LMC INTERNATIONAL

Evaluation of the Common Market Organisation (CMO) in the Cereal Sector

Main Report

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Glossary

This Glossary introduces a number of technical concepts, which relate to the Cereals Common Market Organisation (CMO) or the methods of analysis that are employed in this report.

Arable Aids, Area Payments or Direct Payments: These are payments made to producers of cereal, oilseed or protein crops on a per hectare basis.

The payments are calculated as the product of the reference yield of the relevant crop (derived from actual historical yields between 1986 and 1990) and a basic payment per tonne for the crop in question. Certain eligible crops, such as durum wheat, receive additional fixed supplements per hectare. Until 1999, these were often known also as compensatory payments.

European Size Unit (ESU): the economic size of a farm in the Farm Accountancy Data Network (FADN) classification is expressed in ESUs. The value of one ESU is defined as a fixed number of Euros of Farm Gross Margin.

Over time the number of € per ESU has changed to reflect inflation. However, over the years covered by the Evaluation the value of one ESU has remained fixed at €1,200. FADN classifies the farms in its sample in six ESU size classes: A to F, where A contains the smallest farms (in terms of economic size) and F the largest farms.

ESU Size Class Small: this size category has been created by LMC specifically for this study. It is obtained by the aggregation of ESU size classes A and B used by FADN in its classification.

ESU Size Class Medium: this size category has been created by LMC specifically for this study. It is obtained by the aggregation of ESU size classes C and D used by FADN in its classification.

ESU Size Class Large: this size category has been created by LMC specifically for this study. It is obtained by the aggregation of ESU size classes E and F used by FADN in its classification.

Farm Net Value Added (FNVA): FNVA is the remuneration to the fixed factors of production (labour, land and capital), whether they be external to the family operating the holding or be supplied by the family itself, such as family labour.

It takes account of current subsidies and taxes, but does not deduct either subsidies on investments or the remuneration of the external factors (wages, interest and rent paid)[1]. Family Farm Income is calculated after these last items have been subtracted from the FNVA.

General Field Cropping: This is one of the standard types of farming established by FADN in its sampling approach. Together with Specialist COP crops producers (defined below), general field crop producers are part of a larger category defined as "Specialist field crops producers". A farm enterprise is allocated to this category if more than two-thirds of the farm's standard gross margin (as defined below) are obtained from general field crops farming.

[1] Definition from the FADN Website

Granger Causality Test: This is a procedure which has been applied in the statistical analysis when the objective of the analysis was to ascertain the presence of causality between two different price variables measured over time. Granger Causality can be defined as follows:

Given two variables X and Y, X "Granger-causes" Y if the value of Y at time t can be predicted better by using past values of X than by not doing so, given that all other variables are included in the model.

Gross Margin I: This equals Gross Revenue (Price x Yield Plus Arable Area Payments) *less* Direct Costs (Seed, Fertiliser, Chemical Protection and Irrigation)

Gross Margin II: This equals Gross Margin I *less* Additional Variable Costs (Capital and Labour)

Mixed Crops-Livestock: This is one of the standard types of farming established by FADN in its sampling approach. A farm enterprise is allocated to this category if more than two-thirds of the farm's standard gross margin (defined below) are obtained from mixed crops-livestock farming. This category includes livestock farms that grow cereals for use as on-farm feed for their animals.

Regionalisation Plan: When direct payments were introduced, member states had discretion as to how they determined them, in terms of the number of sub-regions and the number of crops for which separate reference yields were calculated.

The formulae for the computation of the reference yields for individual crops were laid down by the Council (see Arable Aids, above), but member states could determine their regionalisation plans in such a way as to allocate different reference yields to different categories of cereals.

The main distinctions in reference yields in some national regionalisation plans were between maize and other minor cereals, on one hand, and the remaining cereals, on the other; and between irrigated and rain-fed cereals. Member states also had the option of determining different reference yields for set-aside land.

Specialist Cereals, Oilseed and Protein Crops (Specialist COP Crops): This is one of the standard types of farming established by FADN in its sampling approach and, together with General Field Crops farmers (defined above), are part of a larger category defined as "Specialist field crops producers". A farm enterprise is allocated to this category if more than two-thirds of the farm's standard gross margin (as defined below) are obtained from cereals, oilseed and protein crops farming.

In practice, as Part 1 of Chapter 1 explains, more than 85% of the total area that receives arable aid payments is planted to cereals; therefore, this type of farming is often referred to as cereal specialists or specialist cereal producers in the text

Standard Gross Margin: The FADN defines the Standard Gross Margin of a crop as the value of output from one hectare less the cost of variable inputs.

Chapter 1, Part 1: The Cereals Common Market Organisation

If to do was as easy as to know what were good to do, Chapels had been churches, and poor men's cottages princes' palaces. *William Shakespeare, The Merchant of Venice, Act.1, Sc.2*

This chapter describes the measures taken under the Common Market Organisation (CMO) of the Cereals sector, within the Common Agricultural Policy, since 1975, when Regulation (EEC) No. 2727/75 codified the basic framework for the Cereals CMO. During the 1990s, the Cereals CMO has been reformed in a series of steps. The stages of reform were:

MacSharry Reforms: The 1992 reform (known as the MacSharry reform, after the Agriculture Commissioner at that time) took full effect from the 1995/96 marketing year, the first year covered by this Evaluation.

Agenda 2000 Reforms: The MacSharry reform was succeeded by the Agenda 2000 reform from 2000 onwards, which set the regulatory framework for the Cereals CMO until the 2003/04 marketing year, the final year covered by the present Evaluation.

Mid-Term Review of Agenda 2000: Since then, the CMO has been reformed further, with the enactment of regulations implementing the measures agreed under the Mid-Term Review of Agenda 2000 (commonly abbreviated to the Mid-Term Review).

The first part of this chapter introduces the EU cereals sector and describes the measures taken within the Cereals CMO. Part 2 of this chapter illustrates the model of the logic of official intervention within the sector[1].

Since the regulatory framework and its chronology are complex, two Appendices (Appendix 1 and 2) have been prepared to provide details of the regulations affecting the cereals sector. A further two Appendices (Appendix 3 and 4) have also been prepared to provide the background to the development of EU cereals supply, demand and trade in the global cereals market.

1. THE CENTRAL ROLE OF THE CEREALS SECTOR IN EU AGRICULTURE

The Cereals CMO lies at the heart of the Common Agricultural Policy. Table 1.1 summarises data on the importance of cereals to EU agriculture in 2003. The data demonstrates that:

- Cereals account for an important part of the EU agricultural area.
- Cereals are the main arable crop in the Community.

In the 2003/04 marketing year the area planted to cereals in the EU-15 totalled:

- 11.4% of the total EU-15 land area
- 28.4% of the total utilisable agricultural area of the EU-15 states, and
- 87.5% of the total area covered by arable aid applications that year

None of these percentages differed at all significantly from their 1995/96 values.

[1] The word "intervention" is used in the official regulations in two senses: as measures in general, and more specifically in the context of public intervention stocks, purchased at intervention prices. When discussing the CMO as a whole, the former meaning is the one that is understood.

Table 1.1: EU-15 Agricultural Data, 2003

	Cereals Budget (€ million)	Utilised Agricultural Land Area ('000 hectares)	Cereals Area ('000 hectares)	Numbers of Holdings ('000)	Civilian Employment in Agriculture ('000 persons)
Austria	375	3,374	810	85	203
Belgium	181	1,392	308	27	69
Denmark	689	2,641	1,485	41	89
Finland	357	2,246	1,192	60	127
France	5,331	29,430	8,930	331	1,034
Germany	3,307	17,008	6,839	265	862
Greece	503	3,897	1,260	263	654
Ireland	132	4,370	300	14	114
Italy	1,617	15,097	3,928	680	1,037
Luxembourg	11	128	29	2	5
The Netherlands	251	1,924	226	20	219
Portugal	189	3,745	424	152	655
Spain	1,814	25,270	6,447	330	933
Sweden	464	3,129	1,146	43	109
United Kingdom	1,629	16,352	3,059	61	344
EU-15	**16,851**	**130,003**	**36,383**	**2,375**	**6,454**

Source: Eurostat

Note: The cereals budget includes all payments identified under separate budget lines as applying to cereals, including export refunds, the costs of intervention stocks, direct payments, starch refunds and set-aside. The last item is included in the Cereals CMO budget; however, it also applies to other arable crops.

The Community's expenditures on measures that comprise the Cereals CMO account for a sizeable share of the EU budget.

The budgetary costs of the Cereals CMO:

- Amounted to €16.85 billion in 2003/04.
- This was 42.3% of the budgetary cost of all the CMOs for agricultural products, 36.2% of the entire net budgetary cost of the CAP of €46.51 billion that budget year, and 17.4% of the total EU budget of €96.96 billion in the same year.
- The distribution of budgetary costs and cereal areas among the six main cereal-producing EU member states and others is presented in Diagrams 1.1 and 1.2.
- In 1995/96, they totalled €14.96 billion, 35.0% of the net budgetary cost of the CAP and 20.6% of the full EU budget in the same year.

- Cereal farming constitutes a vital component of the rural economy

The central role played by cereals in the EU agricultural economy means that the CMO affects the vast majority of the EU agricultural holdings, numbering 2.4 million in 2003.

Livestock farming, the second largest agricultural sector after arable agriculture, uses cereals as a major feed; thus, many livestock producers also cultivate cereals, though much of their output goes directly for on-farm feed and so does not enter the market.

Cereal production is, therefore, a vital influence upon the livelihoods of the 6.5 million EU workers who were employed in agriculture in 2003.

- The EU cereal sector is a major player in the world market

The EU-15 wheat sector is the largest in the world.

- It accounted for 16.2% of global output in 1995 and 16.3% in 2003[2], when the enlarged EU-25 member states supplied 19.4% of world wheat production.

Among other cereals (excluding rice), the EU-15 is the second largest producer after the US.

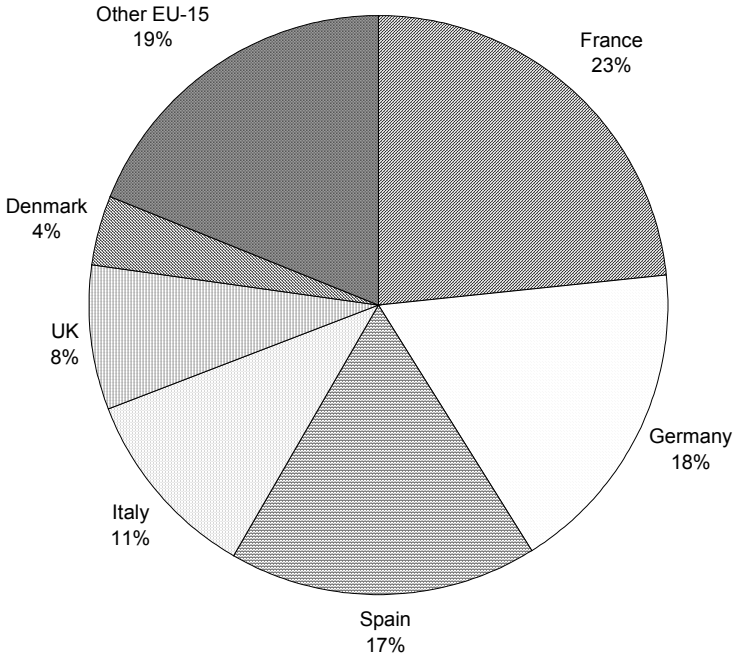
- Its share of world production was 11.3% in 1995 and 10.4% in 2003 (when the EU-25 share was 13.8%).

- EU cereal farming is very diverse, both by crop and by region

In Table 1.2, we describe the growth of output of the range of cereals that the EU-15 produces on a significant scale. Table 1.3 indicates the importance of cereal farming in the overall agricultural area in each of the EU-15 member states in 2003. Appendix 5 contains maps depicting the regional area under the different cereals in the EU-15 Member States in 2002 and 2003.

The diversity of cereal production conditions and crops has created a set of Common Market Organisation measures that are particularly complex by the standards of the CAP, since policies applied to the cereals sector affect a larger number of EU farm holdings than any other sectors' CMO.

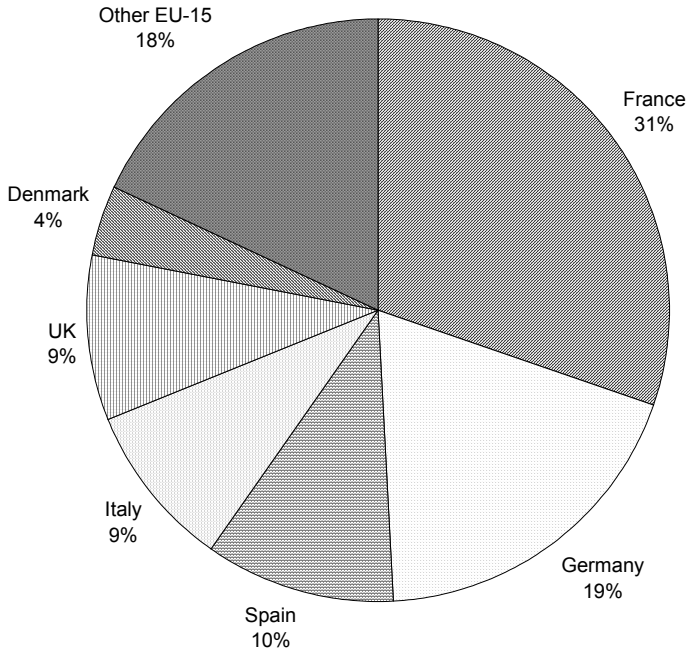
Diagram 1.1: Distribution of EU-15 Cereal Areas Among Member States, 2003/04



Source: Eurostat

[2] The 2003 harvest was a particularly poor one; the EU share of world production in 2002 was 18.2%.

Diagram 1.2: Distribution of EU-15 Cereals CMO Budget Among Member States, 2003/04



Source: Eurostat

Note: The note to Table 1.1 explains that the budget items included in this analysis are those identified as applying specifically to cereals, including costs of intervention, export refunds and direct payments, as well as set-aside.

Table 1.2: EU-15 Cereal Production by Type of Cereal, 1970-2004 (million tonnes)

	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-04
Wheat	52.8	54.7	72.8	81.1	88.1	96.7	101.0
Barley	44.3	51.8	57.2	57.8	50.1	49.9	49.3
Maize	18.1	19.0	23.5	28.5	29.1	35.9	39.2
Oats	12.8	10.9	10.4	8.8	6.9	6.4	6.8
Rye	6.5	5.9	5.7	5.8	4.9	5.9	4.9
Other Cereals	3.4	2.6	2.1	2.3	3.5	5.4	6.1
Total Cereals	**137.8**	**144.9**	**171.7**	**184.4**	**182.6**	**200.2**	**207.1**

Source: UN FAO Database, whose data are by calendar year.

Table 1.3: Cereal Areas as a Share of Total Agricultural Land by Member State, in 2003

	Cereal % of Agricultural Area
Ireland	6.9%
Netherlands	11.7%
Portugal	12.0%
UK	18.7%
Belgium	22.1%
Luxembourg	22.6%
Austria	24.0%
Spain	26.2%
Italy	27.5%
France	30.4%
Greece	33.0%
Sweden	36.6%
Germany	40.2%
Finland	53.1%
Denmark	56.2%
EU-15 Average	**28.4%**

Source: DG Agriculture

2. THE CEREALS CMO MEASURES

The main instruments that apply to the Cereals CMO and their objectives may be summarised under the headings of

- Market support;
- Border measures;
- Direct payments; and
- Supply control.

They are described below.

2.1 Market Support Measures

Intervention prices determine a minimum level for wholesale market prices for cereals satisfying certain quality standards.

Sellers may, during a fixed period of the year, deliver cereals that satisfy certain quality standards to licensed warehouses that are approved by national intervention boards, which are required to buy them at the intervention price. Through such intervention buying, the CMO ensures that internal market prices do not drop far below the intervention price. This is a key element of the CMO.

The Commission determines intervention quality specifications. These specifications were altered (tightened) during the 1992 and Agenda 2000 reforms.

Monthly increments are applied to intervention prices for a number of months after the harvest in order to promote orderly marketing during the course of the marketing year by taking into account the cost of storage.

Threshold prices were defended via variable import levies, which protect the internal market from low world prices.

Originally, threshold prices were fixed so that imported cereals (delivered in Rotterdam) would reach the main deficit region (defined as Duisburg) at a price (the target price, a concept that is no longer used) that was slightly over the delivered cost of cereals purchased in and transported from the main surplus region (defined as Orléans).

Variable import duties were applied after the 1992 reform. The import system was adapted so that variable import duties on cereals were calculated in such a way as to set the landed cost of imported cereals 55% above the intervention price. The official threshold price ceased to exist.

Since the WTO Uruguay Round, variable levies have been replaced by minimum duty-paid import prices equivalent to 155% of the intervention price, capped by the WTO bound rate.

2.2 Border Measures

Import levies, one of the border measures, have already been mentioned in the context of the instruments used to defend threshold prices.

Export refunds are made to permit exporters to cover the difference between internal market prices and world prices that they would obtain on third country markets.

Export refunds for cereals are generally allocated to exporters through a weekly open market bidding process, but a more automatic, standing refund system also exists to allocate refunds.

A separate system of subsidised exports exists when the Commission sells cereals from intervention stocks for export, via a different bidding process. In the case of exports from intervention stocks, the Commission pays the transport costs required to take the cereals to export ports.

Import or export licences must be presented by traders when importing into or exporting from the EU.

When world market prices reach a level that could disrupt the availability of supplies on the internal market, appropriate measures may be taken under the CMO, such as the suspension of custom duties on imports or the collection of export taxes until the disruption to the market has ceased.

