**



Source: OECD.

3.2. Food security

The concept of food security relates both to the global and to the national level. In the global context, the aim is to ensure the capacity of the international community to provide relief in acute supply crises connected with natural or man-made disasters. Previously, Swedish policy in this area prescribed that a certain quantity for such purposes should be bought from Swedish producers, but following a parliamentary decision in 1988, the responsible agency is now free to make its purchases wherever suitable and, of course, at substantially lower prices.

Food supply in a national security context has been much more important in the shaping of post-war agricultural policy. For a small, non-aligned nation like Sweden, self-sufficiency has been of central importance in both the military and non-military areas of total defence. Whereas food security has served as an argument for a relatively large agricultural sector, security-related measures have not formed an integrated part of the overall policy; rather, specific measures such as stockpiling have been designed on an *ad hoc* basis once the size of the sector has been determined on other grounds. This is serious, because self-sufficiency under normal peacetime conditions is a poor measure of the power to resist disturbances associated with military or paramilitary aggression.

On the whole, the national food security goal has been satisfied, but at considerable cost. A trade-off between peacetime costs for an oversized sector and specific security measures yields an optimal policy which places considerably more weight on the latter (see Section 5.2).

3.3. Consumer objectives

Consumer objectives include a wide range of goals associated with quality, diversity and prices. Quality dimensions of interest are taste, freshness, and the absence of infectious diseases and pesticide residuels. Whereas the former two are normally considered as a matter to be settled by the consumer alone, the latter two are the subject of comprehensive legislative and surveillance activities. It is generally considered that foodstuffs in Sweden, whether of domestic or foreign origin, meet high quality requirements in this respect.

The main threats to health do not stem from microbial infections or natural poisons, nor from pesticide residues or

preservatives, but from an unsatisfactory diet composition. A high intake of fat, in particular animal fat, and a low consumption of vegetables, fruit and fibres are considered to be one of the main sources of cardiac and vascular diseases, as well as a number of the most common forms of cancer. In both cases, dietary habits taken together are equally or more important than smoking.

Dietary habits are, of course, largely the result of personal choices, but because prices and regulations influence consumer behaviour, the effects of current policy on supply and pricing should be scrutinized. In some respects, it is obvious that the effects of market regulations have been quite contrary to what is desirable from a nutritional point of view. The monopoly pricing system for dairy products has heavily subsidized butter and milk-powder. The amount of animal fat originating from this subsidy-dependent production has been about the same as the intake via consumption milk, or 40% of the total amount of fat. A second, undesirable but less-strong effect is that the milling levy, which contributes to export financing and raises the price of grain for human consumption by 70%, reduces fibre intake.

Not all policy effects on consumer habits are negative. The consumption of fruit and vegetables has risen steadily over the last decades, as a result both of dietary information and price policy. The tariffs on vegetables range from 10 to 20% during the harvest season, and zero otherwise. Unlike the prices of regulated foodstuffs (see below), prices on vegetables have therefore risen more slowly than the general consumer price index. One consequence of this change is a noticeable decrease in stomach cancer frequency.

Market regulations have had adverse effects on supply diversity. Official prices for standard qualities have not promoted interest in high-quality production among producers. In some instances, there have even been formal hurdles. The regulation of cheese production, admittedly not a governmental regulation but none the less part and parcel of the monopoly administration, has been implemented by quotas to the single dairies, and production above quotas has been penalized — an obvious hindrance to consumer signals affecting production. The earlier mentioned regulations regarding choice and use of raw materials have also slowed down the rate of product innovation.

Prices are, of course, central to an evaluation of policy effects on the consumer. The PSE levels given above, or rather their counterparts, the CSE (consumer subsidy equivalent) levels, illustrate differences between the prices of basic agricultural commodities. A priori, there is not necessarily a strong correlation between these prices and consumer prices, but empirically, countries with high negative CSE values generally also come out unfavourably in the other respect. This is particularly pronounced in small countries. Table 3 gives price-level comparisons between a number of OECD countries for consumption goods generally and for foodstuffs in the mid-1980s.

Table 3

Price level indices in a number of OECD countries for household consumption and food in 1985 (index USA = 100)

	Total consumption	Food
Sweden	95	127
EUR 12	75	77
Denmark	96	101
Germany	86	82
Greece	57	65
France	82	83
Italy	68	76
Netherlands	75	77
UK	73	73
Canada	90	93
Finland	103	125
Japan	89	124
Norway	107	130

Source: OECD (1987). Purchasing Power Parties and Real Expenditures 1985.

Equally important is the contribution of food price development to the general rate of inflation. Through most of the 1980s, the latter was higher in Sweden than in OECD-Europe, but consumer prices excluding food developed slower in Sweden. Table 4 illustrates the differences between the consumer price index (CPI) generally and for food in a number of OECD countries.

Table 4

Consumer price index generally and for food in a number of OECD countries in 1989 (index 1980 = 100)

	CPI (1)	CPI-food (2)	(2)/(1)
Sweden	188,1	213,2	113
Denmark	172,4	165,8	96
Finland	186,2	175,8	94
Germany	126,1	119,9	95
Japan	118,6	116,5	98
Norway	200,2	208,6	104
Switzerland	132,4	137,8	104
UK	172,5	158,3	92
USA	150,3	144,2	96

Source: OECD.

Between 1 and 2% per year of price increases on regulated products can be explained by the dismantling of food subsidies during the 1980s. Taking this effect into account, there exists, none the less a gap in the inflation rate between food and other consumer products. There is no easy explanation for this. It is quite clear that the combination of a small country and high border protection hampers competition, but competition also appears to be undeveloped at the wholesale and retail levels of the food chain, where prices are not regulated. An indisputable negative effect of administered prices is that the annually recurrent price increases on a fixed day have provided the sector with opportunities for coordinated price increases without having to resort to more or less tacit collusion. A second no less important effect is that the primary producers have been more or less automatically compensated for price increases on inputs. Given that the producers' cooperatives dominate the input sector, there has been not only weak resistance to price increases but also, in fact, an incentive in the opposite direction.

3.4. Producer incomes

According to the income goal, 'farmers should have an income development equivalent to that of other comparable groups. In these comparisons, account should be taken of the fact that the costs for production above what is socioeconomically justified shall be incurred by the agricultural producers'. The second part of this statement means that farmer incomes should be adjusted upwards to account for the losses associated with permanent oversupply to the domestic market.

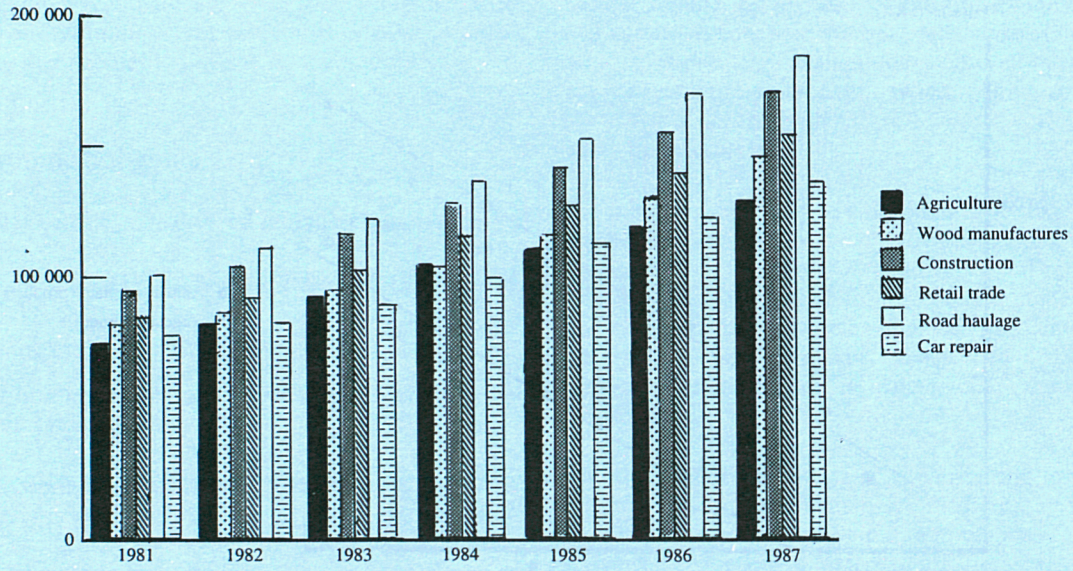
There are several problems in verifying whether this goal is achieved or not. Differences in size and type of farming lead to large variations in income. There are also differences between established farmers and newcomers, and between owner cultivators and tenants. To make a comparison meaningful, interest is normally focused on 'rational, full-time farms.' Even with this narrower definition, ambiguities remain. The standard comparison can be limited to assessed income or capital assets, or widened to cover a spectrum of standard indicators. Reference groups can be chosen from among wage-earners and professional groups, or restricted to other small entrepreneurs. Because levels are difficult to compare, development over time is preferable as a basis for comparison when such data are accessible.

Farmers, like other small entrepreneurs, have relatively low assessed incomes when compared with wage-earners and professional groups. This is because they are able to channel part of their private consumption through the enterprise. Taxation rules make it advantageous to leave as much as possible of the surplus in the enterprise. This makes other entrepreneurs the most relevant reference group for an income comparison. The groups that have been selected are small entrepreneurs in the wood products, construction, retail trade, road haulage and car repair sectors. Like agriculture, these sectors are dominated by small enterprises and also appear in the countryside. Because incomes can, to some extent, be transferred between husband and wife, total household income is the correct basis for a comparison. A married couple is classified as belonging to a certain group if at least 50% of their total income derives from the corresponding economic activity.

Graph 2 shows, the total household income development for married couples belonging to the groups selected through 1987. The adjustment for export costs to be taken into account according to the previously quoted statement of the income goal amounts to SKR 30 000 for 1986 and SKR 26 000 for 1987. It can be concluded that farm incomes have developed in parallel with those of the reference groups, in particular if the adjustment for export costs is taken into account.