Tariff rate quotas may be applied, to establish different tariff rates for imports within a quota or for specific origins, provided that they are introduced in a manner compatible with WTO regulations. For example, TRQs were introduced in 2003 on feed and malting barley and on low and medium quality soft wheat in response to large imports from CIS countries.

2.3 Direct Payments

Direct payments, initially known as compensatory payments, and subsequently entitled arable aids or area payments, were introduced in the 1992 reform.

They were originally intended to compensate producers for the loss of income caused by the reduction in market support. In the Agenda 2000 reform, the link between reductions in market support and the level of direct payments was ended.

The direct payments are calculated by multiplying a basic amount per tonne by the average cereals **reference yields** determined in the **regionalisation plans** for the region concerned. These reference yields were originally calculated from the average cereal (or oilseeds) yields in 1986/87-1990/91, excluding the highest and lowest yields within that period. Reference yields were raised for two member states in the Agenda 2000 reform. Direct payments are also subject to national and regional base area ceilings, based on the 1989/90-1991/92 areas.

Special provision was allowed for the separate calculation of reference yields for maize and for irrigated cereal areas. Several member states took advantage of this provision.

2.4 Supply Control

Compulsory set-aside was introduced in the 1992 reform as a form of supply control.

It was obligatory for larger (commercial) arable crop producers. Smaller producers did not have to set aside any of their land, but were allowed to do so on a voluntary basis.

The proportion of the arable crop area that commercial producers must put into set aside was fixed at 15%. If an individual crop year has a poor harvest, as happened in 2003/04, the Council may decide to reduce the set-aside rate the following year.

3. THE DEVELOPMENT OF THE CEREALS CMO

The reforms that occurred in the CMO for cereals between 1995/96 and 2003/04 can best be understood in the context of the structural problems facing the Common Agricultural Policy, and the Cereals CMO in particular, at the time of the introduction of the MacSharry reform in 1992.

In the 1970s and into the 1980s, the Community relied upon two main policy instruments in its Cereals CMO: market support, via intervention stock purchases, helped to defend the system of intervention prices, which were generally, but not always, above world market prices, and guaranteed that all eligible cereal output had an assured outlet at a pre-determined price; and border measures, which reinforced the market support via a combination of export refunds and import tariffs.

These measures had not changed substantially since the Stresa Conference in 1958 establishing the original objectives of the Common Agricultural Policy, which were promulgated in January 1962 and entered in force in 1967. Article 39.1 of the Treaty of Rome[3] defined these objectives as being:

[3] Many revisions have been made to the original Treaty, and these updated versions are known as the Treaty Establishing the European Community.

1. To increase agricultural productivity by promoting technical progress and by ensuring the rational development of agricultural production and the optimum utilisation of the factors of production, in particular labour;
2. Thus to ensure a fair standard of living for the agricultural community, in particular by increasing the individual earnings of persons engaged in agriculture;
3. To stabilise markets;
4. To assure the availability of supplies;
5. To ensure that supplies reach consumers at reasonable prices.

Under Agriculture Commissioner Mansholt, the focus of CAP measures in the 1960s was to raise productivity, achieve food self-sufficiency in the Community and avoid the shortages of the immediate post-War period. Price support was identified as a key measure in attaining this objective. These measures were not specific to cereals, but as the major arable crop, cereal output was greatly affected by them.

The progress made in enhancing agricultural productivity in the cereals sector and in attaining self-sufficiency in the market balance for cereals is described in Table 1.4.

Cereals market balance from 1970-74 to 2000-02

- Between 1970-74 and 1985-89, the cereals area in the EU-15 member states[4] fell by over 3%, but higher yields increased total cereals output by over 35%.
- Demand expanded more slowly than production; indeed, demand declined in absolute terms between 1980-84 and 1990-94, because of the competition for domestically produced cereals from cereal substitutes, such as cassava pellets and corn gluten feed, which entered the EU at zero or low import tariffs.
- The competition in the internal market was felt most keenly in the animal feed sector. Cereal demand for food use has been relatively stable since the early 1970s, and "other uses" (notably starch manufacture) have grown steadily. However, feed demand fell by more than 15% between 1980-84 and 1990-94.
- With cereal output expanding, by virtue of much improved yields, the Community was transformed from its position as a structural net importer of cereals during the 1970s into a structural net exporter from 1982.

By the beginning of the 1980s, it could be said that that the policy had become a victim of its own success, as the Community was regularly exporting large quantities of cereals. There was a budgetary cost as export refunds were usually required, particularly since the change in US agricultural policy after the 1985 Agricultural Act. Meanwhile, domestic cereal users, such as bread and meat producers, were paying prices that were usually above world market levels for their cereals, and, as noted above, in the case of animal feed, locally produced cereals lost sales to substitutes.

[4] The series relates to all EU-15 member states to ensure consistent inter-country comparisons over time, although the CMO measures did not affect all these countries throughout this period.

Table 1.4: EU-15 Market Balance for All Cereals, Excluding Rice, 1970-2002 (million tonnes)

	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-02
Production	137.8	144.9	171.7	184.4	182.6	200.2	208.9
Area (mn hectares)	*43.3*	*42.8*	*42.7*	*41.2*	*37.3*	*36.9*	*37.1*
Yield (tonnes/ha.)	*3.2*	*3.4*	*4.0*	*4.5*	*4.9*	*5.4*	*5.6*
Imports	45.3	50.9	44.7	37.5	37.0	44.3	51.4
Stock Change	-2.3	-3.1	-4.3	0.2	1.3	-5.2	-4.0
Exports	24.5	30.6	44.2	58.3	68.4	65.9	69.4
Net Exports	-20.8	-20.3	-0.5	20.8	31.5	21.6	18.1
Domestic Demand	**156.3**	**162.1**	**167.9**	**163.7**	**152.4**	**173.4**	**186.8**
Of which							
Feed	98.2	102.1	106.9	100.9	90.0	107.8	117.6
Food	55.5	56.8	57.6	59.1	58.4	61.2	63.5
Other Uses	2.6	3.2	3.5	3.8	4.0	4.4	5.7

Source: UN FAO Database. This table covers all EU-15 states, although not all were members throughout this period.
Note: The data all relate to calendar years. Imports and exports include intra-EU trade.
2002 is the final date for which comprehensive foreign trade and end-use data are available.

During the 1980s, measures adopted to limit output and expenditure on the Cereals CMO included:

- Establishing a Maximum Guaranteed Quantity (MGQ) of cereals output of 160 million tonnes for the EU-12, excluding the new German Länder;
- Creating a co-responsibility levy to penalise producers via lower prices when total production exceeding the MGQ;
- Reducing the period during which cereals could be sold into intervention; and
- Socio-structural measures, including voluntary land set-aside and encouraging the early retirement of those wanting to leave the sector.

These measures did not prevent exportable surpluses from growing, nor did they end the accumulation of intervention stocks (which rose from 4.3 to 33.3 million tonnes from 1983/84 to 1992/93). Both of these outcomes had important budgetary consequences.

Until the early 1980s, international trade issues were not viewed as a major concern in the cereals sector, since the EU was not a major exporter. However, in 1982 the Commission accepted a limitation to 14% in its share of world wheat exports, and there was a dispute with Canada over EU imports of high quality, hard wheat. By the late 1980s, the emergence of a large export surplus made trade issues more pressing.

The EU came under pressure to liberalise its agricultural trade policies with the inclusion of agriculture in the Uruguay Round trade negotiations started in 1986. The US-EU agreement in 1992 to settle a trade dispute linked to the accession of Spain to the EU granted *ergo omnes* access for 2.3 million tonnes of maize and sorghum into Spain. This was later enlarged to grant access for 0.5 million tonnes of maize into Portugal. These commitments were included in the schedules of the 1994 WTO Marrakech agreement. In the same schedules, to meet the minimum access requirement, a duty-free quota of 300,000 tonnes of high quality wheat was adopted.

In the wider GATT arena, the Commission was under pressure to accept measures that included supplementary reductions in both the values of export subsidies and the volumes of subsidised agricultural exports.

4. "EVOLUTION NOT REVOLUTION": THE 1992 REFORM OF THE CEREALS CMO

Faced with rising export surpluses, high intervention stocks, falling internal sales of cereals for feed, heavy budgetary outlays and imminent world agricultural trade reform, Commissioner MacSharry introduced in 1991 proposals for reform of the Cereals CMO, which formed the basis for the reforms approved by the Council in May 1992. These reforms constituted a reforming, evolving approach to these pressures.

They maintained and adapted the major measures, notably market support and border protection, from the previous CMO, but introduced some policy innovations.

The proposals set new objectives for the CAP in general and the CMO in particular:

- To adapt the quantities supplied to demand;
- Restore the competitiveness of EU products, by bringing producer prices closer to world prices;
- Increase the sales of domestic cereal products in the EU internal market;
- Limit the increase of budgetary expenditures and use them in a more efficient way;
- While contributing to a better geographic distribution of production and to the preservation of the environment.

Until June 1999, the CMO was guided by the 1992 framework, which included a transition period from July 1993 to June 1995, before full implementation in 1995/96.

This reform had the following main elements:

- Reduced internal market supports from intervention prices and border measures;
- The use of area payments that provided a fixed income per hectare on areas planted to cereals, oilseeds and protein (COP) crops, but which member states could apply in ways that differed from region to region.
- Supply management via compulsory set-aside to limit the area planted to arable crops in a manner that exempted small farmers from set-aside obligations.

4.1 Market Support

The 1992 reform continued the trend that what already under way of reducing the intervention price for cereals, with the objective of making EU cereals more attractive to local end-users and stimulating internal demand. It also harmonised intervention prices for all eligible cereals (breadmaking wheat, durum wheat, barley, maize, rye, sorghum).

The cuts in intervention and in threshold prices (set 45 ECUs above the intervention price) occurred in three steps between 1993/94 and 1995/96[5].

[5] After correcting for agri-monetary adjustments, the cereals intervention price was reduced from 140.86 ECUs per tonne in 1993/94 to 119.19 ECUs from 1995/96 to 1999/2000. For comparison, the intervention price for bread-making wheat was 193.29 ECUs in 1992/93.

4.2 Area Payments

Direct payments already existed for durum wheat, but their introduction for producers of all other cereals marked a major innovation in the 1992 reform.

Direct payments had the declared aim of compensating producers for the loss in income caused by the cuts in market support.

- Cereals area payments were computed by multiplying a basic amount per tonne by the cereals reference yields determined in the regionalisation plan for the region concerned[6]. These were subject to base area ceilings.
- The reference yields were calculated from the average yields in 1986/87-1990/91, excluding the highest and lowest yields within that period, and were frozen at that level.
- Special provision was allowed under national regionalisation plans for separate reference yields for maize and for irrigated cereal areas.
- In all cases, the basic amounts per tonne (calculated per hectare by multiplying this sum by the appropriate reference yield) were the same for all cereals[7].

4.3 Set-Aside

Another major element of the 1992 reform was the introduction of compulsory set-aside for producers benefiting from the direct payments in the Cereals CMO. Set-aside itself was not novel; a general voluntary set-aside scheme had already existed since 1988, as a structural measure. In the 1992 reform, set-aside payments per tonne, multiplied by the regional cereals reference yield, determined by national governments under their regionalisation plans, were 26.6% higher than those on non-set-aside land[8].

A distinctive feature of the set-aside provisions was the establishment of a 'general scheme' open to all producers and a 'simplified scheme' that was open only to small producers[9], who were free to decide whether they put any of their land under set-aside.

To benefit from set-aside payments under the general scheme, farmers had to set aside a pre-determined percentage of their arable area.

- The set-aside scheme made distinctions between rotational and non-rotational set-aside.
- It allowed farmers to volunteer to set aside a larger share of their land than that stipulated by the Commission.

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[6] Regionalisation plans and their effects upon producers' incentives are discussed in Chapter 2, Part 2.

[7] The compensatory payment was zero in 1992/93. It rose from 30.19 ECUs per tonne (multiplied by the historical reference yield applicable to each producer) in 1993/94 to 54.34 ECUs in 1995/96-1999/2000.

[8] Set-aside payments were 54.34 ECUs per tonne in 1993/94 and 68.83 ECUs from 1994/95 to 1999/2000.

[9] These are defined as those farming an area of cereal, oilseeds and protein crops that would produce less than 92 tonnes per annum if the regional reference yield for cereals were applied.

- Set-aside land had to meet minimum environmental standards, but did not have to be left fallow, since the cultivation of arable crops for non-food uses (notably for biofuels) was permitted.
- There was also provision for special increases in set-aside areas in a member state if its national base area was exceeded.

4.4 International Trade Policy Reform and the Uruguay Round WTO Agreement

The full implementation in 1995/96 of the MacSharry reform followed a year after the final agreement on the Uruguay Round of trade negotiations.

The WTO agreement required the EU to reduce domestic support measures, export subsidies and improve market access. The main commitments were:

Domestic Support

- Capped at 1986-1988 average levels
- Reduced by 20% over next six years

However, policies considered to have little or no trade-distorting effect were exempt from this commitment. These were categorised as "Green Box" measures and included direct payments unrelated to production type or volume. EU direct payments were not yet decoupled from production, but were exempt under separate "Blue Box" measures, which included direct payments based on fixed areas or yields.

Export Subsidies

Over a six year transitional period, the EU was required to reduce:

- The value of its direct cereal export subsidies by 36%
- Its subsidised cereal export quantities by 21%
- Where the reductions were calculated against average values in 1986-1990.

The cuts in intervention prices made the attainment of the first objective, cutting export subsidies, comparatively simple, despite the daunting 36% cut that was required. The reductions in subsidised export quantities were harder to achieve, but presented little problem, in practice, due to high cereal export prices in both 1996 and 1997, as well as the scope until 2000/01 to carry forward unused limits on subsidised export tonnages.

Market Access

- Non-tariff barriers to be converted to tariff barriers ("tariffication"), at bound rates
- Tariffs reduced by average 36%, with minimum 15% for each tariff line by 2000
- The variable levy for wheat, maize, rye, barley and sorghum was replaced with a duty-paid import price of 155% of the intervention price, but no more than the bound tariff. The actual tariff level can, therefore, vary, depending on world prices, but is capped by the bound rate
- Tariff Rate Quotas (TRQs) were established to maintain previous access levels

The tariffication of EU non-tariff barriers created high bound rates, and import levels were little affected directly.

4.5 The Cereals Market Balance After the 1992 Reform

In the first years of the 1992 reform, EU cereals output fell significantly, due to drought in Spain and Portugal, while internal demand reversed its previous downward trend. Hence, exportable surpluses declined. Intervention stocks were also reduced substantially in the early years of the reform. Therefore, reviewing the situation in 1996/97, the Commission was able to claim success in restoring market balance in the cereals sector and in reducing export subsidies.

After 1996/97, problems emerged. In particular,

- Intervention stocks surged;
- Export refunds increased.

The Commission in July 1997[10] noted that the intervention price seemed too high to be only a safety net and might cause an increase in the production of low quality cereals (singling out rye for special mention), which could end up in intervention or having to be exported with high rates of refund.

The Cereals CMO was acknowledged in the same document to be open to criticism for:

- The complexity of the measures;
- The limited requirement for good environmental practices by farmers benefiting from the measures;
- While cereal farmers were increasingly dependent on subsidies in their incomes.
- On EU-12 cereal specialist farms, subsidies as a share of Farm Net Value Added were estimated at 45 % in 1993, 56 % in 1994, 65 % in 1995, and 59 % in 1996.

5. THE AGENDA 2000 REFORM: 1999/2000-2003/04

The Agenda 2000 reform took effect from July 1999.

The reform was designed to:

- Take account of criticisms of the effects of the earlier reform;
- Reflect commitments to limit export subsidies under the Uruguay Round accord;
- Incorporate budgetary constraints upon expenditures on the CAP; and
- Prepare for EU enlargement in 2004.

The reform continued the evolution of policy, with no major innovations within the Cereals CMO. The main features of the reform are outlined in the next text box.

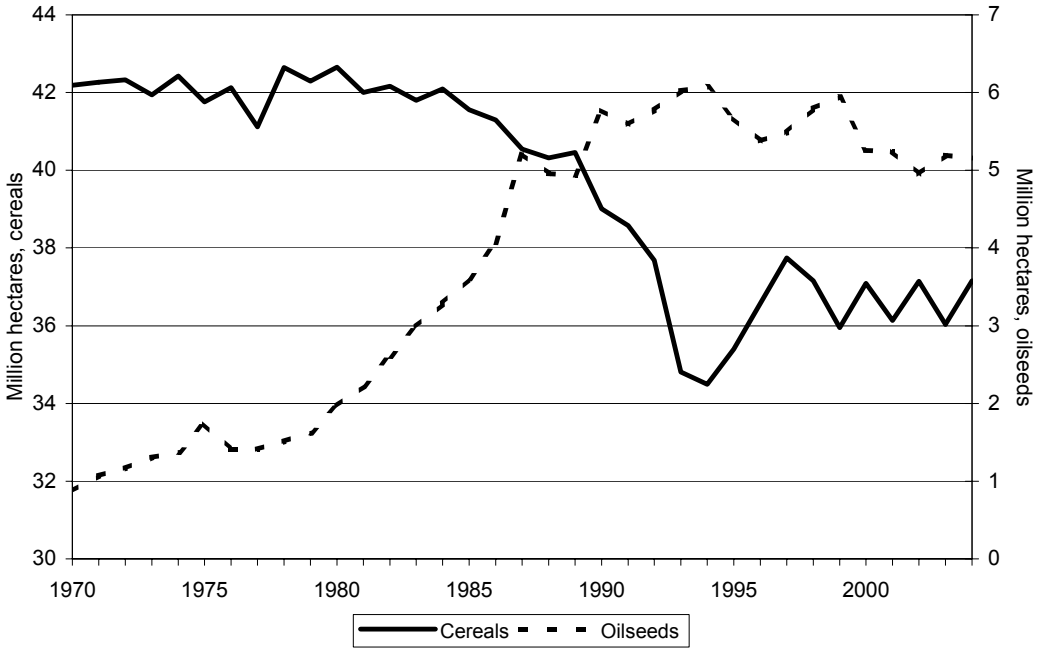
[10] In *Situation and Outlook Cereals, Oilseeds and Protein Crops, CAP 2000 Working Document*, DG Agriculture, July 1997

- A stress upon the environmental benefits of well managed agriculture.
- Lower market support, with intervention prices[11] reduced in stages[12].
- Area payments were raised to moderate the effect of lower intervention prices on producer incomes but, unlike the MacSharry reform, the increase in direct payments was set well below the decrease in the intervention price.
- The set-aside payment was aligned with that for cereals.
- Of equal significance, the reform provided for a three year transition period in which payments per tonne for oilseeds, which previously were based on a specific calculation and were mostly higher than those for cereals, were aligned with cereal payments from 2002/03.
- The basic set-aside rate specified in the regulations was lowered from the theoretical 17.5% to 10% of the arable area; in practice, however, it had never been fixed at a level higher than the 15% rate applied in 1993/94 and 1994/95.

5.1 The Cereals Market Balance

Diagram 1.3 illustrates the reduction that occurred in EU-15 oilseed areas after 1999.

Diagram 1.3: Total EU-15 Harvested Cereal and Oilseeds Areas, 1970-2004



Source: UN FAO database, by calendar year.

[11] Intervention prices were lowered from €119.19 per tonne in 1999/2000 to €110.25 in 2000/01 and €101.31 from 2001/02 onwards.

[12] Some of the important changes made during the Agenda 2000 reform were the result of Commission decisions, using their powers, rather than part of the general rules of the CMO. The steady tightening over time of the quality specifications for intervention purchases of eligible cereals was an example of such discretionary decisions which affected the internal market.

Table 1.4 demonstrated that, over the period from 1999, the two major supply/demand trends observed during the MacSharry reform — rising production and recovery in domestic cereal consumption — were maintained. The recovery in internal demand continued to keep total export volumes well below their peak levels. Within the overall arable crop sector, a feature of the Agenda 2000 reform was the decline observed in the total oilseeds area, partly in response to the elimination of the higher area payments paid on oilseed crops than on cereals (Diagram 1.3).

This change in producers' choices between the major arable crops is also revealed in Table 1.5. This summarises the changes in the total base areas declared by member states for the purposes of establishing ceilings for the areas eligible for arable aids.

Within this total, the share of cereals in the cereal, oilseed and protein crop area not under set-aside rose from 86.1% to 87.5% during the Agenda 2000 reform period.

Diagram 1.3 suggests that, in the decade 1985-95, EU cereal areas declined. Among the factors that may have influenced this outcome were the introduction of set-aside, changes in crop choices in member states that joined in 1995, notably Finland and Sweden, and the effect of reunification in Germany's new Länder.

Since 1995, the same diagram seems to suggest that after 1995 cereal areas were stabilised; and similar diagrams for each major cereal crop hint at comparable changes of trends after in areas after 1995. However, when the times series are analysed[13], the volatility of the areas planted to cereal crops is so great that no significant results are found.

6. THE MID-TERM REVIEW OF AGENDA 2000, TAKING EFFECT FROM 2004/05

During the early years of the application of the Agenda 2000 reform, new pressures emerged for the further evolution of the CMO.

- Externally, the new WTO trade negotiations added to the pressure to reduce subsidised exports and internal support (including blue box payments). Full decoupling would allow direct payments to be moved from the WTO's "blue" to "green" boxes, and be accepted as fully non-trade-distorting.
- Internally, there was pressure to "green the CAP", and link agricultural support more closely to environmental benefits.
- In budgetary terms, there was a need to restrict the total CAP budget to the envelope agreed by the Council, while preparing for enlargement in 2004.
- There was also pressure, which was magnified by the budgetary constraints, to target the benefits to producers towards those with lower incomes, via the modulation of the benefits for larger producers.

The Commission's July 2002 *Communication on the Mid-Term Review: Towards Sustainable Farming* listed the following objectives:

- "To enhance the competitiveness of EU agriculture by setting intervention as a real safety net measure, allowing EU producers to respond to market signals while protecting them from extreme price fluctuations."

[13] Applying Generalised Least Squares to the time series data.

- "To promote a more market oriented, sustainable agriculture by completing the shift from product to producer support with the introduction of a decoupled single farm payment, based on historical references and subject to compliance with environmental, food safety and animal welfare requirements."

- "To provide a better balance of support and strengthen rural development by transferring funds from the first to the second pillar of the CAP via the introduction of an EU-wide system of modulation and expanding the scope of currently available instruments for rural development to promote food quality."

The eventual Mid-Term Review reform that was adopted introduced

- The decoupling of area payments for cereal producers via Single Farm Payments. However, regulations allow for partial decoupling. Member states may retain 25% of the cereals component of the single payment scheme or, alternatively, up to 40% of the supplementary durum wheat aid, in order to continue the existing coupled per hectare payments up to those percentage levels.

- These were linked to cross-compliance conditions on environmental, public health, animal welfare and good agricultural practice.

- A modulation mechanism for reducing direct payments to larger farms.

- Intervention prices were not reduced further, but the eligibility of cereals for sale into intervention was tightened by excluding rye from the scope of such sales.

- Also, the monthly increments to the intervention price were halved.

- The new measures started to take effect in the 2004/05 marketing year, but the Single Farm Payment only starts to be implemented in 2005/06. Some member states are applying these payments as soon as they are permitted, but others are taking advantage a transitional period to prepare for this measure; the latest date that is allowed for its implementation is 2007/08.

Table 1.5: EU-12 and, from 1995/96, EU-15 Arable Aid Applications by Crop and Marketing Year, 1993/94-2003/04 ('000 hectares)

	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04
Total Base Area	**48,825**	**49,030**	**53,561**	**53,561**	**53,548**	**53,545**	**53,529**	**53,522**	**53,593**	**53,577**	**53,568**
Set-Aside & Five-Year Set-Aside	6,102	7,353	7,259	5,761	3,978	4,212	5,742	5,586	6,446	6,073	6,410
COP Crop Area (excluding set-aside)	***38,066***	***39,077***	***42,958***	***44,884***	***46,872***	***46,246***	***44,311***	***44,863***	***44,228***	***45,427***	***44,517***
Oilseeds	5,482	5,222	4,712	4,779	5,222	5,506	4,952	4,420	4,474	4,037	4,299
Protein	1,251	1,257	1,168	1,176	1,362	1,434	1,221	1,122	1,227	1,252	1,275
Cereals	31,333	32,598	37,078	38,929	40,288	39,307	38,139	39,321	38,527	40,137	38,944
Cereals as % of COP Area	*82.3%*	*83.4%*	*86.3%*	*86.7%*	*86.0%*	*85.0%*	*86.1%*	*87.6%*	*87.1%*	*88.4%*	*87.5%*
Set-Aside as % of Base Area	*12.5%*	*15.0%*	*13.6%*	*10.8%*	*7.4%*	*7.9%*	*10.7%*	*10.4%*	*12.0%*	*11.3%*	*12.0%*
COP Area as % of Base Area	*78.0%*	*79.7%*	*80.2%*	*83.8%*	*87.5%*	*86.4%*	*82.8%*	*83.8%*	*82.5%*	*84.8%*	*83.1%*

Source: DG Agriculture

Note: The total cereal, oilseed and protein (COP) crop area excludes COP crops planted on set-aside land for non-food uses

Chapter 1, Part 2: Logical Diagrams

The next six diagrams apply the technique of logical diagrams to illustrate a comprehensive model of the intervention logic in the measures applied to the Cereals CMO.

The first diagram, Logical Diagram 1, summarises the chronology of the major regulations, the measures included within them and the objectives of the Cereals CMO from 1975, when the first Cereals CMO was created to take account of the enlargement of the Community to nine states, until the 2003 Mid-Term Review of Agenda 2000 reforms, which prepared the CMO for the enlargement to 25 member states.

The next four diagrams present logical diagrams linking measures to intermediate and final objectives during the period under review in this Evaluation, namely the period from the 1992 reform until just before the application of the Mid-Term Review. The logical diagrams start with Logical Diagram 2, an overall survey of the framework for measures affecting the cereal sector during that period.

This diagram is followed by Logical Diagram 3, which focuses upon the framework for measures affecting cereal prices. There is then a separate diagram (Logical Diagram 4) that concentrates upon the measures affecting foreign trade in cereals; and the final logical diagram (Logical Diagram 5) in this quartet relates to the framework for direct payments to cereal producers.

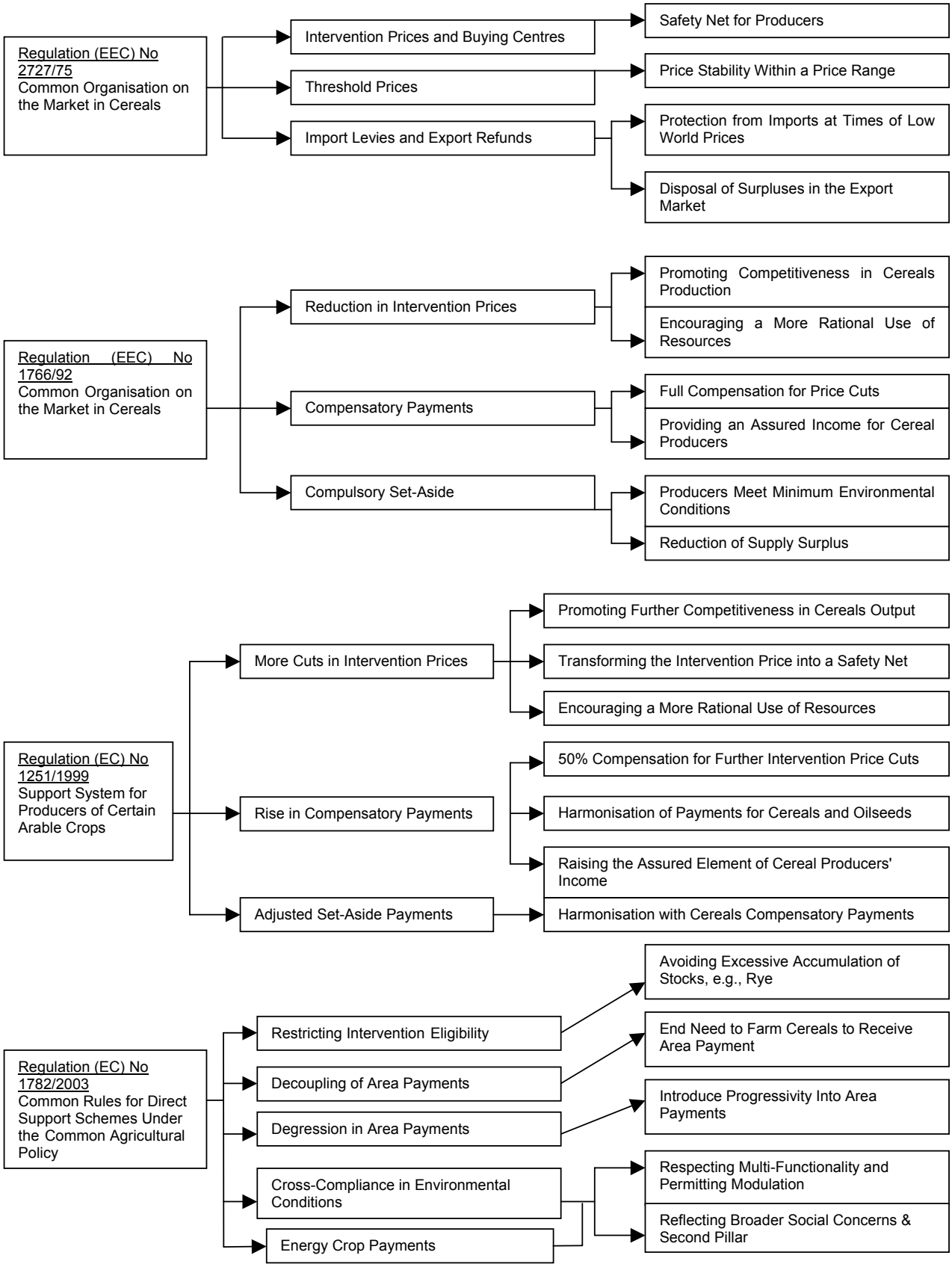
Since the nature of the Cereals CMO has been significantly altered by the Mid-Term Review of Agenda 2000, we have prepared a further logical diagram (Logical Diagram 6) to highlight only those changes that have occurred between the overall measures affecting the Cereals CMO until 2003 (as described in Logical Diagram 1) and those in place after 2003.

To illustrate the most important of these changes, we have started by reproducing Logical Diagram 1, but removed all references to measures prior to the Mid-Term Review[1]. The only references to specific regulations included in the new diagram relate solely to this regulation, 1782/2003.

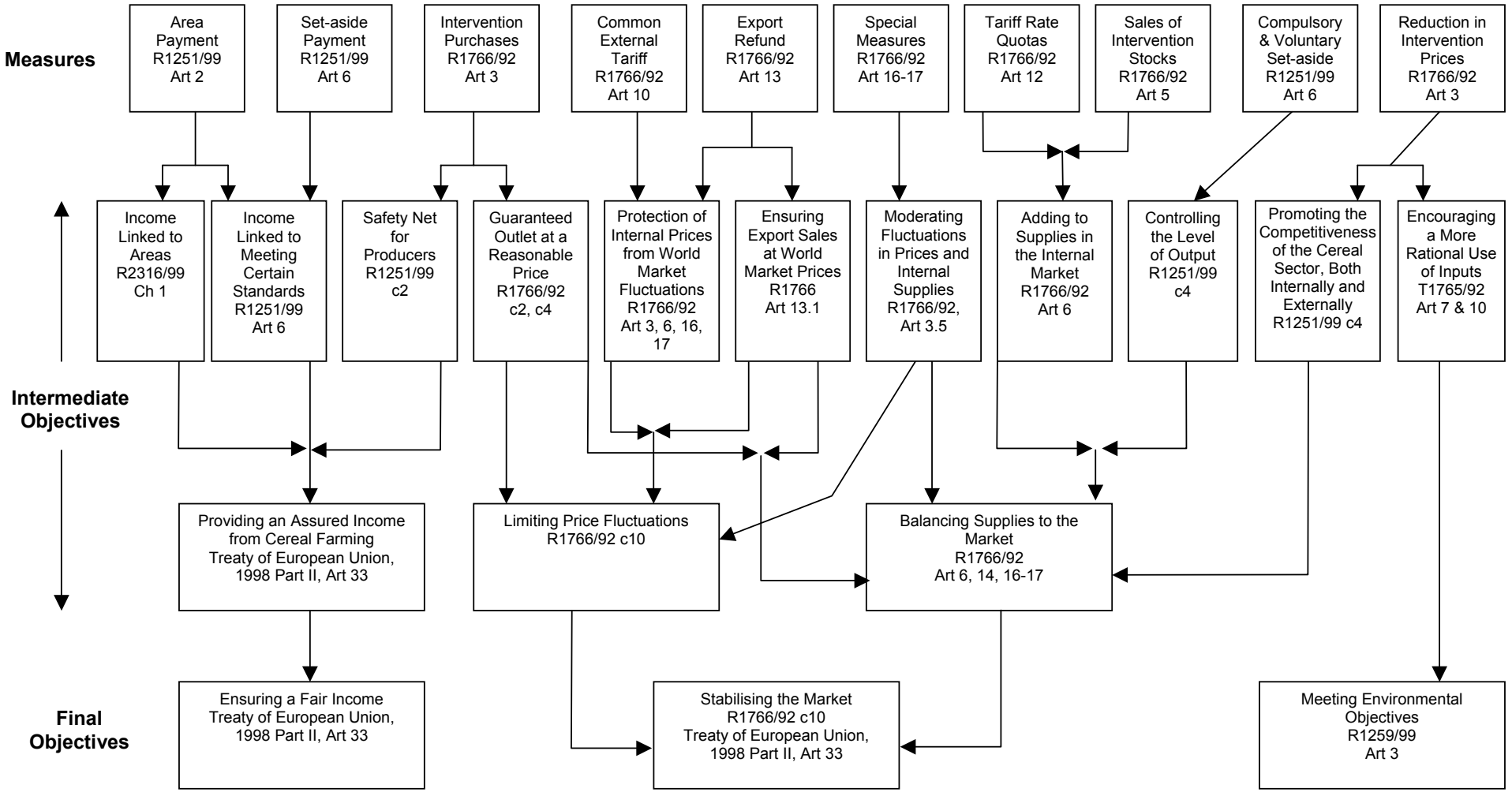
All changes in measures and objectives are highlighted by means of colouring the relevant text boxes in grey. Where new measures and objectives have been introduced into the CMO, the new boxes are also identified in grey.

[1] Described in *Regulation (EC) No 1782/2003, Common Rules for Direct Support Schemes under the Common Agricultural Policy*.