In a comparison of net capital assets, farmers turn out to be well off. The average net capital per household in 1986 was SKR 1 015 000 for farm households, 327 000 for other entrepreneurs, 151 000 for workers, and 278 000 for pro-

GRAPH 2: **Income development in agriculture and five reference small-business sectors, 1981-87**



NB: According to the 1985 agricultural policy decision, incomes in the agricultural sector should be adjusted upwards by SKR 30 000 for 1986 and SKR 26 000 for 1987.
Source: Swedish Board of Agriculture.

fessionals.[1] Most of farmers' assets are in the farm; net assets outside the enterprise are somewhat above the average worker's. It should be noted that what is considered as an asset in the private economy is rather a burden on the enterprise, as a large capital gives a low rate of return for a given surplus.

When other standard indicators are used as a basis for comparison, a varied picture emerges. Farm households have a higher standard than the average household concerning living area, household machines, and cars (both for one or two cars), whereas expenditure on leisure activities or journeys abroad is below average.

The working load for farmers is higher than for average workers but below the average for other small entrepreneurs — 47,0 as compared with 48,8 hours per week. These figures are based on interviews and are far in excess of the estimated work load for rational enterprises.

Health standards, as measured by the frequency of protracted illness, reduced working capacity, or impairment of hearing, do not differ between farmers and other workers when differences in age profile are taken into account.

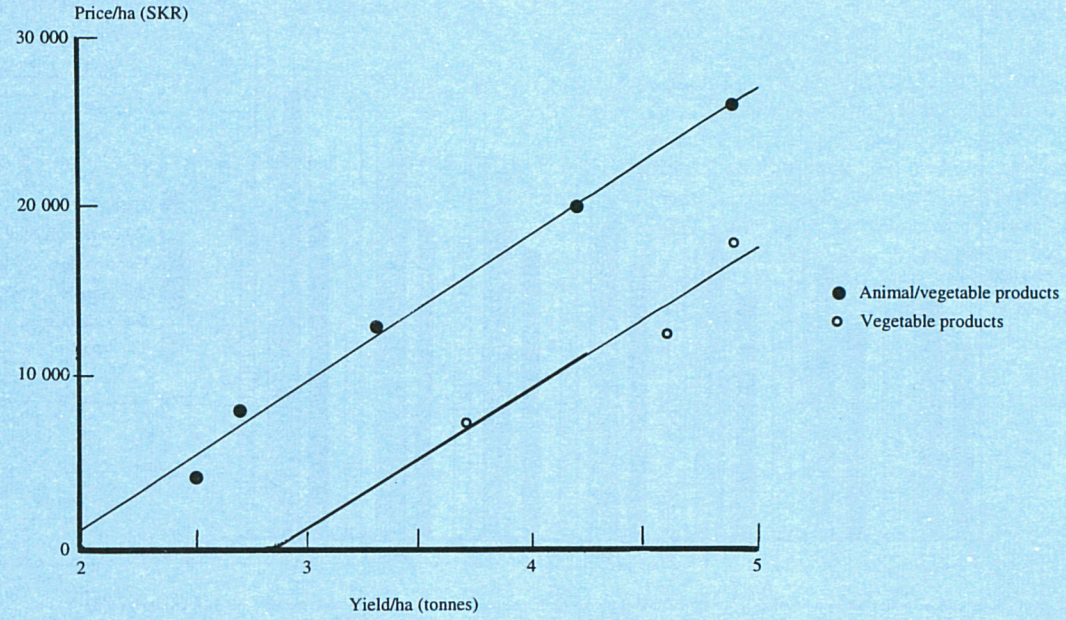
In summary, a definite evaluation of the standards of living is difficult to carry out, but there are no indications that farmers are unfavourably treated. Differences exist, but can be naturally related to differences in general living conditions.

The main difficulty in clarifying the income goal is that it has not been specified for how many producers it is supposed to be relevant. The fewer the producers, the easier it is to satisfy. Between 1965 and 1983, farmers' real wages per production unit rose by 61%. Behind this net figure lies a reduction in income from agriculture of 40%, an increase from other sources of 30%, and a decrease in the number of production units by 71%. Virtually all the real income rise thus derives from the fact that there are fewer farmers today.

In a sector with free entry, income policy goals are not likely to be influenced by administered prices in the long term. As established already by Ricardo, we should also expect capitalization effects in the least mobile of production factors, i.e. land or — more recently — production quotas. The most

[1] *Source:* Statistics Sweden.

GRAPH 3: **Land price versus yield per hectare (barley) in different regions in Sweden**



Source: Swedish Board of Agriculture.

clearly visible effect of capitalization is in land prices. Because administered prices are per unit and production costs do not grow in proportion to yield, one should expect land prices to vary in accordance with the yield per hectare so that the surplus relative to weaker areas is absorbed in the form of higher land rents. This hypothesis is borne out by the facts. In Graph 3, the variation of land prices with yield per hectare for barley is illustrated over a wide range of output levels. It turns out that agricultural land falls into two categories; in areas with extensive animal production or profitable special crops (e.g. sugar beet, industrial potatoes), land prices are higher than in areas specializing in cereals production.

The capitalization effect becomes more evident when comparison is made with Finland, where production conditions are equivalent to those of central and northern Sweden, but grain prices were about twice as high in 1989 (SKR 2,67 as compared with SKR 1,39 per kg). At 3 tonnes per hectare, land price in Sweden was about SKR 10 000 per hectare, at 2,2 tonnes per hectare, it was about SKR 3 000. The corresponding prices in Finland are given in Table 5.

Table 5

Land prices in Finland versus yield per hectare for barley (1989)

	Yield/ha (tonnes)	Land price (SKR/ha)
Southern Finland	3,0	45 000
Central Finland	2,4	30 000
Northern Finland	2,2	22 500

Source: Board of Agriculture, Finland.

Similar effects are observed when agricultural prices change drastically. Real land prices in England and Wales rose by more than 50% when the United Kingdom joined the EEC.[1]

[1] Bowers and Cheshire (1983), based on MAFF statistics.

The obvious conclusion from these comparisons is that farm incomes cannot, in the long term, be influenced by administered prices; they are determined by the farmers' own requirements on wages and rate of return on capital. Any revenue above this minimal required level is capitalized in the land price and accrues to present landowners only.

3.5. Environmental goals

Environmental goals can be divided into three categories:

(i) limiting the negative external effects from agricultural production;

(ii) maintaining the productive capacity of agricultural land;

(iii) safeguarding certain biotopes which are dependent on agricultural production.

These goals were established for the first time in 1985. Certain measures designed to contain the negative spill-overs — upper limits on cattle density, catch crops, etc. — have been taken quite recently. The effects are not yet fully observable because of the inertia of the production system; less than 10% of nitrogen leakage in a given year is estimated to emanate from the nitrogen input in the same year.

The most serious effect of overfertilization is the eutrophication of lakes (mainly phosphates) and coastal waters (mainly nitrates). The efficiency of the nitrogen balance (nitrogen harvested compared with nitrogen input) has decreased substantially over the last decades; from 80% in the 1950s to 50% today. Increased inputs are not the sole cause of increase in nutrient leakage; the drainage of wetlands and the straightening of ditches have augmented the average water-flow rate, thereby hampering the natural denitrification processes that transform nitrates into harmless nitrogen gas. The contribution from agriculture to the total outlet to coastal waters that can be influenced varies from almost zero in the northern regions to 60% in the western parts of Sweden.

Nitrogen contamination of groundwater is a serious problem in certain areas. About 100 000 Swedes are estimated to be drinking water with a nitrate content above the health standard of 50 mg per litre.

Pesticide contamination has been observed in both surface water and groundwater. There is evidence of negative effects on the wild flora and fauna, and also when contaminated water has been used for irrigation. So far, the contents registered have not reached levels believed to be hazardous to human health.

The productive capacity of the soil is influenced by a number of factors, of which some are controlled by the producer, while others are not. Acidity, for instance, is a result of natural weathering processes, acid precipitation, fertilizing, and harvested volumes. The acidification effect from agricultural crops or energy plantations, measured in calcium oxide equivalents (kg/ha), is about twice as high as from forest plantations, due to both larger biomass volumes extracted and higher fertilizer input.[1]

Other long-term threats to soil productivity caused wholly or in part by agricultural practices are cadmium enrichment (about 50% originating from fertilizers), soil compaction due to heavy machines, and decreasing humus content, caused by unfavourable crop-rotation schemes. In drained soils, the natural processes of decay are speeded up, leading to a long-term reduction of the organogenic content and a decrease in yield.

The third environmental goal, contributing to the maintenance of the flora and fauna associated with agricultural land and practices, is somewhat different in character, given that it concerns a positive external effect from agriculture. A large number of plant species in Sweden which are rare or threatened by extinction are in some way or other connected with agriculture, and the same is true for certain animals (e.g. certain bird and frog species). The threat is the result of long-term changes in the modes of production. Graph 4 illustrates the changes in land use associated with agricultural development, in particular the ratio of arable land to meadows and unfertilized pastures.

Total acreage expanded until around 1930, when contraction started. The striking feature about the later development is a large-scale transformation of meadows into arable land, explained at least in part by guaranteed minimum grain prices.

Price regulation and the associated higher land value has also had detrimental effects on a microscale. Higher land prices raise the incentive for cultivating marginal land, for instance wetlands, and eliminating small obstacles such as ponds or stone fences. These are important biotope components, and their removal may indirectly cause as much harm as the direct effects from pesticides.

The process illustrated above has its counterpart in the EC in connection with the deployment of the CAP. The British experience is particularly illustrative.[2]

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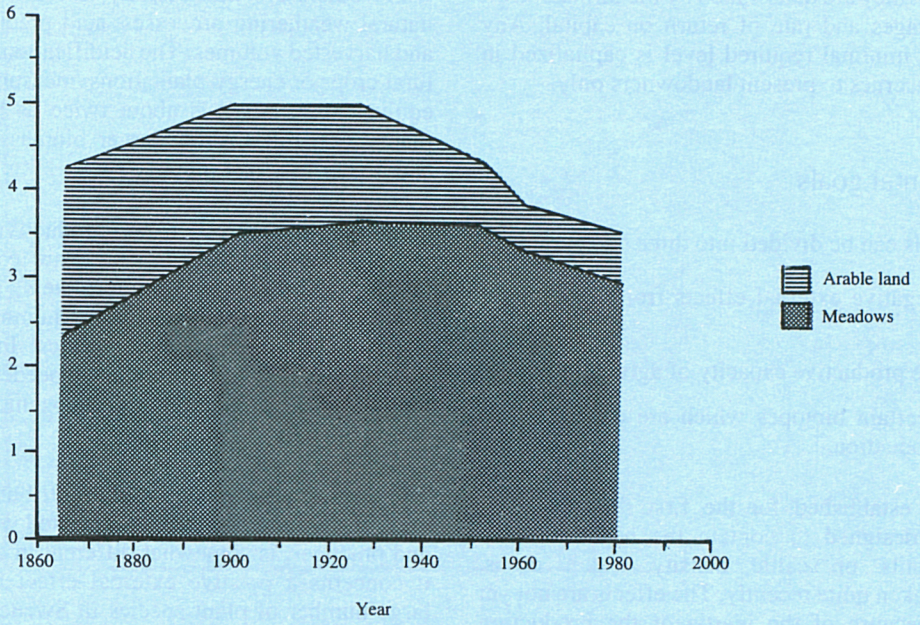
[1] Andersson (1989).