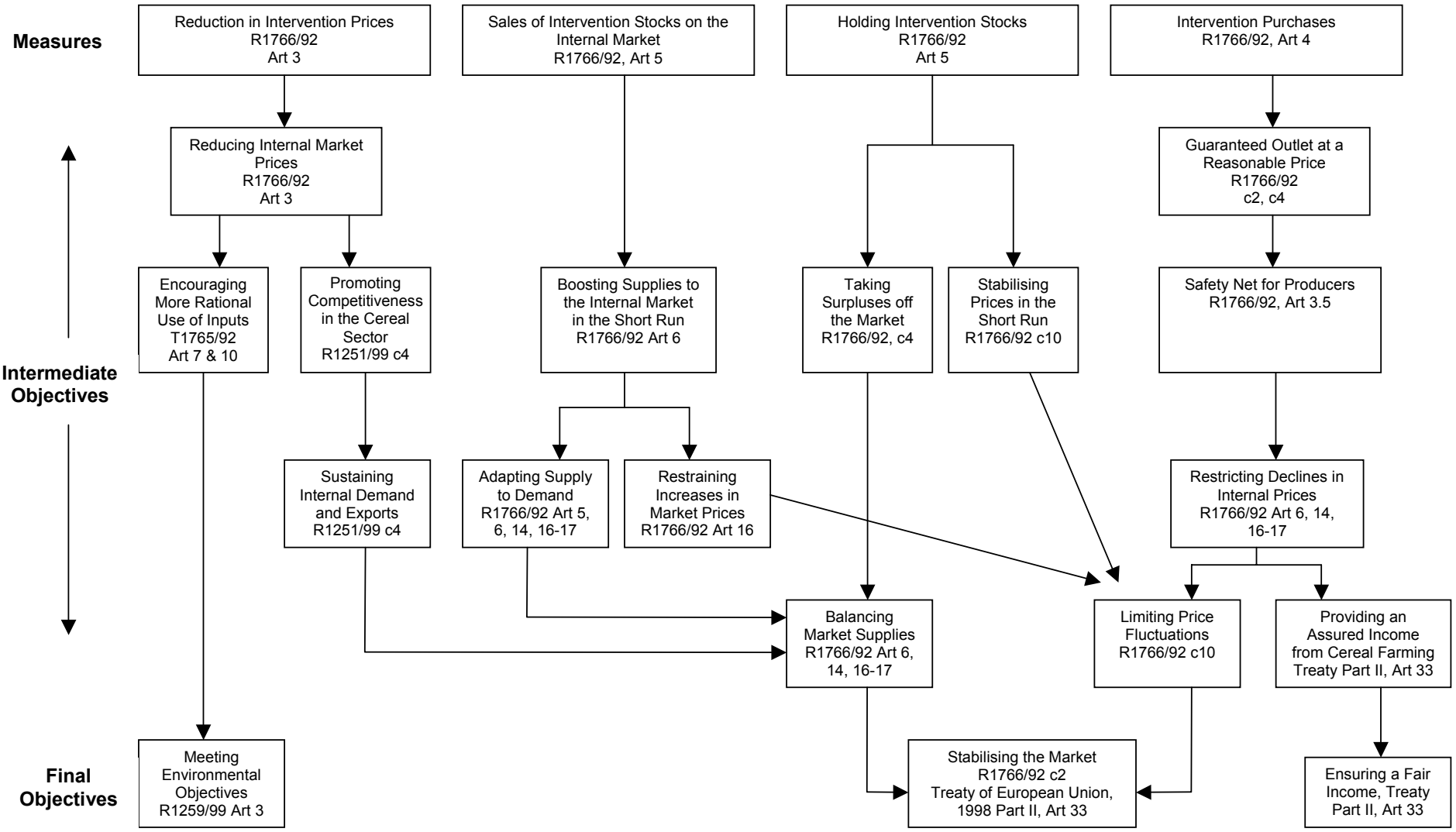
Logical Diagram 1: A Chronology of Regulations, Measures and Objectives in the Cereals CMO, 1975-2003



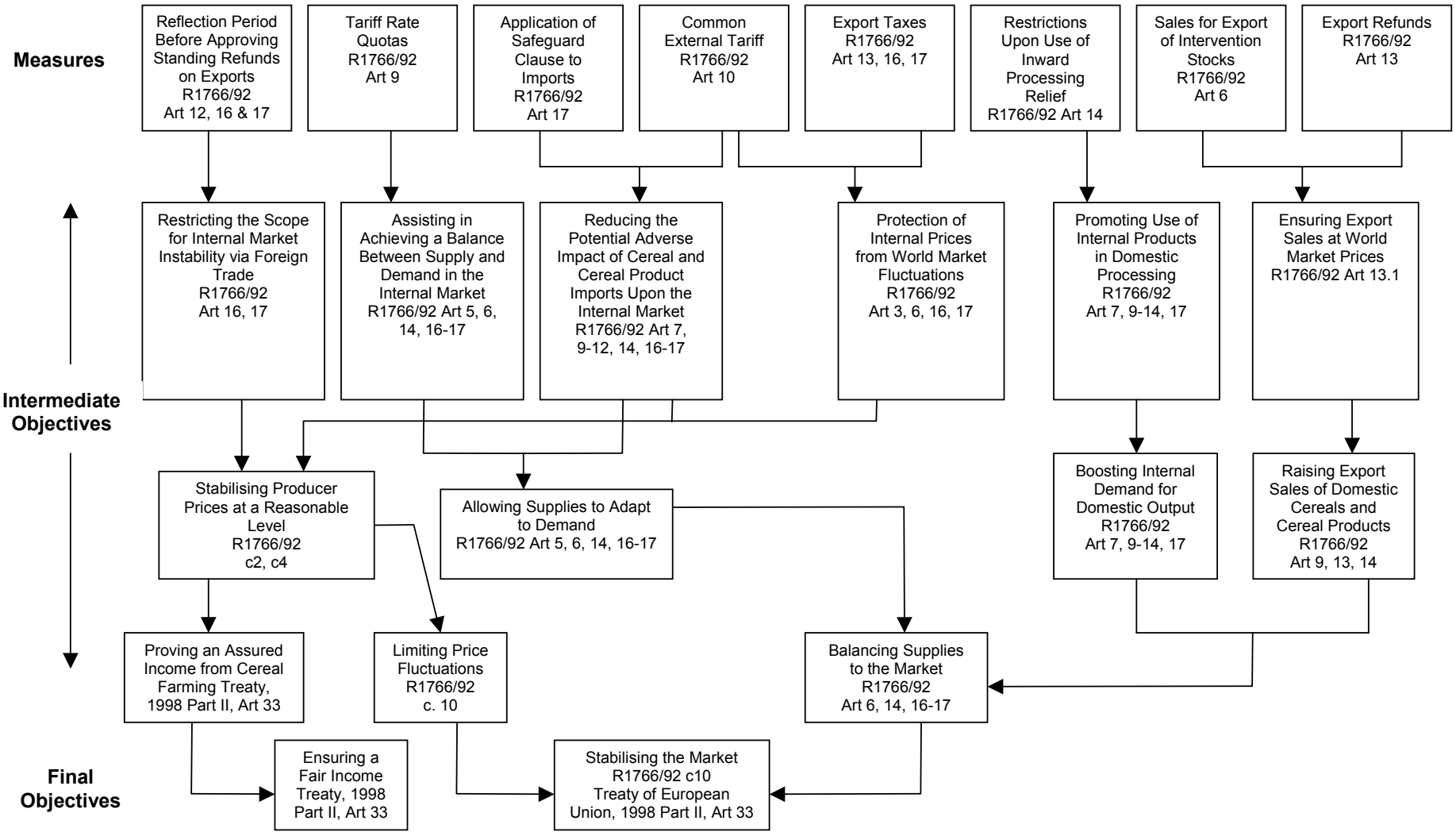
Logical Diagram 2: Framework for Measures Affecting the Cereal Sector



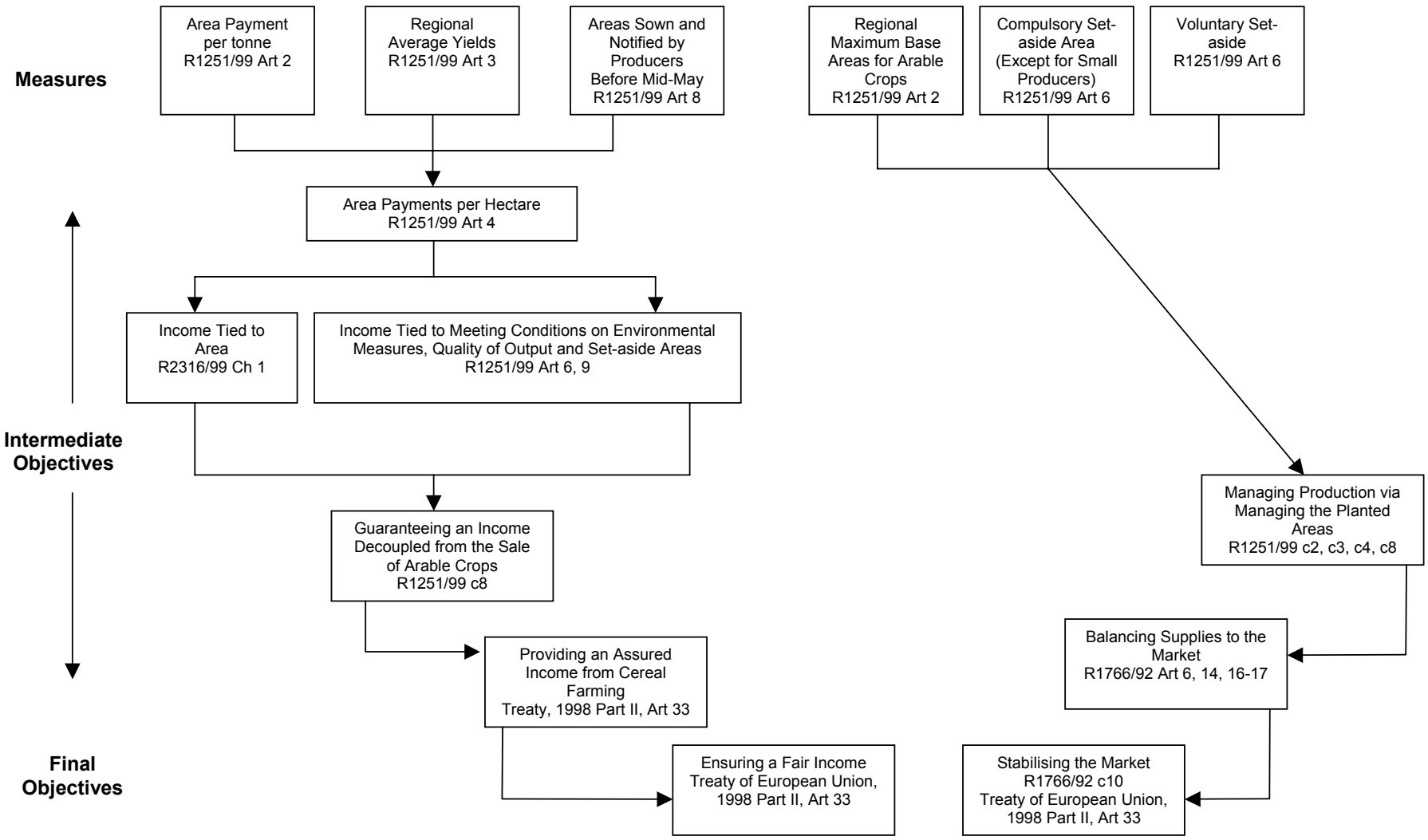
Logical Diagram 3: Framework for Measures Affecting Cereal Prices



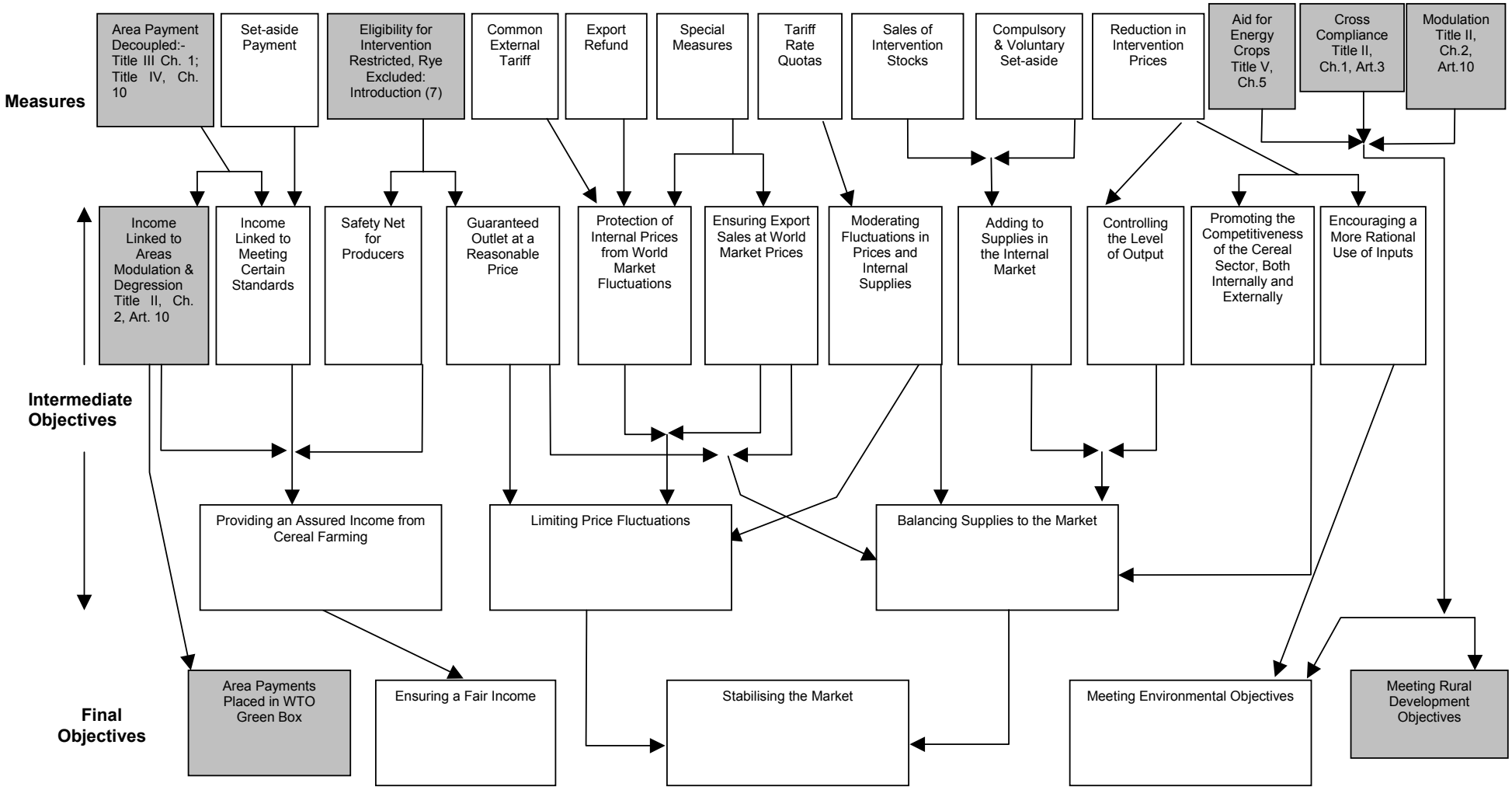
Logical Diagram 4: Framework for Measures Affecting the Foreign Trade in Cereals



Logical Diagram 5: Framework for Direct Payments to Cereal Producers



Logical Diagram 6: Impact of the Mid-Term Review of Agenda 2000 Upon the Framework for Measures Affecting the Cereal Sector



Note: Boxes in grey refer to changes from Logical Diagram 1 as a result of measures under the Mid-Term Review. Throughout the references are to R1782/2003.

Chapter 2: Methodology

If it has not an intervention theory it is not even a policy. *Elliot Stern, Presidential address, 5th European Evaluation Society Biennial Conference, Seville, 11 October 2002*

This report evaluates the relevance, effectiveness and efficiency of the Cereals CMO during a time of major reform. The EU cereals sector encompasses a wide diversity of production conditions, with different cereal crops, productivity levels and sizes of individual holdings in different regions. Also, policy changed frequently and significantly between 1995/96 and 2003/04, which compounds the problem of developing an acceptable modelling approach that isolates the impact of individual measures.

For these reasons, the methodology applied in this report emphasises detailed micro-economic analyses, with eight cereal producing member states selected for careful research. Within these member states, regions were chosen for special study, so as to reflect differing structural and agro-climatic conditions within the Community. A large number of interviews were undertaken with participants in the cereals sector in these member states and regions in order to provide qualitative information to reinforce the results of quantitative analyses of regional data.

The member states and the regions selected for the detailed research are listed in the following box. Case Study monographs, appended to this report, have been prepared for all the eight member states. Different combinations of member states and regions have been selected for comparative analyses of the effects of particular measures. Explanation of the reasons for including the selected regions and member states in the Evaluation is presented in Appendix 6, which explains the choice of individual regions and member states used to provide empirical observations relevant to specific Evaluation topics.

Member States and Regions Selected for Detailed Research

- Denmark
- France: Aquitaine and Centre
- Germany: Niedersachsen and Mecklenburg-Vorpommern
- Hungary
- Italy: Piemonte and Puglia
- Poland
- Spain: Castilla y León
- UK: England and Scotland

The heavy reliance upon quantitative and qualitative methods of micro-economic analysis does not mean that macro-economic analyses were excluded entirely. In the consideration of issues such as the EU's role in the world cereals market and cost-benefit analysis of the welfare effects of the CMO, a macro-economic modelling approach is applied.

This report employs five main methodologies; these are described below.