[2] Bowers and Cheshire (1983); *World resources 1987* (Chapter 4).

GRAPH 4: **Land in use in Sweden: Arable land and meadows, 1867-81 (million ha)**



Source: R. Mattson, Swedish University of Agriculture Sciences.

To the extent that high border protection has contributed to continued production where the alternative would otherwise be no production at all, the effect from the overall policy has been beneficial. On the other hand, it is obvious that providing direct subsidies to producers with particularly valuable biotopes is a more efficient means of performing this task.

3.6. Regional goals

The regional goal associated with agricultural policy is to promote regional balance by strengthening the labour market in areas with limited employment opportunities. It has also been stated explicitly that agriculture in northern Sweden should approximately maintain its relative position.

The general economic basis for rural life has changed considerably during the last decades. Classical basic industries have experienced a recession, measured in employment terms, and the services sector, in particular the public sector, has taken over as the prime source of income. In 1985, the relation was about 2 to 1 in favour of the services sector.

The development of transport and telecommunications systems has integrated an increasing part of the rural world with urban areas. For example, between 80 and 90% of the agricultural land is now located within 30 to 40 kilometres of urban areas with at least 10 000 inhabitants. This implies that an overwhelming majority of farmers have easy access to local labour markets.

The question of the efficiency of the present policy is twofold. The first is connected with the general multiplier effect on employment from subsidies to agriculture. Computations for the northernmost region in the late 1970s indicate a low multiplier for agriculture, 1,3, compared with other alternatives: 2,1 for infrastructure, 2,3 for the wood, paper and pulp industry, and 1,5 for forestry. For the extremely sparsely populated areas of the far north, the figure is even lower, because the food industry is concentrated in coastal areas. This is reflected at the micro level in the cost of creating new job opportunities in sparsely populated areas — SKR 450 000 in agriculture as compared with a general average of SKR 90 000 in 1988.

The second question concerns the effects of current policy on the balance of agricultural production as such. It has

already been noted that price support concentrates the subsidy volumes to high-yield areas. To support the production in the northern regions, it has therefore been necessary to supplement the general price support by a budget-financed, specific-price support to these regions. In 1991, this amounted to about SKR 9 000 per year and per cattle unit in the northernmost region, or SKR 270 000 per full-time farmer. Statistics on production and profitability for the 1980s indicate that the policy has been successful in maintaining the relative position of the northern regions, but at a very high cost.

3.7. Summary

A general conclusion from the evaluation is that some of the stated goals appear to have been met, while others have not, and even when the answer is in the affirmative direction, the policy is far from efficient. A simple reason for failure is that the previous policy has relied essentially upon one single means, price support, in order to achieve four or five different objectives. Unless there is considerable redundancy among the goals, this provides too tittle freedom. The obvious remedy is to play down the role of price support and to develop specific measures tailored to the high-priority objectives.

4. Main principles of reform

The long-standing international debate on agricultural reform has produced a bewildering number of suggestions and remedies. Many of these discussions have taken the status quo as a point of departure. The road followed by the parliamentary working group was to start with a discussion of possible or desirable end states, and to derive from there the short-term policy measures necessary to reach these states. The concept of 'state' should be understood to cover a set of behavioural rules rather than states in a narrow sense. Traditional policy has failed to a great extent by putting too much emphasis on produced quantities, profit levels, and other state variables.

The starting-point for the discussion is that agriculture should be subject to the same conditions as other economic activities, unless valid arguments to the contrary are presented. This does not a priori rule out the possibility of specificities that justify extraordinary treatment, but the burden of producing evidence is laid on anyone arguing for such treatment.

The aim of any productive activity is to satisfy a demand. From the previous general principle, it follows that producers should be recompensed for the production of goods and services that satisfy such a demand and for that alone.

The normal method of recompensing producers for goods produced or services performed is within the market. This implies that decisions about the transactions to take place are made by those who are directly affected by them. On the other hand, the existence of external effects will normally lead to market failures, in which case public decisions on production levels, permissible outlets, etc., are called for.

In a discussion about the agricultural policy to be pursued by a given country, the natural basis of the demand is the population of that country. To the extent that there is a foreign demand for products under normal commercial conditions, this could, of course, be added to the domestic basis.

The production of raw materials for the food industry is, and will continue to be, the central activity of agriculture. Unless there are market failures in the exchange processes associated with this production, prices that clear the domestic market provide an upper limit for the remuneration to producers. External effects associated with this productive activity are (possibly) food security, environmental services, and employment opportunities in rural areas. These are some of the so-called 'non-economic' objectives of agricultural policy,[1] which are of course to be treated like any other public goods or services. The negative external effects associated with agricultural production, on the other hand, should be penalized in accordance with the generally accepted 'polluter-pays' principle. The income goal cannot be interpreted in any other way than indirectly; that is, the income goal is satisfied when goods and services are produced to the extent required by the consumers (again anticipating the discussion of the following section). Finally, the general efficiency goal simply reflects the self-evident requirement that the other objectives should be satisfied using a minimal amount of scarce resources.

5. The principles at work

The present section implements the programme sketched above. The central role of agriculture — to supply raw materials for the food industry — is analysed against the background of the specificity-of-agriculture hypothesis. This is followed by discussion of the public goods aspect of agricultural production — food security, environmental services and regional-policy-related contributions. The section

[1] Winters (1990).

concludes with a more technical discussion of various possible bases for remuneration and their implications for the efficiency issue.

5.1. Food products: Is agriculture specific?

The arguments for special treatment of the agricultural sector in the capacity of a raw materials producer are based on the idea that the sector has certain characteristic features that lead to market failures, more precisely to a permanent, unfavourable rate of return on the production factors used. Such alleged characteristics are associated either with production as such, with its economic and financial aspects, or with more casual factors connected with a particular historical situation. The first category of arguments stresses the fact that production is bound geographically. The second category focuses on the small scale of the average enterprise, its capital requirement, special market characteristics, or alleged anomalies in the supply behaviour of the producers. The third type of argument is tied to the special problems that may be experienced in a sector with a more or less permanently contracting labour demand.

5.1.1. Process and product characteristics

The fact that agriculture is based on biological processes has implications for the variability of the production process. Harvesting conditions vary from year to year, and are sometimes drastically affected by, for instance, hailstorms. In the absence of market regulations, prices and quantities will exhibit countervariations that affect the net revenue. In a system with fixed prices, quantity variations are not dampened.

Uncontrollable weather effects are by no means unique to agriculture. The tourism industry, ski-lift owners, fur-coat dealers, and transport companies that receive part of their income from snow-clearance work are all examples of enterprises that are highly sensitive to weather variations. Recently, four mild winters in a row in Sweden have caused great problems resulting in bankruptcies in these sectors. The annual variations in the agricultural sector are, in fact, relatively modest at the national level — cereals harvests exhibit a standard deviation which is approximately 10% of the mean. Local variations may be greater — a hailstorm may hit one farmer but leave his neighbour unscathed — but in this case the statistical basis for a risk assessment is quite strong.

Farmers are generally known for being risk-averse,[1] and have traditionally found various methods of absorbing economic risk. This is reflected in the frequency of bankruptcies given in Table 6 below. It shows the relative number of bankruptcies in a number of sectors dominated by small enterprises. The figure for agriculture, forestry and fishing (which is totally dominated by agriculture) is exceptionally low and amounts to approximately 10% of the average for other sectors.

Table 6

Relative frequency of bankruptcies in certain sectors in Sweden dominated by small enterprises

(%)

	1989	1990
Agriculture, forestry and fishing	0,16	0,17
Manufacturing, other	1,09	1,30
Construction	1,51	1,93
Wholesale trade	2,43	3,24
Retail trade	2,01	2,62
Restaurants, hotels	2,41	3,78
Road haulage	1,51	1,97
Business services	1,23	1,55

Source: Statistics Sweden.

In the first place, what is interesting to the single producer is a relatively stable revenue, not a stable price, and already this observation questions the relevance of almost-fixed administered prices. Probably the single most important stability-enhancing factor among Swedish producers is the income flow from other sources. Collectively, Swedish farm households receive around 30% of their total income from agriculture, the other main sources being forestry, contracted work, and salaried work.

Insurance against bad harvests or complete failures has traditionally been subject to subsidization. The Crop Insurance Fund was administered by the government until the late 1980s, when it was privatized; it is now managed by the Federation of Swedish Farmers.

Whether less-drastic variations, associated with normal annual fluctuations, call for public intervention is a different question. The Swedish experience gives little information, given that prices have been under political control for more than half a century. The situation is somewhat different for animal and for vegetable products. In the former case,

[1] Binswanger (1980); Hazell (1982).

fluctuations are on the whole man-made, and in principle predictable. In the latter case, weather conditions are a main source of variation. This makes them largely unpredictable, but there is, on the other hand, a sound actuarial basis for the supply of insurance services.

In the absence of countermeasures, the domestic price may, in principle, fluctuate between the level given by the border protection and the world market price, and the average price determines the long-term revenues of the producers. Variations in the world market price are difficult to predict, and this calls for substantial financial strength in the insurance agency. The question of the appropriate form for the supply of such services is discussed further in Section 6.5.

Concerning the general need for public intervention, it should be observed that the same type of variations as exhibited by the agricultural sector have not been considered a legitimate reason for intervention in the other abovementioned sectors.

A different aspect of the production process is the existence of production lags. Often a year elapses after a decision on a production expansion is taken before it results in an actual output increase. But this is no more than variability unique to the agricultural sector. In fact, lags are the rule rather than the exception. Investments in machine capital bind resources whether they are used for production or not. An extreme level of inertia is exhibited by the forestry sector, where the producer normally does not live to see the harvest occurring 60 to 80 years after plantation. None the less, this sector manages to live under world market conditions, and a few thousand farmers in Sweden earn their living from forestry alone.

A related problem is that some products are difficult or impossible to store. This is the case for most animal products, but less so for vegetable products. But the same can be said about products from the horticultural sector, where market intervention is limited to a relatively modest tariff during the harvest season.

Common to all raw material industries is that the products are relatively anonymous. This makes it more difficult to exploit trade marks, quality stamps, etc. Again, the most important raw materials producer in Sweden, the forestry sector, is not subject to market regulations for this reason. Further, the relative rareness or absence of such trade-mark products is, to a considerable extent, a direct consequence of the market regulations. There exists a system of quality-related payments to the primary producers based on protein or fat content, but this payment bears little relation to the quality dimensions appreciated by the final consumers.

5.1.2. Economic and financial characteristics

Farms are small enterprises. In Sweden; 151 000 enterprises out of a total of 162 000 in 1988 had less than 20 or no employees. Out of 3,3 million employees in the corporate sector, 1,9 million worked in such small companies. According to a widespread belief, farms are exceptionally capital-intensive and are therefore more vulnerable than the average small enterprises. To establish oneself as a full-time farmer, one currently needs about SKR 1 million as a tenant and SKR 2 to 3 million as an owner-cultivator. This can be compared with other typical assets in small enterprises. As shown in Table 7, the comparison is restricted to the larger farms that are run in the form of legal personalities; this seems to be the most relevant group for comparison given their more businesslike character.

The conclusion drawn from Table 7 is that the agricultural sector is not particularly capital-intensive, whether measured by average capital assets or by the capital-to-labour ratio. There is a difference between farms managed as legal personalities and the majority of farms in that the latter are personally responsible for losses, whereas the responsibility of the former category is limited to the company. This difference is more formal than real, however, because small entrepreneurs are normally de facto guarantors of the bank loans to their enterprises.

A different line of argument concentrates on the interaction between buyers and sellers in the markets for agricultural products. The number of primary producers is large compared with the number of buyers, which is supposed to create an unfavourable asymmetry between the two parties. On the other hand, the history of the producers' cooperative movement shows that there are no prohibitive barriers to entry for new agents among the buyers. Part of the problem with the present Swedish situation is that the cooperative movement now dominates to the extent that most producers have only one buyer as well as one supplier of inputs. It is true that the typical farmer is one of the owners of these enterprises, but this partial ownership is no guarantee for harmony of interests. In the forestry sector, the balance between cooperative buyers and other agents is more conducive to a normal functioning of the market.

A related idea is that particularities in the production system or in the psychology of the average farmer should generate a negative, that is a strongly anomalous, relationship between

Table 7

Capital assets, own capital, and capital divided by labour costs (C/L) for the average enterprise in certain sectors dominated by small enterprises in 1988

	No of enterprises	Average capital	Average own capital	C/L
Agriculture forestry, hunting and fishing	5 878	3 288	640	4,47
Wood and wood products	3 630	11 369	1 932	4,04
Manufacturing, other	524	4 334	802	2,53
Construction	11 446	9 369	1 259	2,78
Retail trade	33 033	3 432	371	3,22
Retail trade, everyday commodities	11 109	1 197	102	1,67
Retail trade, cars and fuels	4 898	9 135	763	6,10
Restaurants and hotels	6 857	1 916	125	1,25
Road haulage	8 463	3 416	257	2,18
Repair, laundry and other service	6 927	1 500	141	1,99
All sectors, enterprises < 20 employees	150 905	11 182	2 095	4,61

NB: Capital values are based on assessment for taxes and considerably below market values. Labour costs are actual (1 000 SKR).
Source: Statistics Sweden.

price and supply, so-called 'perverse supply curves'. There is overwhelming empirical evidence against this hypothesis.[1] For example, Swedish milk production decreased tangibly in the late 1960s when real prices decreased, and soared again when the price level was restored in the early 1970s. The transformation of the Community from a net importer to an important exporter after the launching of the CAP is another example; the British experience is particularly illustrative in this respect. The examples put forward in support of the hypothesis are normally explained by previous market interventions — thus the dismantling of milk quotas can be expected to generate a simultaneous price decrease and production increase — and are consequently illustrations of perverse market conditions rather than perverse supply behaviour.

5.1.3. A particular historical situation

The agricultural sector is contracting when measured by manpower and also when output value is related to GNP. This is again assumed to create an unfavourable situation for producers. Whether this is true or not depends on the mobility of production factors. Capital is certainly mobile; some SKR 4 billion was invested anually in the agricultural sector during the 1980s. There is also clear evidence that manpower is mobile; the fact that farm households now receive a large percentage of their income from other sources is proof enough. An increase in educational standards and geographic mobility has opened up new labour markets for farmers, which were not available half a century ago. This, together with a difference in the relative importance of the agricultural sector, is perhaps the main difference between today's options and those available in the early 1930s; and this is also the reason why the solution of yesterday, explainable though perhaps not commendable, has lost much of its relevance.

Another important fact is that current policy has, to a considerable extent, stimulated production increases. This is an indisputable effect of the CAP in the Community and of the 1977 agricultural policy decision in Sweden.

5.1.4. Summary

An examination of the support for the hypothesis of specificity of agriculture shows that all the features exhibited by this sector can be found to a varying degree in other

[1] Mundlak (1985); Paarlberg (1988).

sectors, and these sectors have functioned well without the far-reaching regulatory machinery used in the agricultural sector. In some cases, the effects are more obvious than in other sectors. The examples that come closest are perhaps the forestry and the horticultural sectors; of these, the former functions under normal world market conditions, and the latter is sheltered by modest tariffs ranging between 10 and 20% during the harvest season. The conclusion seems to be that the specificity-of-agriculture argument cannot be sustained when confronted with facts.

5.2. Public 'goods': Food security, environmental services, regional distribution

The measures needed to ensure a sufficient production level of public goods such as food security or environmental services are highly dependent on the size of the production apparatus. It was concluded above that a domestic price level resulting in self-sufficiency is an upper limit on the consumers' valuation on the products. If the domestic price level is set lower, a smaller sector will result, and specific security-related measures or payments for environmental services can be expected to become more important. There is consequently a trade-off of consumers' and taxpayers' expenditure.

Obviously, payments for public goods should be seen as a complement to payments for market-supplied food products. The bulk of the total payment is market-based, and the other sources relate only to public goods production above levels naturally supplied jointly with market-related agricultural production volumes.

In order to reduce the risks of abuse, programmes related to public goods should be based, as far as possible, on operative and transparent objectives and indicators.

5.2.1. Food security

An optimal design of food-security measures, taking into account both the peacetime costs of an oversized sector and the costs of specific security measures, has been discussed previously.[1] The calculations are based on standard scenarios for defence planning and average menus designed with respect to calorie requirements and other nutritional restrictions. The standard method of increasing efficiency during a crisis is to reduce the role of animal products and to increase correspondingly the intake of vegetables. It turns out that the lower limits on the peacetime production apparatus set by security restrictions are rather low; an acreage of 2 million hectares is sufficient as compared with the current 2,8-2,9 million hectares. The result is rather robust with respect to variations of parameters such as the peacetime cost per hectare of a land reserve or the assumed length of crisis. The security value of an average hectare is SKR 50 (ECU 6 to 7 ECU) per year.

The above calculations concern the aggregate characteristics of the sector. For particular products such as rapeseed, specific measures are required.

In recent years, the concept of food security has been extended to cover also resistance to threats of a non-military origin. They may be associated with global ecological change, such as the greenhouse effect, or with regional environmental stress emanating, for instance, from acid precipitation. Some problems are purely local in character, such as soil compaction or cadmium enrichment. Whatever mechanisms and effects are involved, it is clear that these threats to productive capacity operate on a slower time-scale than the conventional security-policy-related threats, and that planning measures against the latter type also provide security against the former.

If insurance-type restrictions on land use are considered necessary to hedge against long-term threats, they should be concentrated on irreversible changes. Precautionary measures could be justified concerning the removal of the topsoil layer or building on agricultural land. Forest plantation, on the other hand, implies no irreversible change to long-term productivity and may, in fact, be beneficial.

5.2.2. Environmental services

Environmental services connected with agricultural production are of two different kinds. The first concerns rather well-defined and delineated biotopes, housing rare species or combinations of such. The second service is associated more with everyday landscape values, appreciated by travellers or local dwellers spending part of their spare time outdoors.

As a basis for public intervention in supplying services of the first kind, the National Environmental Protection Agency has been engaged in drawing up field-research-based species inventories for several years. The most valuable biotopes are located and comprise about 300 000 hectares of meadows, forest meadows, etc. The Central Board of National Antiquities has also contributed, using somewhat different criteria when singling out the most highly valued agricultural land. These databases satisfy the conditions of meeting objectives and well-defined criteria of selection.

[1] Molander (1988).

The second type of service — preserving a varied and open landscape — may appear somewhat exotic to a Community citizen, but, none the less, warrants strong support, in a country where the share of agricultural land is 9% of the total area, as compared with an average of 60% for the European Community. There are, of course, no scientific criteria on which to base this service, given its aesthetic character. Attempts have been made to estimate the public demand for this type of service using contingent valuation, but all such surveys are of limited value given that they are applied to a very limited number of issues.[1]

This type of service is not costly; if the only objective is to prevent a spontaneous reforestation of the land, the maintenance costs are of the order of SKR 400 to 500 per hectare per year.

The second type of service is much more localized than the first. About three quarters of out-of-town travelling is local or regional,[2] and also leisure activities tend to be localized near the place of residence. This makes the financing of the second type of landscape service mainly a concern for the municipality or possibly the county council. This may have a restraining effect on expenditure, which to some extent compensates for the absence of scientific criteria. By contrast, species conservation and preservation of first-rate habitats are naturally in the national interest and should be financed over the federal budget.

5.2.3. Regional policy

As emerges from the previous evaluation (Section 3), there is no reason to treat agriculture separately from other sectors if the objective is to support economic activities in weak regions. On the contrary, earmarked support exhibits a substantially higher average cost of supplying new employment opportunities. An immediate conclusion is that regional policy instruments should be general. The most natural candidate to replace agricultural support is an existing investment subsidy to sparsely populated areas. It is a very flexible instrument, which may, in principle, accrue to agricultural production or small-scale food processing such as mini-dairies, should such projects prove to be the most effective in a given situation.