1. GROSS AND NET MARGIN ANALYSIS

Many aspects of this report relate to the responses of producers to policy measures. Analysis of gross and net margins is employed to assess the economic incentives provided by the CMO to different types of farmers in their production decisions. These

incentives are compared with the observed behaviour of the same groups to determine how the measures influenced cereal output. Within this framework, two alternative approaches are employed. One is based upon detailed analysis of the DG Agriculture Farm Accountancy Data Network (FADN) data, which are presented by specialisation of individual farms, rather than individual crops. The other approach applies the results of regional surveys of producers' returns per hectare from individual cereals vis-à-vis alternative arable crops to determine how CMO reforms in the entire arable crop sector affected the relative profitability of cereal crops. These results are then compared with the observed changes in farmers' choice of crop to estimate how the reforms influenced cereal output. This second approach is described in Appendix 8.

When the latter approach is applied, practical constraints mentioned above, notably the limited period covered by this Evaluation, as well as the agronomic constraints imposed by crop rotations, mean that few significant conclusions emerge in terms of direct links between policy measures and cereal production decisions. Therefore, this Evaluation has relied more heavily upon FADN data in the analysis of margins, as well as other aspects of micro-economic decision-making, such as those regarding input intensities.

The FADN data have three major advantages:

- They are prepared on a consistent annual basis;
- They apply to regions, as well as member states (and thus may be related to the regions selected for special study in this report); and
- They apply to different types of farm specialisation.

Unfortunately, the same data also have three disadvantages:

- They are an accounting, rather than an economic, database;
- They rely upon samples of producers that often change over time[1]; and
- The types of farm specialisation employed by FADN are not defined specifically in terms of their dependence upon cereal production; this is discussed below.

1.1 FADN Typology of Farms

The farm typology that has been applied to the analysis of FADN data is based on the premise that measures taken under the Cereals CMO may have had different effects on producers with different degrees of specialisation in cereal farming, distinguishing between those in different geographical regions and sizes of holdings.

FADN classifications of farm size are based not on area, but on farm gross margins, which in turn are expressed in European Size Units (currently 1 ESU = €1,200 of gross margin). The classification of farms by specialisation is made in terms of the proportions of their total gross margin derived from particular agricultural activities.

[1] In Appendix 7, we compared the results of analysis of incomes based upon a fixed group (a "cohort") of producers with that where analysis is based upon the changing full sample of producers. It emerges that, while it is acceptable to use the full samples to analyse the trends in overall income levels after 1995/96, they are not acceptable, in terms of statistical significance, as a basis for assessing income volatility.

The FADN farm typology distinguishes between many types of specialisation and farm sizes. For this study, four categories and three size categories are singled out for special attention. These farm types and size classes are listed in the following box:

FADN Types of Farm, by Specialisation, Used for Analysis in This Report

- Type 8: Mixed crops-livestock
- Type 13: Specialist cereals, oilseeds and protein (COP) crops
- Type 14: General field cropping
- All Other Types: All other types (livestock and annual & permanent crops)

Specialist COP crop producers are the closest to farms that produce solely cereals. They are defined as holdings for which over two thirds of Standard Gross Margins derive from COP crops. Table 1.5 in Chapter 1, Part 1 reveals that cereals, on average, accounted for 88% of the total area on which EU producers received area payments in 2000/01-2003/04; therefore the average specialist COP producer is, in practice, very heavily dependent upon cereal output. Thus, in this report, we also refer to them as cereals specialists.

Mixed crops-livestock and general field crop producers are also significant COP crop producers, in the former case, often for on-farm feeding, but are not dependent on these crops (and hence on cereals) to the same extent as FADN Type 13. Mixed crops-livestock producers are defined as holdings for which both arable crops and livestock farming contribute between one third and two thirds of the farm's total SGM, whereas FADN classifies as general field cropping producers farms for which more than two thirds of the total SGM are obtained from arable crops other than COP crops.

"All Other Types" represent the combination of all other types of producers, apart from Types 8, 13 and 14. None of the "All Other Types" is significant as a cereal producer.

FADN Farm Size Classes (where 1 ESU = a Gross Margin of €1,200 in 2003/04)

- Small: FADN Size Classes A and B (<8 ESUs)
- Medium: FADN Size Classes C and D (From 8 to 40 ESUs)
- Large: FADN Size Classes E and F (>40 ESUs)

2. REGIONAL AND NATIONAL INTERVIEWS AND QUESTIONNAIRES

The second approach used widely in this report is a programme of interviews and questionnaires (the latter solely for producers) in the selected regions. These provide both qualitative and quantitative information about participants in the cereals *filière* regarding the effect of reforms in the Cereals CMO in the past decade.

The draft questionnaires sent to cereal producers are reproduced in Appendix 10, together with the guidelines to the interviews conducted with different groups in the cereals sector. Many of the issues considered in this Evaluation are best covered by reference to specific case studies drawn from selected regions of the Community. Each regional partner was allocated a subset of these issues (listed in Appendix 6, Table A6.2) that varied accordingly to the specific characteristics of each region. The only topics covered for all selected EU-15 regions are those relating to Chapter 3 below.

The field research yielded 290 completed questionnaires from farmers in the six states that had been members since 1995 and 129 interviews in the full set of eight member

states selected for case studies[2]. The magnitude of the responses is large enough to allow their results to support analysis and conclusions derived from quantitative methods, such as the examination of FADN data. The selection of farmers for the questionnaires (translated into their mother tongue) is described in the next box.

Selection of the Samples of Producers for the Submission of Questionnaires

In all six EU-15 member states selected as case studies, Government agencies were approached to provide a list of farmers in the different categories so that a random sample could be drawn from this list. In most instances we were told that providing such information was illegal. Even when this was not true, official agencies suggested that farmer associations and chambers of agriculture should be contacted instead, since they would have lists readily available, classified by specialisation and size class.

Samples were then selected to provide cross-sections of the three key specialisations outlined above, namely specialists COP crops, mixed crops-livestock and general field cropping producers in small, medium and large farm sizes.

On average, 200 questionnaires were sent out in each region. The number was highest where respondents were not known to the researchers, or where farmers' organisations had not provided some form of introduction to the respondents, since those were the regions which reported the lowest response rates.

3. TIME SERIES ANALYSIS

The third tool that has been employed in this report is the application of econometrics to time series analysis. As mentioned above, the diversity of production conditions and structures in different regions of the Community, as well as the evolving reforms to the Cereals CMO, make it difficult to undertake such analyses. In general, a micro-economic approach is favoured over the use of econometrics, since there are relatively few statistical degrees of freedom available for annual time series analysis between 1995/96 and 2003/04. Where the use of econometrics clarifies aspects of the analysis, econometric models have been fitted using the R statistical package[3]. The statistical methods applied to time series data are described in Appendix 15.

4. WELFARE ECONOMICS COST-BENEFIT ANALYSIS

The fourth methodological approach employed in the analysis is the application of welfare economics to determine the impact of the measures, and their allocation between different groups, such as producers and end-users, within the Community. This approach is described in Appendix 9.

5. TRANSPORTATION ALGORITHM

The final tool that is employed is one which is applied specifically to analysis the geographical segmentation of the market. This is the use of transport algorithms.

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[2] It was not considered useful to send questionnaires to producers in Hungary or Poland, whose experience of the Cereals CMO was restricted to the 2004/05 crop year.

[3] A language and environment for statistical computing, R Development Core Team, R Foundation for Statistical Computing, Vienna, Austria, 2005, 3-900051-07-0, http://www.r-project.org

This technique, based upon linear programming techniques, computes the allocation of cereals between member states in the most efficient inter-spatial manner, so as to minimise the overall transportation costs of supplying the different national markets. This is calculated after applying the realistic constraints that differentials between the market prices in two locations should not be greater than the freight costs for cereals between those locations. (If they were greater than these freight costs, it would be profitable to transport cereals from the surplus to the deficit region.)

6. THE AVAILABILITY OF DATA

The tools employed in the analysis were applied to sets of data, mostly time series, collected from different sources, for which a comprehensive list is presented in Appendix 11.

A problem frequently encountered during this study, particularly regarding micro-economic information, but also, more surprisingly, in respect of certain aspects of the aggregate data for member states and the EU as a whole, is the patchiness and limited availability of data.

- It is remarkable that the UN FAO and US Department of Agriculture (USDA) databases on EU cereal crops are often more detailed and more up-to-date in many respects than the official EU information from Eurostat and DG Agriculture.

- The USDA, like the Australian Bureau of Agricultural and Resource Economics and Agriculture Canada, provides a wealth of detailed micro-economic information about the economics of the crop production, by individual crop, as well as for farms as a whole, within its own borders for every region.

- The corresponding EU information is available only from special regional sources (usually university departments) in individual member states, and are not necessarily prepared on a consistent basis.

- At the EU level, there are important aspects of the implementation of policy that have potentially substantial budgetary and economic costs for which official data are at best partial. No full time series exists, for example, of the areas of different crops grown on set-aside land specifically for energy purposes.

- Even more surprising, since direct payments are the largest single item in the budgetary costs of the Cereals CMO, accounting for more than €14,500 million of expenditures in 2003/04, the Commission does not possess comprehensive information about the regionalisation plans established by the individual member states.

- These plans, which are established for a large number of different regions in some member states, determine the reference yields, and hence the direct payments, that apply to producers of different types of cereals, as well as oilseed and protein crops.

- The same regionalisation plans also determine the regional set-aside payments (with a further budgetary cost of over €1,600 million in 2003/04).

- In the preparation of this study, we were fortunate that we were able to obtain details of regionalisation plans for nearly all the regions covered in the detailed case studies. It was not possible, however, to analyse the effects of these plans at a Community-wide level.

Chapter 3, Part 1: Income of Cereals Growers

A peasant's life may be poor, but it is long. *Leo Tolstoy, How much land does a man need? And other stories, Penguin Books, London-New York, 1993, p.96.*

Have the measures, in particular the level of market support, direct payments and set-aside, helped different types of producers obtain a fair and sufficiently stable income? This analysis will be based on a typology of farms which will take into account, inter alia, the following criteria: specialisation in cereal production, use to which the produce is put, relative amount of direct payments/income from the market, farm size, etc.

Changes in income levels by period and the territorial distribution of the typology selected will also be studied.

For this question, particular attention will be paid to the issue of the possible unexpected effects of the policy measures taken during the period.

1. INTRODUCTION TO ANALYSIS

1.1 Interpretation of the Question

The Cereals CMO pursues the objectives established in the original Treaty of Rome[1], among which the provision of a fair standard of living for producers and market stabilisation are central. Market support, via intervention prices and public stocks, complemented by border measures, stimulated domestic production and transformed the Community from a net importer of cereals prior to 1980 to a structural net exporter.

High internal prices reduced domestic cereal demand from 1984 to 1992, leading both to higher exports and the accumulation of intervention stocks. The policy logic behind the 1992 Cereals CMO reforms was to improve the competitiveness of the domestic cereals on the internal market through reductions in market support. These were combined with supply control measures via compulsory set-aside, as well as area payments, intended to compensate producers for lower prices. The Agenda 2000 reform reduced market support further, but ended compensation for price cuts, introducing, instead, a system of direct payments.

The *fairness* of cereal producers' incomes is interpreted in terms of cross-sectional equity within the internal agricultural sector. The incomes of cereal producers are compared with those of other agricultural producers. These comparisons are made for different types of farms, in terms of specialisation, farm size and geographical regions. Because of the dominance of the cereal sector in EU agriculture, it might be argued that the Cereals CMO in effect is the benchmark against which policies in other CMOs are determined, rather than *vice versa*. In Chapter 6, Part 1, we consider an alternative interpretation of fairness, in which cereal producers' incomes are compared with earnings outside agriculture.

The *sufficiency of the stability* of cereal producers' incomes is also interpreted as applying to comparisons with other agricultural specialists within the EU.

A particular issue in assessing the fairness of incomes that result from the measures is whether pure profits are generated. The factor of production that most directly captures such profits is land. Therefore, special attention is paid to the behaviour of land rentals to determine the influence of CMO measures upon the profitability of cereal farming.

[1] This has been updated frequently under the title, The Treaty Establishing the European Community.

1.2 The Relevant Cereals CMO Measures

The CMO measures relevant to the analysis of producers' incomes are:

- Market support measures, notably institutional (intervention and threshold) prices
- Direct payments and the associated regionalisation plans, determining the reference yields applied in each region of the Community, and
- Set-aside, both compulsory (for larger "commercial" producers) and voluntary

All three measures have undergone reform since 1992, and this process has continued beyond the end of the period covered by this Evaluation, with the introduction of Single Farm Payments in the Mid-Term Review of Agenda 2000. In a parallel development, the Agenda 2000 reform added environmental and social objectives to the CMO, and these were also reinforced and given greater importance in the 2003 reform.

1.3 Judgement Criteria, Indicators and Data Sources Applied in this Section

Table 3.1 lists the judgement criteria employed in this section, together with the indicators that have been used and the sources of data for the analysis.

Table 3.1: Judgement Criteria, Indicators and Data Sources Regarding Farmers' Incomes

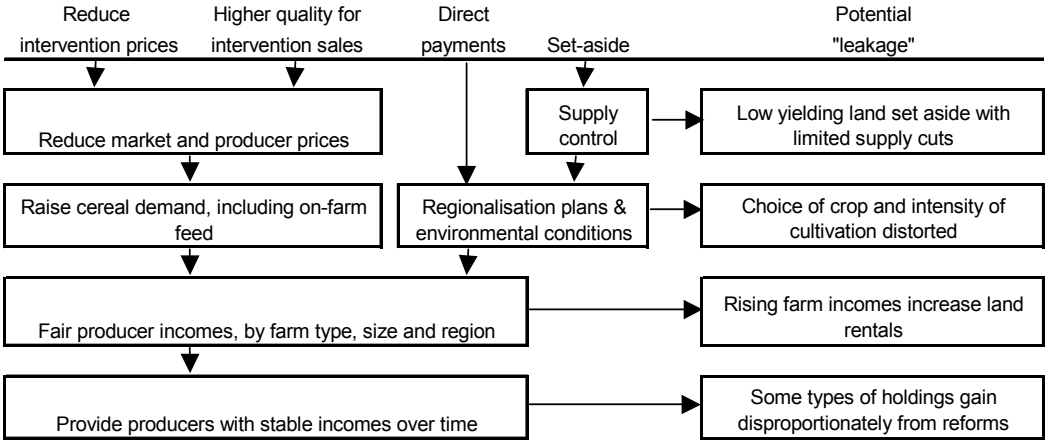
Judgement Criteria	Indicators	Data Sources
Similarity of levels and stability of incomes for cereal specialists and producers	Farm incomes per worker and max-min range of incomes by	FADN database
(a) over time,	(a) farm size,	Data over time on
(b) by size of holding, and	(b) specialisation, and	(a) production
(c) region	(c) region	(b) farm income
Existence of leakages/inefficiencies between the measures and objectives	Division of incomes into (a) market sales, (b) area payments, and (c) set-aside	from (a) the Commission (b) Member States (c) regional sources
Unexpected effects	Incomes if sales made at world prices	
(a) in land values, and	Land rentals and capital values	Case study interviews
(b) changes in choice of crop	Regionalisation plans	Producer questionnaires

Diagram 3.1 depicts the logic behind the CMO reforms since 1992. It also illustrates the potential inefficiencies in implementing the reforms. These leakages arise because the number of policy instruments (three main ones are identified: intervention prices, direct payments and set-aside) is less than the number of objectives (greater competitiveness in the domestic market, fair incomes across different types of farm by size, specialisation and location, as well as market stability and supply control)[2].

These problems are potentially compounded by the manner in which individual member states apply the regionalisation plans which determine the payments made per hectare to producers for different crops and on set-aside land by region.

[2] Jan Tinbergen and James Meade were among the first economists in the 1950s to elaborate the theory that number of independent policy targets must be less than or equal to the number of independent policy instruments for optimal policy formulation.

Diagram 3.1: Reforms to the Cereals CMO and Potential Inefficiency in Outcomes



2. THE EFFECT OF LOWER PRICES ON REVENUE PER TONNE OF CEREALS

In this section, we consider how reforms to the CMO affected overall revenues per tonne of cereals, if market sales and direct payments are combined. This does not take account of other components of farm income, including set-aside, earnings from other crops and changes in farm size. These are discussed later in this chapter.

Table 3.2 has been prepared to simulate the effect of the reforms on the revenues earned from the main EU cereal crops, calculating the average value per tonne of the producer price plus direct payments for the six member states selected for case studies in this report. These averages are weighted averages, reflecting the levels of output in the six member states, and the net revenues per tonne are compared for four periods, the 1989-92, 1993-96, 1997-2000 and 2001-03 calendar years.

Estimating the Effect of the Reforms Upon Average Revenue per Tonne of Cereal

- For each country, we estimated the effect of changes in yields over time on the value of direct payments (which are determined using fixed reference yields) per tonne of actual output.
- In the absence of official EU data on the regionalisation plans applied throughout the Community, we have estimated national average reference yields assuming that they followed the rule stating that reference yields were computed from average annual yields between 1986 and 1990, excluding the highest and lowest values in that period.
- The values in the table are under-estimates. Increases were made to Italian and Spanish reference yields in the Agenda 2000 reform, but the effect of the increases is not known without details of their national regionalisation plans.
- The six member states that are combined in the table are the leading EU cereal producers. They include high price, importing members, Italy and Spain, as well as the main exporters, France and Germany. However, the estimates should be treated as indicative of trends, rather than actual averages for the entire EU.

Table 3.2: Combined Net Revenues from Market Sales and Direct Payments, for the Six Selected Member States, 1989-2003 (ECUs/€ per tonne, adjusted for switchover coefficient)

	1989-1992	1993-1996	1997-2000	2001-2003
Soft Wheat	167.7	185.3	171.2	174.4
Durum Wheat	251.9	417.5	377.1	392.7
Barley	158.4	170.3	155.9	156.6
Maize	181.8	190.0	172.8	181.4
Rye	160.7	167.0	153.5	153.1
Oats	154.0	177.8	161.6	166.5

Source: Eurostat.

Note: Calendar year yield data from 1986 to 1990 were used to estimate reference yields and direct payments.

For every cereal, the period immediately after the introduction of the MacSharry reform saw an increase in average net revenues per tonne. Memoranda preparing the Agenda 2000 proposals interpreted that implying that the direct payments from 1993 to 1996 provided over-compensation, since market prices fell less than had been assumed when determining the level of compensatory payments.

The subsequent two periods saw declines in the average net revenues per tonne for all cereals from their 1993-96 levels. Values in this table are nominal; therefore real net revenues declined more than these figures imply. However, average yields rose over this period, raising total revenues per hectare (if the effects of set-aside are excluded), and average farm sizes increased, as well. These factors are taken into account in the next section, which considers the incomes of entire holdings.

3. ANALYSIS OF THE INCOMES OF FARMERS BY SPECIALISATION

Throughout this report, where FADN farm income data are used to analyse producers' incomes, the statistic that is used is Farm Net Value Added (FNVA) per Annual Working Unit (AWU). We shall refer to this as farm income per worker. FADN calculates this on a consistent basis over time for every region and farm type. A few points should be noted about its derivation, as explained in the next text box.

Farm Income per Worker

- FNVA does not include non-farm income, apart from activities, such as on-farm tourism, which are closely linked to farming. Non-farm incomes are increasingly important in the total income of farm households, affecting both the level and stability of their income over time. This is considered in Part 3 of this chapter.
- FNVA is a form of gross margin, including as income some elements of an enterprise's fixed costs, e.g., wages, rents and interest charges. This means that changes in the structure of farm operations, such as the growing use of outside contractors' services, may affect inter-temporal comparisons of the FNVA.
- This is because fees paid for these services, which are deducted from revenues before calculating the FNVA, include items that would have been included within the FNVA if the farmer had provided the same services.

- A further issue in interpreting farm income per worker is that different types of farms have differing structures of fixed costs. Analysis of FADN fixed cost data by type of farm[3] does not reveal systematic differences in these costs by farm size.
- A concern in analysing FADN data is that its "standard samples" vary in their composition over time. Ideally, analysis of incomes would follow fixed cohorts of individual farmers over time, since they provide the best indication of producers' responses to changes in measures, but few sufficiently large FADN cohorts exist.
- In Appendices 7 and 15, we present statistical tests of the acceptability of using FADN standard samples, rather than cohorts from its database, to analyse levels and volatility of producer incomes. These imply that it is statistically acceptable to analyse income levels using standard FADN samples; but it proves not to be acceptable to analyse the volatility of incomes using the same standard samples.

3.1 The FADN Farm Typology

The FADN farm typology distinguishes between many types of specialist producers. Four are of particular relevance to analysis of the effects of the Cereals CMO:

- Specialist cereals, oilseeds and protein (COP) crop producers, who rely upon these crops for more than two thirds of their farm gross margins. Since cereals account for more than 85% of EU-15 arable areas that received arable aids[4], we consider specialist COP producers to be synonymous with cereal specialists.
- General field crop producers, who typically produce significant amounts of cereals, but receive less than two thirds of their incomes from COP crops;
- Mixed crop-livestock producers, who cultivate cereals, as well as other arable crops, partly for on-farm feed; and
- All other producers, ranging from specialist livestock farmers to permanent crop (tree crops) specialists, who are not included in the three groups given special attention. Weighted averages of the incomes of all farm types that are not significant cereal producers are used as points of comparison against which to assess the fairness of the Cereals CMO on producers' incomes.

FADN data distinguish producers by region and size of holdings. Appendix 7 explains the FADN classification of farm size, from A, the smallest, to F, the largest. For many regions and types of specialisation, the FADN sample sizes are too small to be statistically valid. Therefore, the analysis was undertaken on three size categories:

- Small, combining FADN size classes A and B;
- Medium, combining those in size classes C and D; and
- Large, combining size classes E and F

[3] Appendix 19 does this for rent and interest payments. It reveals that there is no statistically significant difference between larger and smaller holdings in the proportions of their incomes represented by such payments. Analysis of the intensity of use of wage labour in presented in Part 3 of this chapter.

[4] Table 1.4 in Chapter 1, Part 1 presents data which reveal that cereals consistently accounted for more than 85% of the COP crop area covered by arable aid applications from the 1995/96 marketing year onwards (this excludes COP crops set-aside land). The cereals percentage averaged 88% in 2002/03 and 2003/04.

3.2 Farm Income per Worker by Type of Producer

For all 15 member states, as well as each region included in the case studies, farm income per worker has been analysed for the different types of specialisation and size classes in 1995-2002 (see Case Study Monographs and their Appendices, and Appendix 13).

Appendix 14 presents cross-country comparisons for the same types of specialisation and farm size categories.

Diagrams 3.2-3.4 depict the EU-wide results, using weighted averages (with national cereal areas as the weights) to combine the FADN estimates for all 15 member states.

The diagrams contrast farm incomes per worker for the four types of specialist farmers listed above for the three different categories of farm size. The comparisons, both for the EU-15 and by member state (see Case Study Monographs and their Appendices, and Appendix 13), are similar in their results:

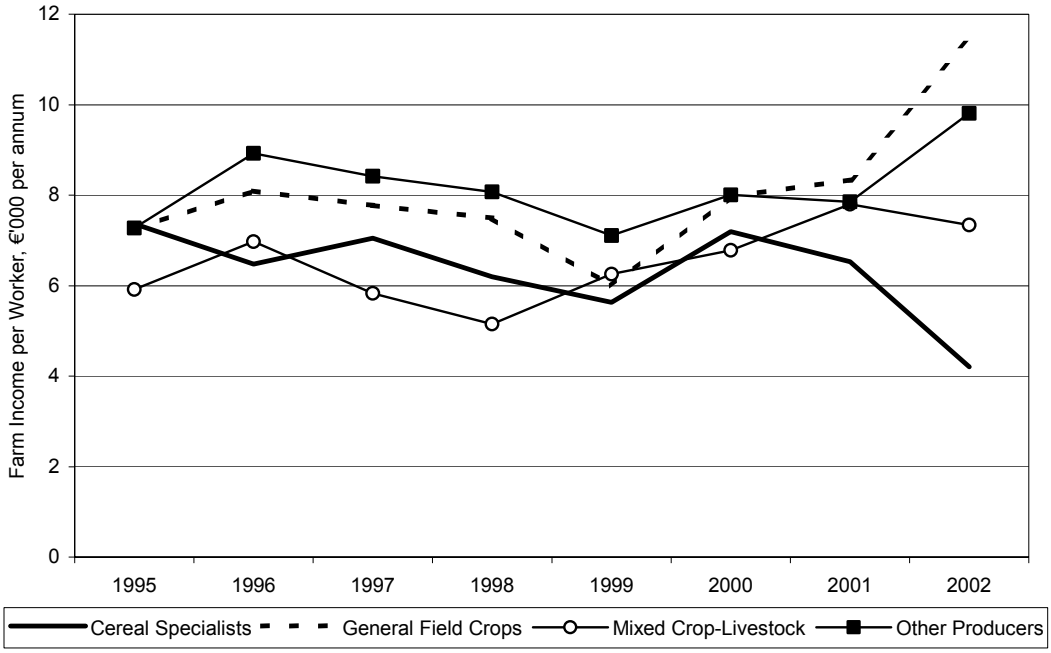
Comparisons of Farm Income per Worker by Size and Type of Farm

- For all farm types in all member states, larger farms earn higher average incomes per worker than smaller farms (see Diagram 3.5 for the comparison for cereal specialists in the six member states selected for the case studies);
- We conducted a series of t-tests, for each country and each specialisation, comparing the means of the time series on income for the three size classes.
- The analysis revealed that for none of the pairs of size classes that were tested was the null hypothesis significant; this is the hypothesis that there was no difference between the two distributions of the income. This reinforces the impression provided by the graphical analysis that farm size is a major determinant of farm income per worker[5].
- Time series analyses yield no evidence that incomes for any of the different farm types or sizes have consistently increased or decreased from 1995 to 2002;
- Analysis also reveals that there is no statistically significant difference between average incomes by farm type over time;
- Yet, the diagrams suggest that cereal specialists' incomes declined relative to other producers, and that they fell in nominal terms from 1995 to 2001 and 2002.
- For both small and medium-sized holdings, cereal specialists had the highest average incomes per worker of the four farm types in 1995, but the lowest in 2002. For large holdings, cereal specialists achieved the highest incomes in both 1995 and 2002, but their advantage narrowed steadily over time.

[5] Given the nature of the data, it is arguable that the t-test does not represent the best tool to test for differences in the means of these data, since some of the assumptions of the t-test model are not met. However, the short run of data - a mere eight years – available for each time series does not lend itself to an analysis where ad hoc time series methods can be applied, since in that case the results could be misleading.

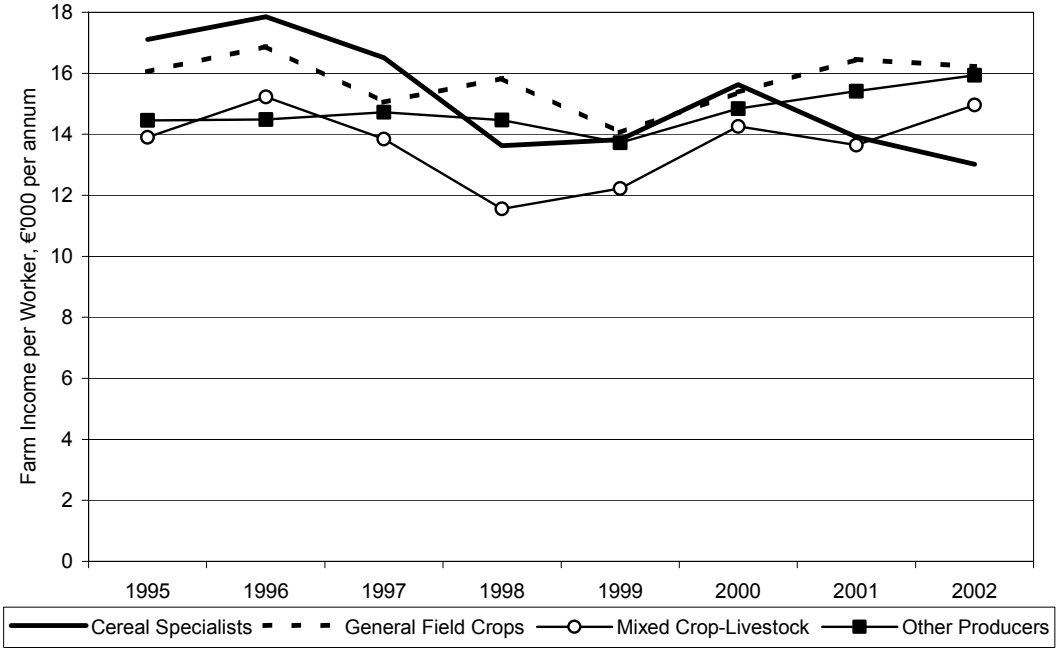
In view of these limitations and the practical objective of this analysis, it was decided to test for differences in means using the t-test.

Diagram 3.2: Farm Income per Worker of Small Holdings in the EU-15 by Specialisation, Weighted by National Cereal Areas, 1995/96-2002/03



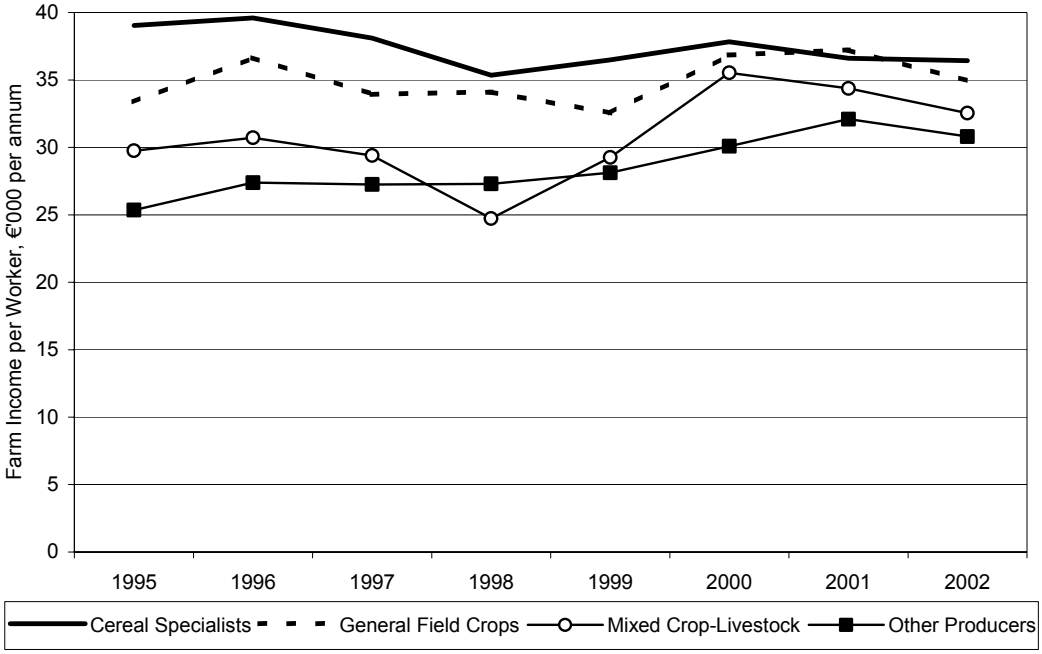
Source: Derived from analysis of FADN data

Diagram 3.3: Farm Income per Worker of Medium-Sized Holdings in the EU-15 by Specialisation, Weighted by National Cereal Areas, 1995/96-2002/03



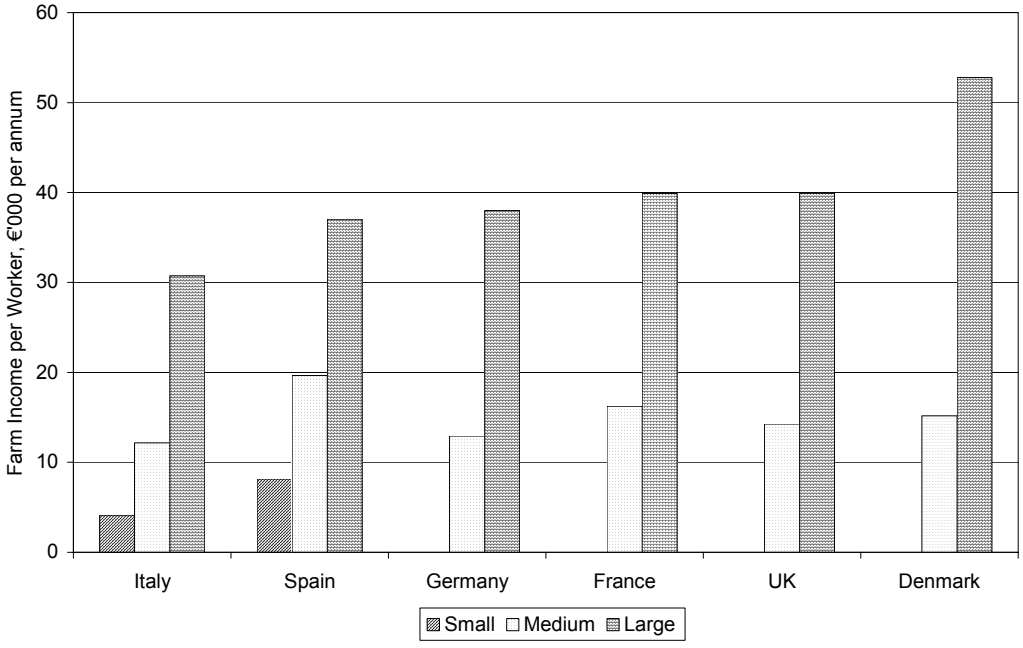
Source: Derived from analysis of FADN data

Diagram 3.4: Farm Income per Worker of Large Holdings in the EU-15 by Specialisation, Weighted by National Cereal Areas, 1995/96-2002/03



Source: Derived from analysis of FADN data

Diagram 3.5: Average Farm Income per Worker for Cereal Specialists for Selected Member States by Size of Farm, 1995/96-2002/03



Source: Derived from analysis of FADN data

3.3 Volatility of Incomes

As mentioned earlier, statistical analysis was undertaken of the volatility of FADN income estimates within constant cohorts (of the same individual producers over time) and within FADN standard samples (of a changing sample of producers over time) in the regions selected for the case studies. The results are presented in Appendix 14.

There are only a few regions and farm types for which the cohorts are sufficiently large to permit proper analysis; for these regions and farm types, the volatility of the cohorts' incomes can be shown to be significantly different, in a statistical sense, from that for the standard samples. Therefore, analysis of income volatility within FADN standard samples cannot be considered valid as a basis for conclusions about the effect of the CMO measures upon the stability of the incomes of a given group of cereal producers.

Unfortunately, there are only three of the ten regions selected for case studies for which the available cohorts are sufficiently large to be suitable for analysis. Even for these three, only a few of the specialisations and farm sizes are cohorts large enough to use for analysis. For these, no significant conclusions can be drawn regarding income volatility. Therefore, we adopt an alternative approach to assessing the volatility of producers' incomes, taking the absolute range of the dispersion of average incomes per worker from 1995 to 2002 as an approximate guide to their stability in those years.