5.3. Public 'bads': Environmental damage

According to the 'polluter-pays' principle (PPP), environmental effects from producers' activities should be penalized to a degree determined by the damage experienced by the persons affected. The total penalty is a priori unrelated to the costs of reducing or eliminating the effects in question, but in case such costs are low compared with the damage done, pollution abatement is, of course, an attractive alternative.

The application of the PPP in practical situations raises a number of problems. Revealing the true damage experienced by others is a problem of the same character as revealing the true demand for public goods. Estimates based on contingent evaluation can obviously be questioned on the same grounds in the former case as in the latter. Such a survey has, in fact, been carried out in Sweden, relating to the contamination of drinking water from nitrogen leakage; incidentally, the total damage estimated by consumers is of the same order of magnitude as the value attached to the environmental services supplied by the agricultural producers, but this probably tells more about the method than about real preferences.

In practice, environmental charges must be designed following a much more pragmatic course. Damages are estimated on the basis of scientific evidence, and charges are set using more or less well-founded ideas of producer sensitivity to price changes. Because such sensitivity will normally depend on the context and the product affected, the level should be chosen with respect to the main pollution sources relative to a given substance.

In the agricultural sector, environmental charges are used for pesticides and fertilizers. These economic instruments have been combined with other measures, and it is difficult to estimate the contribution from charges alone to the reduction in volumes that has taken place during the 1980s. The matter is further complicated by the hybrid form of the fertilizer charge; part of the money levied has been used to finance unprofitable cereals exports and thus stimulates, the use of fertilizers, while at the same time penalizing them. On the whole, it is difficult to decide whether agricultural production does pay its own environmental costs.

5.4. Instruments of support

The simple principles established in Section 4 enable a more structured discussion of the bases for payments to producers in the agricultural sector. Natural as they may appear, they generate some important conclusions concerning the present and future instruments of agricultural policy. For instance, the widespread use of more or less permanent set-aside or fallow systems is not compatible with the basic principle, given that they are based on payment for non-production and not for production.

[1] For a general critique of contingent valuation surveys, see Kahneman and Knetsch (1991).

[2] *Source:* Swedish Board of Transport.

Concerning the core activity of farming — producing raw materials for the food industry — market control is sufficient to warrant an efficient allocation of resources. The payment is not specified by this condition; only an upper limit is given by price leading to an equilibrium in the domestic market. The lower limit is given by the world market price, but it is quite clear that this level of remuneration will not be attainable within the near future, even if it is considered it to be a desirable long-term goal.

Defining the appropriate level between these two extremes — an open market operating at world market prices, and complete autarky, respectively — is a genuinely political issue. The main conclusion from the established upper limit is that export subsidies are very difficult to justify.

Whenever a price level above the world market price is chosen, this raises the problem of filling the gap between the world market price and what is judged to be a reasonable payment to domestic producers. Traditional Swedish policy, like the CAP, relies essentially on variable import levies, whereas the US system places the main burden on the taxpayers. In the international discussion on agricultural policy, much energy has been devoted to finding non-distorting support systems. It must be recognized, however, that all support systems are distorting in one way or another, to a greater or lesser degree. Income insurances and other labour-related systems promote the use of labour, acreage support promotes the use of land, etc. If there were such a thing as completely decoupled support, the question would arise as to why the category 'farmers', and no other should be supported.

It is true that price support is not an accurate support method. An estimate of the leakage based on Swedish data shows that only 40 to 50% of the consumer sacrifices actually reach the farmers.[1] On the other hand, budget transfers are associated with dead-weight losses from tax extraction. Estimates relating to Sweden in 1979 (Hansson, 1984) yield welfare losses of the same order of magnitude for such transfers, using the most important tax instruments and given the present level of government expenditure. The excess burden should be somewhat lower at present, following the extensive tax reforms. The conclusion seems to be that there are no automatic and substantial welfare gains to be made from a massive transition from classical price support to direct income support. Other reasons, such as the environmental gains from less-intensive land use, may of course be advanced for such changes. The change from an implicit to an explicit redistribution system may also be beneficial.

[1] Nordisk Ministerråd (1989), based on Fahlbeck (1989).

Whatever course is chosen for general agricultural support, there remains the problem of administrating payments for public goods production. Whether the issue is to maintain a land reserve for food-security reasons or to manage certain biotopes or landscape segments, the problem amounts to securing a certain activity on agricultural land that would otherwise be taken out of production. Payments may be tied to production factors, for instance land or cattle units, to labour input or to income; alternatively, the task could be specified in a contract between the State or municipality and the producer.

All solutions have their merits and drawbacks. Payments dependent on income and integrated with the general tax administration system are vulnerable to manipulation because of the possibility to transfer incomes between different rubrics in the tax assessment schemes. Agricultural income would include income from forestry, which is not desirable.

Among the production factors, land is certainly easier to handle than labour or cattle units. The latter two require elaborate administration, and payments relying upon livestock will tend to generate artificial fluctuations in slaughtering, apart from being vulnerable to fraud. Land, on the other hand, is problematic because it is not landholding as such but rather a certain activity that is desired. An acreage-based support will consequently have to stipulate a minimum requirement for the support to be paid out. This already takes us halfway towards a formal contract between the authorities and the producer.

A full-fledged contract specifying what is required from producers will remove any doubt about the precision of payments. The administrative burden is a drawback, but the services in demand will be highly standardized, which limits the administrative cost. The regional authorities in charge of environmental protection already have several years' experience of drawing up such contracts, specifying, for instance, the required number of cattle units per hectare in order to ensure the grazing pressure needed.

The general conclusion emerging from the previous discussion is, firstly, that there is no ideal solution to the remuneration problem. Secondly, concerning the bulk of the payments tied to food production, there is essentially a choice between a classical high-price solution based on border protection and a low-price solution using direct payments. There seems to be no strong efficiency argument for either of these solutions. Thirdly, the sheltered market solution, whichever form is chosen, should be supplemented by budget-financed, contract-based payments for certain services of a public goods nature.

6. Consequences of dismantling internal regulations

The results of the previous sections provide a natural baseline for the policy discussion — a free domestic market sheltered by a tariff or an import levy. The obvious starting-point for the development of an alternative policy is, consequently, an analysis of the effects of dismantling the domestic market regulations. The need for supplementary measures should be decided once this baseline solution has been formulated.

The core of the system of internal regulations is, of course, collectively financed export subsidies. This is what makes it possible to maintain a domestic price level that is relatively independent of production levels. Over the decades, the system has developed a number of ramifications tailored to specific producer needs. Most of these are of minor importance when compared with the export subsidy system, and the discussion will be limited to a small selection.

6.1. Effects on competition, supply, and prices

In domains where a net import exists, the dismantling of internal regulations will have little or no effect. But in most of the regulated product areas, Sweden has been a net exporter and the producers have consequently been dependent on export subsidies.

Theoretically, the removal of collectively financed export subsidies in the presence of a surplus leads to an equilibrium on the domestic market with a price level below the administered one. Special circumstances may yield other outcomes, and, in many cases, it is difficult to make a forecast even for the medium term. Depending on what the antitrust legislation permits, producers may try to establish a private organization performing the same task as the previous official regulating bodies. In Sweden, with the traditionally very strong position held by the producers' cooperatives, this is, in fact a most likely outcome, unless legislation bars this possibility. Even if horizontal price agreements are precluded by law, there is always a possibility that all the producers' cooperative enterprises in a product area will merge, thus effectively disarming the antitrust regulating agencies.

From the producers' point of view, a cartel is the producer of a 'public good' — a higher price. In theory, cartels will not survive if producers behave rationally and reap the benefits of a higher price without contributing to the costs of maintaining it via export subsidies. But in oligopolistic or near-monopolistic markets like the Swedish ones, the producers' cooperative movement can play the role of a coordinator, tacit if necessary; the producers are a favoured group in Olson's terms.[1] Further, the cartel need not cover the whole market. The price regulation in the egg market has persisted although in the past only 60% of the product flow has entered the formally regulated market; small producers have borne only part of the costs of maintaining the target price.

Assuming that the necessary measures are taken, a domestic equilibrium price will be established. The consequences of this lower price will, of course, vary with product-specific factors such as supply/demand relations before the change, price elasticities, interaction between cereals and animal production, etc. This is treated succinctly below. There will also be a deeper, long-term effect on price formation. Without the periodically recurring opportunities for price changes, the inflation rate can be expected to decrease. The suppliers of inputs to the agricultural sector, again dominated by the cooperative enterprises, cannot expect that their price increases be automatically forwarded to the consumers and must expect a tougher negotiating situation. As indicated above, the same inflation rate in the food sector during the 1980s as for consumer goods in general would have reduced expenditure on food by SKR 5 to 10 billion at the end of the decade, which corresponds to about 1% of total private consumption.

6.2. Consequences in previously regulated product areas

In this section, it is assumed that domestic deregulation does, in fact, lead to an ideal market, which is cleared at equilibrium and quantities.

The total average yield for cereals, compensating for the fallow programme of the late 1980s, is about 6 million tonnes, of which 1,8 million tonnes have to be exported. This is in terms of volume, the largest relative surplus of any product area. An adaptation to domestic demand would require an average price decrease of SKR 0,20 to 0,30 per kg, or 15 to 20%. The optimal average production volume is somewhat below self-sufficiency, because of the high costs associated with exports. Price fluctuations between years would be large — the limits being the world market price and the same price plus the import key — if producers took no countermeasures, which is, of course, highly unlikely (see Section 6.5).

The problems of establishing and maintaining a functioning cartel are substantial. There is a large trade in coarse grains

[1] Olson (1965).

directly between the producers and the consumers in the animal production sector, and this volume can be expected to grow should contributions to the export funding become voluntary. The situation is somewhat different concerning wheat for human consumption, because single producers have difficulty in meeting the quality requirements of the milling industry. In a deregulated system, the primary producers would normally try to secure an outlet for their produce, and the use of contracts, hitherto limited to special qualities and rather small volumes, could be expected to spread.

The elasticity of demand for cereals is small, although large price changes would have effects on feed mixtures. In years of surplus, a domestic spot market would establish itself beside the regular market.