This approach compares the arithmetic means and maximum-minimum ranges of farm incomes per worker over the eight FADN accounting years from 1995 to 2002, by member state, specialisation and size class. The details are provided in Appendix 14.

Diagram 3.6 summarises the results by specialisation and across size classes for the EU-15 as a whole. In each case, the diagram depicts the mean (the lozenge) and the range (the solid lines) from the maximum to the minimum values of farm income per worker in the years from 1995 to 2002 for the relevant specialisation and size class.

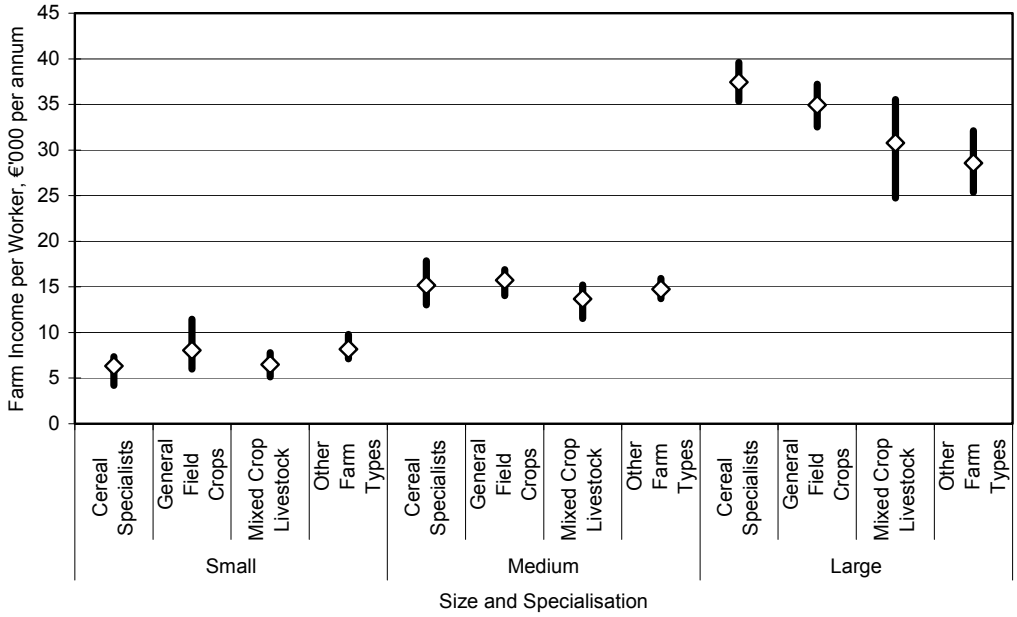
These comparisons (and the results are also valid for each member state) reveal that, for each comparison of farms by size, the eight year minima of the average incomes per worker for larger farms are always higher than the maxima for smaller farms for each of the four types of specialisation.

The observed volatility in the average incomes combines four different influences:

- Instability in yields as a result of climatic conditions;
- Instability in producer prices; this was moderated by the effect of the CMO measures providing market support via intervention and threshold prices, when compared with world market prices;
- The stability provided by the introduction of direct payments; and
- The effect of set-aside payments, where the percentage of compulsory set-aside areas for "commercial" (larger) cereal producers changed over time.

In closed markets, changes in yields tend to be reflected in price changes in the opposite direction, which helps to stabilise revenues. Market support in the Cereals CMO weakens the extent of the offset, but direct payments provide background stability to producers' incomes that is reflected in the levels of income volatility depicted in Diagrams 3.2-3.4 and 3.6.

Diagram 3.6: The Mean and Range of Farm Incomes per Worker by Specialisation of Production and by Farm Size in the EU-15, 1995/96-2002/03



Source: Derived from analysis of FADN data

4. IMPACT OF CMO MEASURES AFFECTING CEREAL PRICES UPON THE PRODUCERS' INCOMES BY FARM TYPOLOGY

The 1992 and Agenda 2000 reforms reduced internal cereal prices, thereby influencing the difference between internal and world market prices for the main cereals. In this section, we consider the effect of these measures upon cereal producers' incomes.

The measures' influence upon internal-external cereal market price differentials and producers' incomes is analysed in Appendix 16. The world market price for cereals, measured at the EU border, is viewed as the appropriate benchmark against which to assess the effect of the CMO measures upon internal prices. The extent to which the measures raise internal prices above border prices is assumed to equal the average export refund in the cases of wheat, barley and rye, in all of which the Community is a net exporter. For maize, in which the EU is a net importer, the effect of the measures in raising producer prices above world market levels is assumed to equal the average difference between the internal market price and the c.a.f. import cost.

It is also assumed that price-raising effects of the CMO measures are transmitted to all producers as the same absolute amount. The derived estimates of the measures' influence upon farm revenues are applied to FADN data to assess the share of producers' incomes attributable to the effect of CMO measures upon producer prices[6].

[6] Chapter 5, Part 4 examines the impact of transport costs upon the cereal prices within the Community. It concludes that, apart from landlocked areas where intervention stocks accumulate because price gradients are insufficient to cause cereals to flow to deficit areas or for export, the current price differentials in the EU reflect freight costs from surplus to deficit areas. Prior to the latest enlargement, the main cereal surplus states were also coastal states; thus price transmission from EU borders to producers in different regions was considered to have been relatively efficient during the period under evaluation, prior to 2004/05.

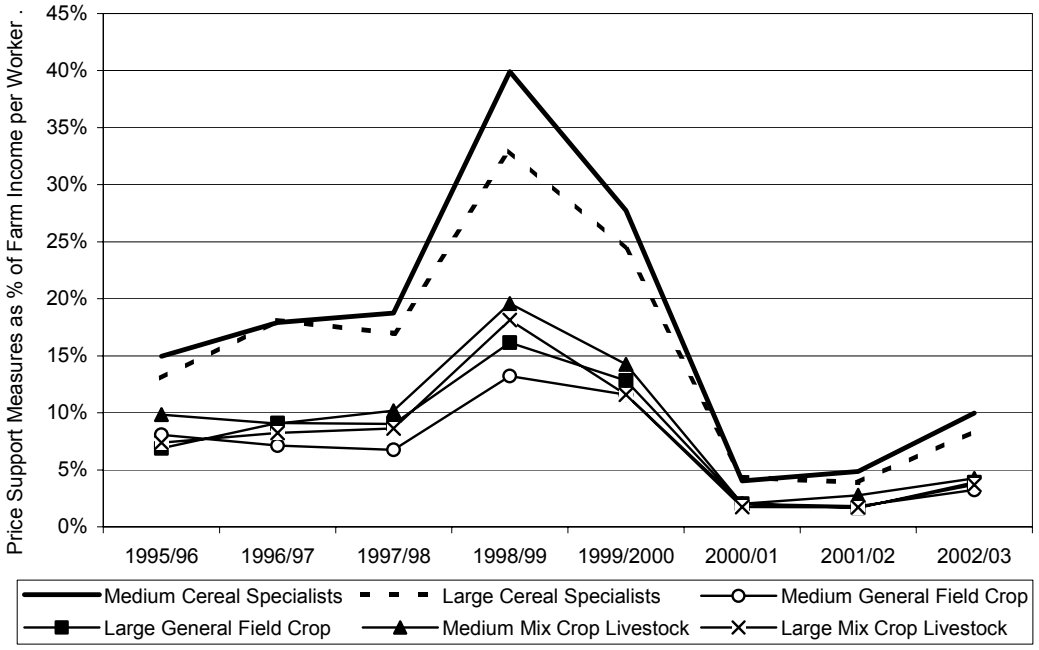
Analysis of the effect of the measures upon prices was undertaken for the six member states selected for the case studies.

Diagram 3.7 presents the results of weighting the effect of price support measures across the member states, using as the weights their cereal areas. This analysis is prepared solely for medium and large farms, for which information is available for all six countries. Sufficiently large samples of FADN data to allow incomes on small farms at a national level exist only for two of the six selected member states (Italy and Spain).

The results indicate that:

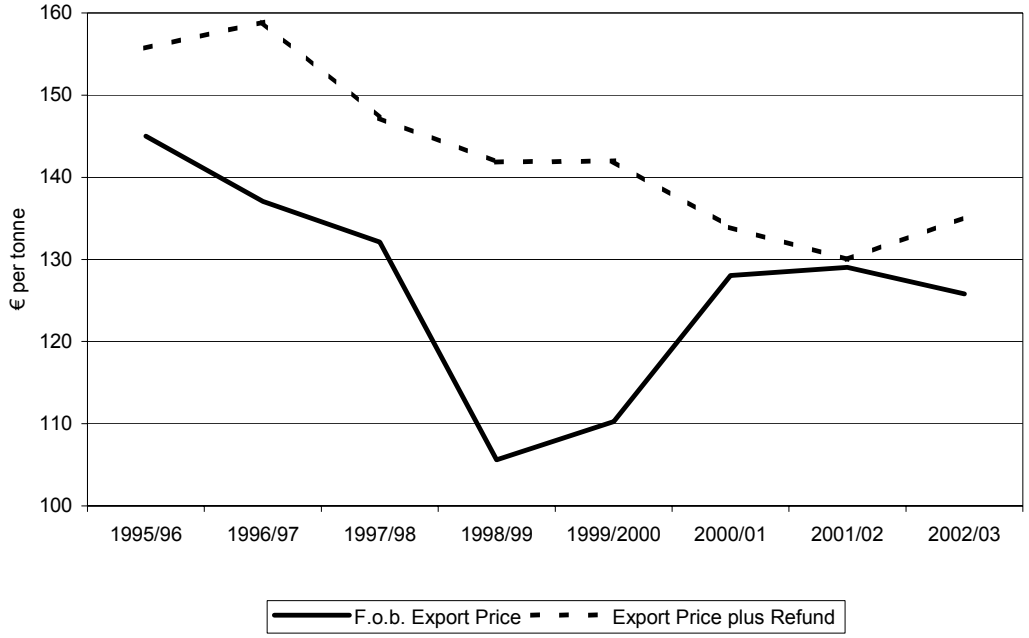
- The share of farmers' incomes attributable to CMO measures that lifted internal prices above world prices rose to a peak in 1998/99.
- This coincided with a period of unusually weak world market prices, as may be seen from Diagram 3.8, which compares EU common wheat export prices with the same prices plus export refunds from 1995/96 to 2002/03.
- After 1998/99 and 1999/2000, the share of farmers' incomes attributable to price support measures fell to relatively low levels, which were typically well below the levels observed in the mid-1990s.
- For all countries, cereal specialists benefited most from the price supporting measures, which is consistent with their high dependence upon cereal output.
- For cereal specialists, there is some evidence that large producers benefited slightly less than their medium-sized counterparts from market support measures.

Diagram 3.7: Average Effect of Measures Raising Cereal Prices as a Proportion of Farm Income per Worker in the Six Selected Countries, 1995/96-2002/03



Source: Derived from analysis of FADN data

Diagram 3.8: Comparison of EU f.o.b. Common Wheat Export Prices, With and Without Export Refunds Included, by Marketing Year 1995/96-2002/03



Sources: USDA ERS and COMEXT export price data

5. THE IMPACT OF AREA AND SET-ASIDE PAYMENTS UPON FARM INCOMES

The CMO measures also influenced cereal producers' incomes via direct payments and compulsory set-aside for commercial farmers, both of which were first introduced in the 1992 reform. That reform set payments per tonne for set-aside higher than those for cereal area payments. The monetary values were unified in Agenda 2000.

These payments made a direct contribution to producers' incomes. In addition, the set-aside requirements restricted commercial farmers' ability to maximise their earnings from cereal crops. Appendix 17 presents analyses of the impact of area and set-aside payments and of the constraints created by set-aside requirements (in restricting commercial producers' ability to cultivate cereals freely on their arable areas) upon farm incomes. These compare the three farm types most reliant on cereal output: cereal specialists and general field crop and mixed field crop-livestock producers. We shall focus in the following discussion upon the most relevant group, cereal specialists.

The contribution of area and set-aside payments to farm income per worker may be determined from FADN data. Nine of the ten case study regions (Puglia is the sole exception) have sufficient data for the largest cereal specialist farms. Seven regions have sufficient data from which to analyse medium-sized holdings (Mecklenburg-Vorpommern, Niedersachsen and Scotland are the regions absent from the sample). For small holdings, only one region, Castilla y León, has data available for analysis.

In the detailed analyses in Appendix 17, we contrast average results for the ten regions in the 1995/96-1997/98 accounting years with those for 2000/01-2002/03[7].

[7] Examination of estimates for the intervening period, 1998/99-1999/2000 reveals that they are broadly similar to the average values observed in 1995/96-1997/98 and 2000/01-2002/03.

To analyse the constraints imposed upon farm income by the set-aside requirement under the CMO measures, we assumed that set-aside areas – if cultivated, rather than set aside – would have yielded 70.5% of the gross margin per worker of land under cereal cultivation[8], where the gross margins are calculated before the payment of either area payments or set-aside payments.

In interpreting these results, it should be noted that:

- The area payment increased from €54.34 per tonne in 1995/96-97/98 to €58.67 in 2000/01 and €63.00 per tonne in 2001/02-2002/03, which was then multiplied by the reference yield determined by the regionalisation plan for each region.
- Set-aside payments fell from €68.83 per tonne in 1995/96-97/98 to €58.67 in 2000/01 and €63.00 in 2001/02-2002/03. These values were multiplied by the set-aside reference yield determined by the regionalisation plan for each region.
- In Italy and Spain, average reference yields rose in the Agenda 2000 reform.
- Changes in labour intensity over the period affected farm income per worker.
- Also, since FADN data refer to a sample of producers that changes over time, there is a margin of error inherent in inter-temporal comparisons of income data.

Considering the effect of changes in area and set-aside payments and regionalisation plans, one would expect to observe that, in the absence of changes in labour intensity:

1. In Italy and Spain, the higher reference yields under Agenda 2000 would raise their area and set-aside payments more steeply than in other member states.

2. Because set-aside payments per tonne were higher than cereal area payments in 1995-97, but were the same in 2000-02, the assumption of no set-aside would have been more likely to have caused a loss of farm income in the earlier period.

3. In regions with unchanged reference yields in Agenda 2000 (i.e., regions outside Italy and Spain), higher area payments would raise the farm income per worker from such payments by 13.3% between the two periods, while the reduction in set-aside payments would decrease set-aside payments per worker by 10.6%.

It may be expected that, with high labour productivity and reduced intensity over time:

4. Farm income per worker and the contribution of area payments would both rise by more than 13.3% outside Italy and Spain. Likewise higher labour productivity would lead to a decrease of less than 10.6% in set-aside payments per worker. (These percentages are the changes in average payments per tonne between the periods.)

Analysis of the FADN data for cereal specialists appear to support only the first and second of these four expected outcomes. We observe that:

[8] This figure of 70.5% represents the estimate derived in the DG Agriculture Set-aside Evaluation study of the ratio of arable crop yields in 1996-99 had they been grown on set-aside land to the actual yields recorded on non-set-aside land. Our assumption regarding gross margins is equivalent to assuming that both inputs and outputs per hectare on set-aside land, if cultivated with cereal crops, would have been 70.5% of those on non-set-aside land. In other words, we assume that cereal input costs per hectare move *pro rata* with cereal output per hectare. Sensitivity analyses suggest that the conclusions are not significantly affected by changes in this assumption regarding the intensity of input use.

- Italy and Spain tended to benefit more than other member states in the rise in their incomes earned from area and set-aside payments in 2000-02.

- The data also support the hypothesis that abandoning set-aside would have reduced absolute farm incomes in more regions in 1995-97 than in 2000-02.

- Among large farms, ending set-aside would have reduced total incomes in three out of nine regions in 1995-97, but would have done so for no regions in 2000-02.

- Among medium-sized farms, an end of set-aside would also have reduced total incomes in 1995-97 in three out of the seven regions for which data exist. Ending set-aside would have reduced incomes in only two regions in 2000-02.

The last two expectations, regarding trends in area and set-aside payments per worker, were not generally borne out by the data.

- Only for Scotland and Denmark, among the regions outside Italy and Spain, did the average income per worker on large cereal specialist holdings earned from area payments rise by as much as 13.3% between the two periods

- For medium-sized cereal specialist holdings outside Spain and Italy, not one region recorded an increase in area payments per worker as high as 13.3%.

- Among large and medium farms in regions outside Italy and Spain, only England and Scotland saw set-aside payments per worker increase by more (fall by less) than the reduction of 10.6% expected from the revisions to set-aside payments.

- For Italy and Spain, too, there were instances where area or set-aside payments per worker rose by less than would be expected with constant labour productivity.

It is possible that the complexity of regionalisation plans caused the FADN regional samples of producers, by chance, to shift between the two periods towards areas with lower reference yields, but regionalisation plans in Denmark and the UK are simple, with minimal variation in reference yields between crops and regions, and in Germany they are comparatively simple.

For some regions in these countries, therefore, it seems that the measures had the unexpected effect of raising labour intensity since 1995-97.

For France, as well as Italy and Spain, regionalisation plans are more complex, and there is strong evidence from the case studies for these countries that producers shifted from cereals with lower reference yields to ones with higher values, notably from wheat to maize and unirrigated to irrigated farming. In these cases, the levels of area payments per hectare increased, but so also did labour intensity, generating the observed outcome.

5.1 The Share of Area and Set-Aside Payments in Farm Incomes

With the general decline in cereal producer prices, caused by reduced CMO market support between 1995-97 and 2000-02, alongside the rise in area payments in the Agenda 2000 reform, it would be expected that the overall percentage of area payments in cereal specialists' farm incomes would increase between the two periods – unless, that is, cereal yields increased sufficiently rapidly to offset both the fall in market prices and the application of fixed reference yields to the area payments.