There would be noticeable effects on production methods.[1] In the short term, the optimal use of fertilizers is reduced by 10 to 15 kg per hectare, and pesticide use is similarly affected. Crop-rotation schemes, which include nitrogen-fixing herbage and reduce the relative volume of cereals by one third, turn out to be competitive in the analysis. This suggests a much larger reduction in intensity. Price reduction would also force input prices to fall and approach normal European levels.

The price level of oleiferous plants is closely tied to that of cereals, because they are integrated in the crop-rotation schemes and, to some extent, substitutes. Even if Sweden is not a net exporter, historically about 60% of a standard yield has been exchanged for the same volume, for quality reasons, at a substantial cost. The dismantling of the market regulation for oilseeds as a feedingstuff has increased, but the feed value is not deemed to be sufficient to justify production for this purpose alone.

The potato market is balanced and would not be greatly affected by a deregulation. Potatoes for starch processing are dependent on subsidies, however, and removing these would lead to a substitution by subsidized potato starch from the Community, or rice starch from developing countries.

The sugar market has also been relatively balanced in recent years, in spite of a parliamentary decision that 10 to 15% of the market should be open to imports from developing countries. Both the sugar and the starch industries are pure monopolies, implying that at least the price level given by border protection will also obtain. This opens the way for windfall profits in the industry in connection with a deregulation.

[1] See Andersson et al. (1991) for a recent survey.

Among animal products, the dairy sector exhibits by far the most complex regulatory system. Dismantling internal regulations would not only oblige the producers to adapt production volume to domestic demand, but also require price readjustments among products. The traditional monopoly pricing has led to an artificially high price level for consumption milk, whereas butter, cheese and milk-powder have been artificially inexpensive. In a free system, prices would, in the medium and long term, have to reflect production costs. Apart from the general principles that can be advanced in favour of such a change, this would also be beneficial from a nutritional point of view.

Direct food subsidies to milk production were abolished in connection with the tax reform; this also affects expected consumption patterns. It is estimated that the short-term adaptation, resulting from dismantled export subsidies, corresponds to 5% of the pre-reform production, whereas long-term adaptation, including the effects of dismantled food subsidies, lies between 10 and 15%. This reduction is of the same order of magnitude as the reduction that occurred between 1985 and 1987, when milk quotas were introduced.

The beef market has been in a state of equilibrium for some years, and no problems have been foreseen as a result of deregulation as such. Dismantling milk regulations might lead to a temporarily higher supply level when dairy cows are slaughtered at a higher than normal rate. Pork production in the period 1988-89 was about 10% above domestic consumption. A price reduction on cereals lowers production costs, which stimulates demand. The overall net effect is estimated at −2 to 3%. There are some seasonal variations, the effects of which are difficult to forecast; the skill of producers in following these fluctuations will be decisive. In any case, the effects of deregulation would be less than the reduction in pork production between 1985 and 1987, which amounted to 45 million kg.

The market for poultry has been relatively balanced in recent years, partly as a result of self-imposed production limitations. The egg market has suffered from intermittent oversupply. The price levels are high by European standards, but would not be much affected by deregulation.

6.3. Effects on food security

The size of the production apparatus resulting from the dismantling of the internal regulations is, with few exceptions, sufficient to meet security needs, as defined with respect to the standard scenarios of defence planning. As it is difficult to predict the number of hectares, dairy cows, etc. associated with domestic market equilibrium, the responsible

agency should follow the development closely and suggest relevant measures, i.e. stockpiling of strategic inputs, when necessary.

The production of oilseeds is the single branch where it is possible to conclude ex ante that supplementary measures would be necessary. If the total production volume is reduced to one half of the historical average, the average fat intake during a crisis is considered to be too low, particularly for children. Because the stockpiling of oilseeds is difficult, a lower limit for the production volume at 75% of the historical value has been recommended.

There are also regional aspects on the production apparatus connected with defence planning. Because the transport sector will be a bottleneck during a crisis, a certain primary production volume and a food industry is desirable in the northern regions. This is an argument in favour of support to these regions, although not at the levels reached in recent years.

6.4. Effects on land use and the environment

The precise effects on land use are difficult to forecast. The cereals surplus in a narrow sense corresponds to about 400 000 hectares using historical average yields, but given that poorer land will be taken out of production first, the figure, *ceteris paribus,* should be larger. Reductions in animal production also effect the demand for land. However, a land surplus will reduce the marginal value of land and lead to a different trade-off between land, on the one hand, and fertilizers and other production factors, on the other. The price decrease on products also calls for a lower intensity. The myopic displacement of the optimum gives a lower yield, between 5 and 10% and a corresponding demand for land.

More important is that lower product prices benefit crop-rotation schemes based on nitrogen-fixing plants and grass. One such scheme, which uses two thirds of the standard fertilizer input and yields approximately two thirds of the standard grain output, has been investigated,[1] and found to be competitive when compared with more grain-intensive schemes. If such crop-rotation schemes were generally implemented, land surplus would virtually disappear.

In the long term, other more far-reaching changes can be expected, for example, plough-free cultivation. But even the modest change of the crop-rotation scheme apparently eliminates much of the land surplus and puts arable land to socioeconomically more efficient use.

The environmental effects of the above changes are obviously beneficial. Nutrient leakage and contamination is drastically reduced. What happens to the acreage that is taken out of food production depends on the alternatives. Most of these are unfertilized, including permanent fallow and spontaneous reforestation. Energy plantations are an exception, being comparable with grain production with respect to both nitrogen leakage and acidification.

A secondary effect of new production schemes is an increase in optimal scale. Traditionally, most scale advantages in grain production are exhausted at around 300 hectares. The analyses by Andersson et al. (1991) indicate that increasing returns to scale persist up to 400 to 500 hectares with the expected new cost parameters. It is an open question whether these gains would be realized via mergers or via networks of cooperation established at the farm level. It is to be expected that the process in which marginal land, such as meadows and forest meadows, is taken out of production is not halted. This calls for direct support to farmers who have valuable biotopes to be kept for reasons of species conservation.

6.5. Effects on income and employment

A direct transition from a regulated to a deregulated market causes price decreases in all branches where production is greater than domestic demand at current prices. This calls for a transition period during which the necessary adaptation takes place. But once equilibrium is reached and new prices on production factors have been established, the average remuneration to the production factors, including labour, is sufficient as long as there are alternative uses or employment. Income variations may still be a problem, however, and methods of stabilization are discussed below.

6.5.1. Income variations

As previously indicated, income stabilization rather than price stabilization is the central issue for the individual producer. The fact that the average farm household now receives about 70% of its total income from sources other than agriculture obviously reduces the need for stabilization among most of the producers.

An important question is whether insurance against undesirable variations should be sought at farm level or higher. The unusually strong position held by the producers' cooperatives in Sweden opens the way for uncertainty at the cooperative

[1] Andersson et al. (1991).

level. Solutions at national level come rather close to classical supply regulations and run the risk of reiterating the traditional mistake of trying to stabilize at too high a price level.

Contracts and small-scale stockpiling are stabilization instruments which are already being used at farm level, and contracts, in particular, could be assumed to gain wider acceptance in a deregulated market. Contracts could specify acreage or quantities. In the latter case, the producer would have to reinsure himself against a low yield, either by cultivating a larger acreage or by subcontracts. It appears to be easier for the buyer, i.e. the foodstuff producer or the mill, to handle this insurance activity.

More sophisticated instruments, such as options, are widely used in the financial market but have not been in demand in the agricultural sector so far. It is questionable whether the average grain-producing farm is large enough for options to offer a suitable insurance instrument, but groups of farms or the producers' cooperatives certainly form sufficient bases.

At the cooperative level, supply-regulating activities offer other possibilities. Exporting surplus quantities is preferable to stockpiling if the difference between the domestic price and the world market price is small enough. As indicated above, the fact that exports imply costs to the exporter but benefit all producers is not in itself sufficient to exclude it as a possibility. If one or a few traders are dominant enough, the private benefits may outweigh the costs.

If producers are allowed to organize a formal cartel, stabilization becomes even easier. But then the situation is very close to the traditional one, and nothing much is gained. Another possibility is to allow for a formal cartel but require that this be organized in the form of a joint-stock company. Such a construction reduces the possibilities of permanent deficits from exports, and limits the activities to absorbing fluctuations between years. The compromise solution finally settled upon was that grain exporters and importers should be allowed to handle traded quantities collectively in order to exploit possible returns to scale in the trading activity as such, but that the financing should be kept separate between the companies engaging in such activities.

6.5.2. Effects on employment

The total average surplus during the second half of the 1980s, excluding the effects of production control systems, corresponded to 7 000 to 8 000 man-years in the primary sector and 5 000 to 6 000 in the food industry and input sectors. Given the historical inflow of 2 000 new farmers each year, an adaptation of production to domestic demand over a transition period of four years would correspond to a zero inflow. While this is no forecast of the actual course of development, it none the less gives an idea of the order of magnitude of the change.

Traditionally, the forestry sector has been one of the most important suppliers of supplementary employment opportunities in rural areas. The estimated potential for more intensive forest management is 3 000 employment opportunities on a national basis, which would eventually lead to 2 000 to 5 000 new employees in cutting, depending on the degree of mechanization. Supposing that 100 000 hectares of agricultural land were transformed into woodland, the employment potential would contain another 300 to 400 man-years. Other land-use alternatives, such as energy plantations, could be expected to generate 500 to 1 000 new jobs.

The most important alternative occupations would otherwise be found in other sectors. A recent survey in one of the southern countries reveals that 50% of the additional income sources for farm households are to be found in manufacturing and various types of mechanized service, 15% in transport and communications, and 15% in professional work.

A different activity that might turn out to be profitable is local small-scale food processing. The relevant technology is well developed and well spread in other European countries such as the United Kingdom and Spain. It is inexpensive; a few projects in Sweden have been analysed and found to be profitable, but have not been implemented due to active resistance from the cooperative movement. Because of a high degree of automatization, the need for education is limited. On the other hand, only special product niches are exploitable; the total potential for employment has been estimated at 1 000 to 2 000.

Supplementary opportunities could also be generated over the special support system for sparsely populated areas. This has so far resulted mainly in small-scale industries, tourism-related activities, etc. An expanded programme for the maintenance of particularly valuable biotopes in agricultural landscapes would also generate new employment, because certain more labour-intensive activities are necessary parts of such a programme.

The effects on the food and input industries are small compared with normal labour market fluctuations and affect non-rural areas. Between 1983 and 1987, the food industry underwent a similar reduction of 5 000 employees.

The above reduction is compensated for by dynamic effects from the lower expected inflation rate. If the inflation rate

for food were to equal the general CPI rate of increase as a result of deregulation, it has been conservatively estimated that between 5 000 and 10 000 new employment opportunities would be generated during a five-year period.

7. The reform proposal

7.1. The proposal from the parliamentary working group

The parliamentary working group presented its proposal to the government in October 1989. The group had reached consensus on the basic principles, whereas differences of opinion reigned, in particular with regard to the transitional measures.

7.1.1. Proposal for a long-term policy

The proposal for a long-term policy followed the general principles laid down in Sections 4 and 5 above. The group proposed that internal regulations should be dismantled as of 1 July 1991. The main instrument for protecting Swedish producers should henceforth be a variable import levy. The level of border protection and the instrument used — in particular the question of whether tariffing was considered desirable — was deferred to the GATT negotiations. It was clearly stated that tighter antitrust legislation was necessary to preclude producers from taking over the system of price administration. Reduced border protection was put forward as the ultimate means of warranting the necessary level of competition.

The dismantling of internal regulations was supplemented by budget-financed support to take care of the public goods aspects of agricultural production. The stockpiling of certain strategic inputs, notably fertilizers, might be necessary, depending on the resulting size of the peacetime production apparatus. Special support was proposed for oilseed production at 75% of the historical level. A conservation programme for the most valuable biotopes in the agricultural landscape was given a budget of SKR 250 million per year. The programme was to be administered at regional level, based on the inventories made or in the making, and the responsibility for coordination was given jointly to the Environmental Protection Agency and the Central Board for National Antiquities.

In order to increase the effectiveness of the regional policy, the yearly general investment support for sparsely populated areas was increased by SKR 100 million in the proposal. Regional price support to the northern regions was kept in its previous form.

The increased budget costs were estimated to lie in the region of SKR 400 million to 500 million.

7.1.2. Transitional measures

The shaping of transitional measures is critical to the outcome of a reform. Firstly, they should create no uncertainty about the target. The proposal must, therefore, contain a timetable for the various steps leading to the desired end state. Secondly, temporary support measures should aim at a maximum degree of flexibility. Cash support which is decoupled from production is to be preferred to continued price support. Thirdly, support for investments taking land out of production for the food market could be defended if they lead to semi-permanent or permanent changes in land use, such as forest plantation, but not if they require permanent payments and surveillance, as is the case for set-asides. Finally, it is necessary that the transition to a more marketlike production system takes place in socially acceptable forms. This calls for a safety net for farmers who run the risk of making large personal losses as a direct result of the reform decision.

In the proposal, the date of dismantling the traditional market regulations was set at 1 July 1991. To provide a floor for the domestic grain price during the adaptation period, the Board of Agricultural Market Regulation was to guarantee a price of SKR 0,90 per kilogram for another three years, resulting in a total period of transition of four years. This price was set on the basis of the variable cost of production in the marginal areas for specialized grain production (the plains of central Sweden), so that the average marginal producer should essentially be neutral between continued production and leaving the sector.

The price decrease was compensated for by a stepwise reduced decoupled income support, providing 75, 50 and 25% of the income reduction for the average grain producer. This support was to follow the producer, not the land.

For milk producers, a pension system was offered to elderly farmers who could be expected to have problems in finding other employment. The sum was based on historical production data and was to be paid out for a maximum number of five years or up to the age of 65. For the other animal product markets, no particular support measures were considered necessary.

A safety net was provided in the form of a financial reconstruction programme for farmers having entered the sector after 1980. In the case of an imminent bankruptcy situation, the State was to guarantee a minimum price of sale equal to the original price adjusted for investments and depreciation. This was to serve as a warrant that no individual should suffer the risk of incurring large personal debts as a direct result of the transition to new conditions of production.

In case there were State loans, it was suggested that the State should negotiate a composition with the owner in connection with other creditors.

The cost of the temporary income support was about SKR 4,5 billion. The costs of the other measures are more difficult to estimate, given that they are rule-based and dependent on producer behaviour. In any case, the income support was the dominant entry of the budget of transitional measures.

7.2. The government bill

Like all proposals for major policy changes, the plan of the parliamentary working group was submitted to a general review process ('remissbehandling'), in which interest groups and agencies affected by the proposed changes are invited to express their views. The overwhelming majority of comments were basically positive. Substantial criticism was expressed by the Federation of Swedish Farmers and another producer-oriented organization.

Based on these comments and continued discussion between representatives from the political parties and interest groups affected, the government presented its bill in April 1990. The main principles and the transition plan from the working group proposal were accepted, but the bill introduced several changes and amendments. Perhaps the major deviation from the original proposal was that the State took an active role in promoting alternative land use for surplus acreage. A lump-sum transfer per hectare, depending on average yield, was to be paid to producers who took land out of production permanently. The reorientation support was combined with investment support for certain alternatives (forest plantation, energy plantation, wetland restoration), covering 75 to 85% of the investment cost in the plains areas and a lower percentage in the forest areas.

The transition period was prolonged from four to five years starting on 1 July 1990. Grain price was successively decreased (SKR 1,30, 1,15, 1,00 and 0,90 per kg for 1990/91 through 1993/94, respectively). Income support was extended over five years starting in 1990/91 and, overall, increased by about 50%. The sum was also made partly dependent on the average yield per hectare.

In the dairy sector, the core of the monopoly pricing system was to be kept for another four years, but reduced by 50% during the last year. The export financing system, on the contrary, was to be abolished by mid-1991.[1] To take care of an expected increase in beef supply following the reduction of milk production, *ad hoc* export subsidies for beef were granted through 1992/93. Price support to the northern regions was kept in accordance with the working group proposal, but was coupled with a statement that the general level of profitability was not to decrease as a result of the reform. This paved the way for dramatic increases in this regional support in the years to come. A new form of support was introduced — a starting aid for new farmers. The (unofficial) reason given for this was that the tax reform abolished the right to deduce deficits in small private enterprises from assessed incomes.

The precise rules governing export activities following deregulation were not codified in the food policy bill but deferred to a separate bill based on work on new antitrust legislation.

7.3. The parliamentary decision

In the parliamentary decision in June 1990, further changes were made. In the commentary on the bill from the Parliamentary Standing Committee on Agriculture, the elimination of export subsidies was coupled with, but not made fully contingent upon the GATT process. However, no concrete changes in the proposed transition scheme on this point were required. Income support was lowered in favour of an increased reorientation support. It was also decided that income support should follow the land, not the producer. Reorientation support was also extended to cover annual crops for non-food production and unfertilized leyland. No investment support was granted to coniferous forest plantation, apparently for aesthetic reasons. The dairy products monopoly pricing system was prolonged for another year.

The final decision was supported by all parties except the Green Party.

[1] During its spring session 1993, the Swedish Parliament decided to re-introduce the export subsidies abolished in June 1990. The official reason given was an adaptation to the agricultural policy of the European Community.

7.4. Comment

The changes made by the government and Parliament implied departures from the original principles for the reform process. Although the basic principles of the proposal and the long-term policy were accepted by Parliament, some uncertainty about the ultimate goal was created. Successive price changes for grain instead of a total decoupling and the coupling of the income support to land rather than to producers implied decreased flexibility and larger socioeconomic costs, without improving the situation for the producers. The fact that the government was involved in the reorientation programme and, in particular, that annual crops were included, created the need for an extensive administration. It also opened up the risk of being interpreted as a form of commitment to continued public regulations, contrary to the spirit of the reform.

8. Current status

Since the reform was launched in June 1990, two important decisions have modified the picture. In the autumn of 1990, the Social-Democratic government announced its intention to apply for full membership of the European Community. This intention was supported by a majority in Parliament, and the application was presented in the summer of 1991.

The second decision concerns border protection. Because domestic price levels lowered in the establishment of a domestic equilibrium, previous levels of border protection implied overprotection, the gains of which would in most cases be reaped by the food industry. In order to forward the price decreases to the consumers, and also to make imports feasible facing the new relative prices, the government followed up by decreasing administered prices by an average of about 5%. This bill was supported by a majority in Parliament.

The results of the reforms are limited so far. The Swedish Board of Agriculture published a first evaluation in late September 1991, and the Price and Competition Board issued its first report in October. The observations given below are taken mainly from these reports.

8.1. Market development

In the markets for animal products, the adaptation process has been faster than expected. Balance was expected to be obtained during 1991/92. Among milk producers, the retreat system has been successful. The so-called milk pensions, destined for producers over 60 years of age who cease production, attracted more than 900 producers during 1990/91, corresponding to 165 million kg of milk or 56% of the previous figure. The corresponding retreat system for producers under 60 enlisted 2 000 producers with a total production of 260 million kg of milk, i.e. another 7,5%.

During the late summer of 1991, dairies had to give priority to consumer milk production over cheese. The import of cheese increased somewhat in 1991 and amounted to 15% of consumption.

For beef and pork, balance was also expected to prevail during 1991. The total production of beef was expected to decrease somewhat for 1991, in spite of increased slaughtering activities following the reduction of milk production. Pork production was assumed to decrease by 8 to 10% during 1991/92, but the price decreases were smaller than expected. During the autumn, prices showed a tendency to rise again and were, in fact, higher than in late 1990.

In the markets for vegetable products, the situation is necessarily different. Although 350 000 hectares have been enlisted in the reorientation programme, total grain production in 1991 exceeded domestic consumption by 1,1 million tonnes. The estimated average surplus was 0,9 million tonnes, or about 20%. This situation is to be expected, given that administered prices are well above variable production costs.

The production of rapeseed has decreased, as well as the contracted acreage for sugar, the latter as a consequence of an apparently temporary surplus. The potato markets have been largely unaffected by the reform. Both the sugar and the starch industries are monopolies, and the wholesale prices have not followed the price reductions to the primary producers.

The Swedish Board of Agriculture[1] has investigated whether reduced border protection, effective from 1 July 1991, has influenced prices to primary producers, and the result bears out the prediction that these prices would not be significantly affected.

According to the first evaluation report from the National Price and Competition Board, consumer prices for food are now developing at a slower rate than general consumer prices. Absolute figures are also positive. From January to October 1991, the average price increase for previously regulated products, adjusted for removed subsidies, was only + 0,1%.

[1] Swedish Board of Agriculture (1991b).

It is difficult to isolate the effect of the reform work on this picture. The reform discussion triggered by the work of the parliamentary working party has already had beneficial effects, but completely exogenous factors, such as the business cycle, have obviously been important also.

8.2. Enterprises

The number of farms decreased by 3% between 1990 and 1991, in accordance with the historical trend. The production year 1990 was unusually good because of a good harvest coupled with guaranteed prices at SKR 1,30 per kg and the first income support payments. These factors, combined with low world market prices, caused PSE numbers to soar. The gap between Sweden and the Community remains.

Investments have been significantly reduced, as could be expected. Construction activities seem to have been less affected than machine investments.

The reorientation programme, as indicated, has taken 350 000 hectares out of production for the previously regulated markets. About 10% of this acreage has been enlisted for investment support such as forest plantation, and will, therefore, be more or less permanently out of production. No statistics exist at present describing the activities on the remaining average of over 300 000 hectares.

A sample of 12% were selected in a control programme, and about 30% of these displayed such deviations from the application forms that the support will be changed (ranging from misunderstandings to deliberate fraud). It is expected that the general deviation is smaller than that of the sample.

The safety net for heavily indebted producers has not, so far, been activated. Few applications have been submitted, and all have been rejected.

8.3. Food security

The production reductions have so far not called for compensatory measures in order to ensure the production potential required for food-security measures.

8.4. Environment

Fertilizer use decreased by about 25 000 tonnes, or 10%, as a result of intensity reduction. This is estimated to have reduced total nitrogen leakage by about 2 500 tonnes. The reorientation programme corresponds to a reduction by another 500-1 000 tonnes of nitrogen. The low-intensity crop-rotation schemes do not appear to have gained general acceptance as yet, and in any case would not affect leakage figures in the very short term.

Pesticide use has decreased by approximately 10%.

The effects on the landscape are not yet visible. The process of signing conservation contracts for the most valuable biotopes is ongoing.

8.5. Regional effects

The main contributions to the reorientation programme have come from the plains areas in central Sweden, where specialized grain producers have difficulties in competing with producers in the south. The commitment to essentially unchanged profitability in the northern regions seems to have convinced producers in all northern counties that the reorientation programme covers less than 10% of total acreage.

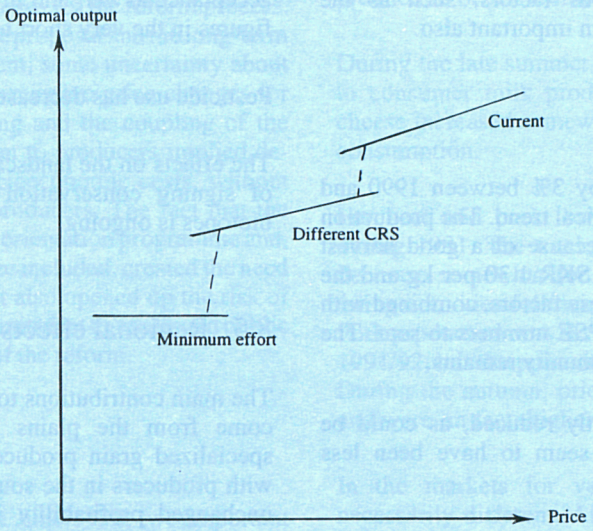
8.6. Future prospects

The new government which took office in October 1991 declared that the reform process should be continued according to the established plans. This is logical — all analyses indicate that joining the CAP would imply a greater reduction of Swedish production than is implied by the reform decision. None the less, the prospect of Sweden becoming a full member of the European Community has created some uncertainty among producers. The proposed product prices, in particular for grain, are much lower than expected equilibrium prices, and would call for more far-reaching changes in production practices than those mentioned earlier. The proposed Community subsidies for taking land out of production by afforestation are also much more generous than the current Swedish ones.

9. A brief comment on the CAP reform proposal

The CAP reform proposal (European Commission, 1991) is analysed in detail elsewhere in this publication. Here, only a brief comparison between the Swedish reform and the EC proposal is made.

GRAPH 5: **Stylized relationship between product price and optimal intensity in vegetable production**



NB: The three levels correspond to historical prices, moderate price decreases resulting in different crop-rotation schemes, and large price decreases. In the latter case, prices do not cover production costs and the producter pases on to 'symbolic farming' with the sole aim of collecting the acreage support.

The conditions in Sweden and the Community exhibit both differences and similarities. Size, population, and the role of agricultural activities in the general landscape are factors that differ substantially between the two. The similarities are striking, on the other hand. Sweden resembles the most industrialized EC Member States with regard to its general level of development, and to the small and shrinking role of agriculture in the national economy. Agricultural policies have, with minor exceptions, been the same. The similarities, broadly speaking, seem more important than the differences, which makes the Swedish example relevant to the CAP reform discussion.

It is quite clear that the CAP reform proposal does not respect the basic principles underlying the Swedish reform. It relies heavily on production regulation at farm level. The set-aside scheme is also central to the new policy; the principle that payment must be coupled with production and not with non-production is, consequently, not respected. The compensation paid in connection with envisaged price decreases is not time-limited, which permits an erroneous resource allocation. Although the proposal relies on a rather drastic shift of the burden from consumers to taxpayers, the major drawbacks connected with the present policy would be inherited by the new one.

One aspect worth special attention is the connection between the price level and the optimal production intensity in vegetable production. The detailed calculus[1] referred to above indicates that a price decrease may lead to a larger reduction in intensity than implied by standard marginal analysis. When the product price decreases, optimal intensity is adjusted downwards in a way that is fairly well known. When the price reaches a certain threshold value (depending on local conditions at the individual farm), it is optimal to change crop-rotation schemes, and a discontinuity in the relationship between price and optimal intensity arises. This is illustrated in Graph 5 above.

When price is decreased further, a point is finally reached where the optimal policy for the farmer is to adapt to the minimal requirements for collecting the acreage support and use the time liberated elsewhere. The way these minimal requirements are stipulated is therefore important to the resulting production level.

The general conclusion from this brief discussion is that the production levels provoked by the much lower prices envisaged in the proposal will probably be lower than

[1] Andersson *et al.* (1991).

indicated by figures produced on the basis of either common marginal analyses or on historical production function estimates. Should the lowest level of 'symbolic farming' become common, the European Community would certainly have taken a great step forward towards reducing production volumes, if that is the primary objective. On the other hand, the policy led would face very serious problems of legitimacy.

References

Andersson, P. et al. (1991), *Grain production in a deregulated market* (in Swedish), Uppsala, Swedish University of Agricultural Sciences.

Andersson, R. (1986), 'Loss of nitrogen and phosphorus from arable land in Sweden' (in Swedish), Ph. D. dissertation, Uppsala, Swedish University of Agricultural Sciences.

Andersson, R. (1989), *Biomass fuels from agriculture* (in Swedish), Stockholm, National Environmental Protection Agency.

Bhagwati, H. (1982), 'Directly unproductive profit-seeking (DUP) activities,' *Journal of Political Economy,* Vol. 90, No 5, pp. 988-1002.

Binswanger, H. (1980), 'Attitudes towards risk: ...', *American Journal of Agricultural Economics,* Vol. 62, pp. 174-182.

Bowers, J. K. and Cheshire, P. (1983), *Agriculture, the countryside, and land use,* London, Methuen.

European Commission (1991), 'The development and future of the common agricultural policy', COM(91) final.

Fahlbeck, E. (1988), *Consequences of a lower grain price* (in Swedish), Uppsala, Departement of Agricultural Economics, University of Agricultural Sciences.

Hansson, I. (1984), 'Marginal cost of public funds for different tax instruments and government expenditures', *Scandinavian Journal of Economics,* Vol. 86, No 2, pp. 115-130.

Hayami, Y. and Ruttan, V. W. (1985), *Agricultural development,* Second edition, Baltimore, Johns Hopkins University Press.

Hazell, P. B. R. (1982), 'Application of risk-preference estimates in farm-household and agricultural sector models', *American Journal of Agricultural Economics,* Vol. 22, pp. 384-390.

Kahneman, D. and Knetsch, J. L. (1991), 'Valuing public goods: The purchase of moral satisfaction', *Journal of Environmental Economics and Management,* Vol. 22, pp. 57-70.

Molander, P. (1988), 'Food supply and national security: Consequences for agricultural policy' (in Swedish), Report C 10311-1.2, Stockholm, National Defence Research Agency.

Mundlak, Y. (1985), 'The aggregate agricultural supply'. background paper to the 1986 World development report, Washington, IBRD.

National Price and Competition Board (1991), *Effects of the food policy reform* (in Swedish), Report 1991:14, Stockholm, National Price and Competition Board.

Nilsson, B. et al. (1987), *The planning of labour and machine systems* (in Swedish), Uppsala, Departement of Agricultural Technology, University of Agricultural Sciences.

Nordisk Ministerråd (1989), 'Agricultural policy in the Nordic countries' (in Swedish and Finnish), Report 1989:15, Copenhagen.

OECD (1987), *Purchasing power parities and real expenditures 1985,* Paris.

OECD (1991), *Agricultural policies, markets and trade,* Paris.

Olson, M. (1965), *The logic of collective action,* Cambridge, Harvard University Press.

Olson, M. (1990), *How bright are the northern lights?* Institute of Economic Research, Lund University.

Paarlberg, D. (1988), 'The backward-bending supply curve', *Choices,* spring 1988, pp. 29-30.

Swedish Board of Agriculture (1991), 'Evaluation of the food policy reform' (in Swedish), Reports 1991: 4-7, Jönköping. Swedish Board of Agriculture.

Swedish Board of Agriculture (1991b), 'Consequences of the reduced border protection, July 1st 1991' (in Swedish), Reports 1991: 11-28, Jönköping, Swedish Board of Agriculture.

Tracy, M. (1982), *Agriculture in Western Europe,* Second edition, London, Granada.

Winters, A. (1990), 'The so-called "non-economic" objectives of agricultural support', *OECD Economic Studies,* No 13, winter 1989-90, pp. 237-266.

World Resources 1987, New York, Basic Books.

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