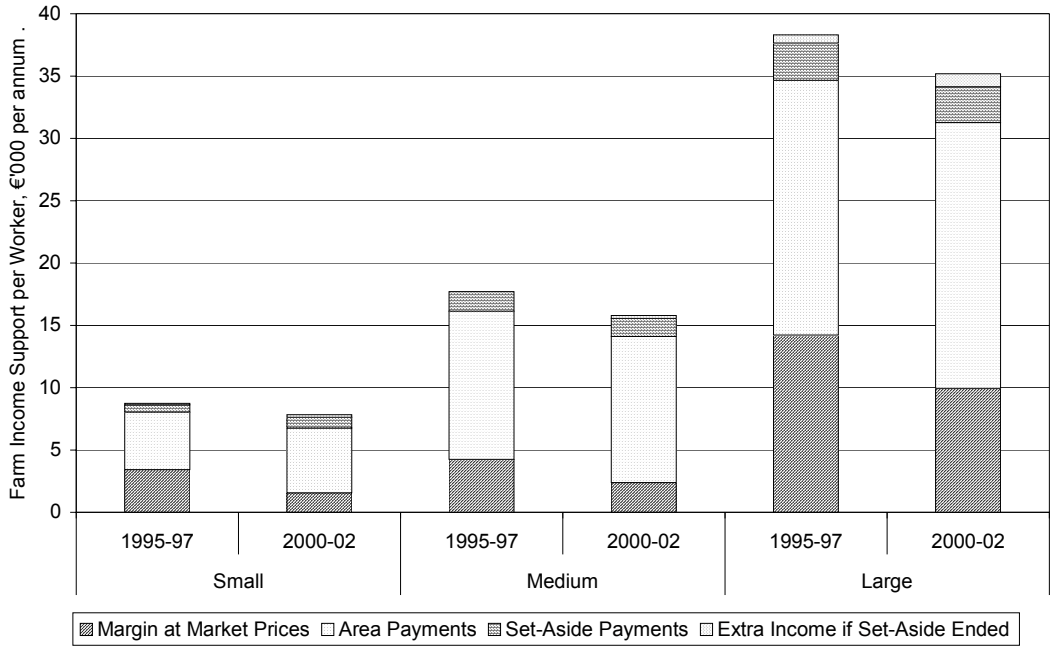
Set-aside payments per tonne were lowered between the two periods, but set-aside makes a much smaller contribution to producers' incomes than area payments.

Thus, we expect to observe rising dependence of cereal producers' incomes upon area and set-aside payments and less upon market sales from 1995-99 to 2000-02.

Diagrams 3.9 and 3.10 summarise, first by value and then as a percentage, the analysis of cereal specialists' incomes presented in Appendix 17. For each size category, arithmetic means have been calculated for all the regions in that category of the farm income per worker from market sales, area payments and set-aside. In addition, estimates are included of the opportunity costs of set-aside for the producers.

As noted earlier, the available data allow analysis to be prepared of farm incomes for large holdings for nine of the ten regions that are surveyed in detail in this report. For medium holdings, data are available for seven of the regions. For the small farms, there are sufficient data only for one region, Castilla y León, to be included.

Diagram 3.9: Market Sales, Area Payments and Set-aside in Cereal Specialists' Farm Income per Worker by Farm Size, 1995/96-1997/98 and 2000/01-2002/03



Source: Derived from analysis of FADN data. Nine of the ten selected regions are included in the Large class (Puglia is the exception); seven regions are in the Medium class; only one region (Castilla y León) has data for Small holdings

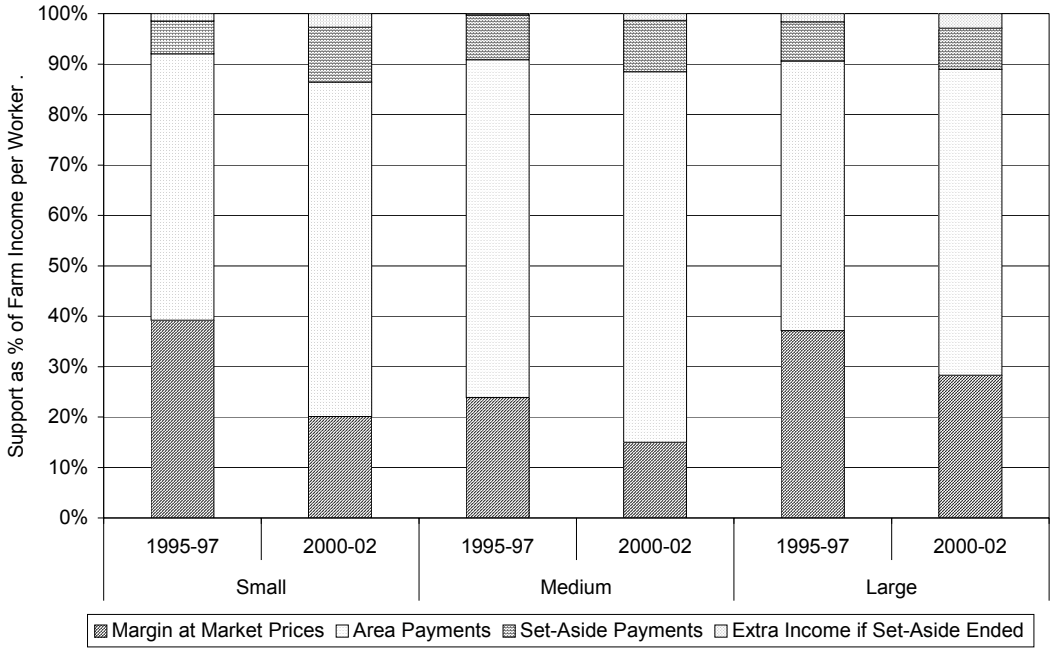
Detailed examination of the data by region, farm size and specialisation reveals that the hypothesis about the effects of the CMO measures on the balance between different sources of income is generally valid.

- Both in absolute terms and as a percentage of total farm income, revenues from market sales declined between the two periods, as domestic cereals became more competitive in the internal market.

- For 14 of the 17 combinations by region and size for cereal specialists, the share of producers' incomes derived overall from area and set-aside payments increased between 1995-97 and 2000-02.

- On average, direct payments represented over half the farm income in both periods. This is examined more fully in Part 2 of this chapter.
- Larger cereal specialist holdings in all regions and in both periods invariably received larger area and set-aside payments per worker than smaller holdings.
- The imputed gain in farm income if set-aside had not existed was negligible in 1995-97, and was only modest in 2000-02.
- Incomes per worker from area and set-aside payments are lower for farm types that are less heavily dependent upon cereal production. This is no surprise.
- Member states (mainly in Southern Europe) with a farm structure that includes many smaller holdings receive lower average area and set-aside payments per worker than those states with a structure weighted more towards larger holdings.
- However, from our regional case studies, there is no evidence that, for the same size of holdings, there is any systematic difference between different regions of the Community in the reported composition and level of farm income per worker.

Diagram 3.10: Shares of Market Sales, Area Payments and Set-aside in Cereal Specialists' Farm Income by Farm Size, 1995/96-1997/98 and 2000/01-2002/03



Source: Derived from analysis of FADN data. Nine of the ten selected regions are included in the Large class (Puglia is the exception); seven regions are in the Medium class; only one region (Castilla y León) has data for Small holdings

This analysis indicates that the largest cereal specialist farms received both the highest absolute and relative margins per worker from market sales in the most recent period.

In addition, they would gain the most if set-aside were removed. Hence, they are the category best placed to compete in a more liberalised market with fewer forms of income and price support. However, after initially opposing set-aside, commercial farmers now use it as a management tool in their rotations and as a way of meeting the increasingly strict environmental requirements in the Agenda 2000 and 2003 reforms.

6. LAND VALUES AND OTHER INFLUENCES UPON FARM INCOMES, INCLUDING EVIDENCE FROM NATIONAL AND REGIONAL CASE STUDIES

If CMO measures affected the profitability of cereal farming, land was the factor of production whose price should reflect the change most directly. In practice, land is very rarely dedicated solely to cereal farming; but cereals are by far the most important arable crop. As noted earlier, cereals accounted for more than 85% of the non-set-aside arable crop area in recent years. Therefore, it is reasonable to suppose that the profitability of cereal production is a very major determinant of the profitability of overall arable farming and of the use of agricultural land in general in the important cereal producing regions that are the subject of the case studies[9].

This view is supported by the 2003 analysis undertaken by the OECD[10], which examined the efficiency of transfers from taxpayers and consumers to the income of farm households via different measures applied in OECD member states.

The OECD study concluded (page 73):

Area payments deliver greater income benefit per dollar of taxpayer (or consumer) costs than other forms of support studied. However, nearly 100% of those gains take the form of increased land rents. Furthermore, increased land rent accounts for the greatest share of the income gain farm households enjoy from farm support, regardless of the policy mechanism used to deliver that support.

The evidence of arable land values discussed in case study monographs and of producer questionnaires (see Appendix 12) is that a widespread phenomenon in recent years has been a significant increase in the capital value of land, as well as less marked increases in the rental value of land.

Other factors influence land values, besides the links identified by the OECD between farm support measures and land rentals. Demand for land for housing, tax advantages for agricultural landowners, competition among farmers to acquire nearby land for expansion in markets where little land changes hands from one year to another, and growing demand for land from corporate investors, all play a role in raising land prices.

In interpreting the increasing value of cereal farming land, one should also note that land markets are often subject to controls (as the French and UK case studies describe), but these should only affect the value of land over time if the nature of the controls has altered. If they have not changed, then land prices should only have increased if landowning has become more profitable and/or interest rates have fallen.

Land rentals are a more valid indicator of pure profits than capital values because of the effect of interest rates. Whereas land prices would rise, all other things being equal, if interest rates fall, land rentals should be stable. Accordingly, in Table 3.3 we compare land rentals for different cereal specialist farm sizes.

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[9] This was the view of the Court of Auditors regarding the Cereals CMO. Its Special Report No. 2/99 stated (paras 4.47-4.48): "A major determinant of wealth, and thus of the standard of living, is the value of land owned by farmers. As the stream of income expected from this land is a principal determinant of the selling price, the reform, which attributes a fixed and definite income to the land, will certainly have an impact on land values. Owing to the lack of empirical data, the Court was unable to estimate this impact."

[10] OECD, Paris (2003), Farm Household Income, Issues and Policy Responses

Rentals have generally risen since 1995, suggesting that the increases observed in arable land capital values over this period were not due solely to falling interest rates. The Cereals CMO measures, affecting the main source of arable farm incomes, increased the annual rental of land.

Table 3.3: Annual Land Rentals, Cereal Specialists by Size, 1995-97 and 2000-02 (€/ha.)

	Small		Medium		Large	
	1995-97	2000-2002	1995-97	2000-2002	1995-97	2000-2002
Denmark			265	287	299	329
France			95	107	110	122
Germany			166	182	156	168
Italy	115	120	131	127	177	163
Spain	60	89	56	88	63	91
UK			155	145	147	168

Source: FADN database, derived by dividing rentals per holding by rented area per holding.

This result - rising land rentals and, by implication, growing profitability of cereal farming - appears to run counter to the evidence from Diagrams 3.2-3.4 above, of merely stable nominal farm incomes per worker for cereal specialists since 1995. Three possible explanations were advanced in the case studies for this outcome: the growing role of contractors; various tax and social security incentives for understating actual farm incomes; and the growth in non-agricultural sources of farm household incomes. These are discussed in Part 3 of this chapter, which examines the changing structure of cereal farming.`

7. CONCLUSIONS

Comparisons were prepared across regions and over time of producers' incomes for four separate types of farms by specialisation: cereal specialists, general field crop producers, mixed crop-livestock producers and all other types of farming combined. The cereal specialists have the greatest dependence upon cereal production, while the final category in the comparison has very little dependence upon cereal farming.

We conclude from our analysis of FADN data that, within each of the small, medium and large farm size categories that have been compared (i.e., not comparing outcomes across different sizes of farms), the CMO measures caused no difference between the different farm types in terms of their levels and stability of farm incomes per worker between the 1995/96 and 2002/03 accounting years.

- The measures yielded fair incomes for cereal specialists. Indeed, there is a slight suggestion that their relative incomes declined vis-à-vis other types of holding.

- Among field crop producers with less dependence upon cereal production (general field crop producers), the CMO measures helped to ensure fair incomes.

- Mixed crop-livestock producers provide insights into the possible significance of the use to which the produce is put in determining farm incomes, since they are major users of their own cereals as on-farm feed. Their incomes, too, are considered fair in comparison to types of farmers with similar sizes of holdings.

- The major respect in which the effect of the measures on farm incomes may not be judged to be fair is by size of holding. For all farm types and regions, larger holdings record substantially higher incomes per worker than smaller holdings.

- For each farm type and size category, there is no evidence that the measures generated systematic territorial differences in incomes. In practice, some member states have larger numbers of smaller holdings than other states, and this inevitably causes national average incomes to display significant differences.

- Market support played an important role in ensuring fair and stable incomes. This was seen most clearly when world market prices were low in 1998/99-1999/2000.

- For all types/sizes/regions of holdings, the CMO measures reduced the shares of producers' incomes earned from cereal market sales in the period under review.

- The shares of income from direct payments increased for all holdings, as a result of higher payments per tonne in the Agenda 2000 reform and its regionalisation plans, which increased average reference yields in some member states.

- For set-aside payments, payments per tonne fell in the Agenda 2000 reform, and this reduced the importance of set-aside payments in producers' incomes.

- The opportunity cost to producers of set-aside rose in the Evaluation period, in part because of the Agenda 2000 reform's cuts in set-aside payments per tonne.

Four leakages arose between the CMO measures and their intended outcomes:

1. Annual rental values of arable land (used mainly for cereal farming) rose. This was an unexpected effect of greater profitability of cereal farming as a result of the CMO reforms. However, this higher profitability is not revealed by analysis of the FADN income data for specific types of holding. A possible reason for this apparent contradiction is that the structure of cereal farming has changed since the 1992 reform. This is examined further in Part 3 of this chapter.

2. A second leakage between the CMO measures and their objectives arose from the implementation of the regionalisation plans. In Italy and Spain, the regionalisation plans increased reference yields in the Agenda 2000 reforms.

   Several member states' regionalisation plans in the 1992 reforms established differing reference yields for different forms of cereal farming. This encouraged unintended shifts in cereal areas towards maize cultivation and irrigated farming, in particular. Both yielded higher direct payments in these regionalisation plans.

3. The third unexpected outcome of the measures was a change in the risk profile of cereal farming incomes and in incentives to restructure. Because the income share from market sales fell for all cereal producers, the risk in cereal farming declined and, as the next part of this chapter reveals, farmers cut their use of risk management tools. In addition, the relativities between the incomes of good and bad farmers were narrowed, thereby slowing the pressures to restructure holdings.

4. The fourth unexpected outcome was the way in which producers incorporated set-aside into their farming systems, using it for better rotations and gaining from opportunities to use it for non-food crops, thereby reducing its cost to farmers.

Chapter 3, Part 2: Dependence on Direct Payments

Has the system of direct payments kept *certain types of holding* overly dependent*? Analysis will be based on the same typology as for the previous question.*

1. INTRODUCTION TO THE ANALYSIS

1.1 Interpretation of the Question

Area payments have been an element of the Cereals CMO since 1992. Previously, the CMO supported producer incomes through institutional prices, complemented by border protection and intervention stocks. The intervention logic of the 1992 reforms and the Agenda 2000 measures was to restore the competitiveness of EU products by bringing producer prices closer to world prices. At the same time, direct payments were introduced providing cereal producers with incomes calculated on the basis of historical yields and with a pre-determined monetary value per tonne. The extent to which producers collectively could take advantage of area payments was limited by the application of base areas for different arable crops, differentiated by region.

It should be noted that in interviews, many producers said that they view compulsory set-aside payments as direct payments since they, too, are fixed within a crop year and producers can only influence the size of these payments by altering their total arable areas crops. In this analysis, direct payments are defined as area payments alone.

The measures are considered to have *kept* certain holdings *overly dependent* upon cereals if they deterred producers from diversifying away from cereal crops, when they would have done so if they had received local market prices without area payments. Likewise, they may have *kept* producers from changing their choice of cereal crop.

Over-dependence also has another interpretation; if direct payments constitute too high a share of producers' incomes or cover too large a share of direct costs, they fail to provide an adequate reward to farmers for raise efficiency and help to *keep* inefficient holdings in operation. More generally, they may slow the process of changing the structure of arable farms by size. This is considered more fully in Part 3 of this chapter.

To reflect the wide range of cereal production conditions in the EU, we use excessive and moderate *over-dependence* to describe differing degrees of cereals producers' over-dependence upon direct payments.

1.2 The Relevant Cereals CMO Measures

Area payments and the associated regionalisation plans were introduced in the 1992 reform, with different payments per tonne for cereal, oilseed and protein crops. The regionalisation plans, establishing reference yields for cereal crops, were determined nationally, but were within the overall national budget envelopes set by the Council.

Agenda 2000 increased the level of direct payments per tonne on cereals, and harmonised them for oilseeds, cereals and set-aside, but durum wheat received additional payments per hectare. The same reform also increased the average cereal reference yields in two member states, Italy and Spain.

Full implementation of Single Farm Payments in the reforms as part of the Mid-Term Review of Agenda 2000 marks a shift towards more fully decoupled payments by area.

1.3 Judgement Criteria, Indicators and Data Sources Applied in this Section

Table 3.4 summarises the judgement criteria employed in this section, together with the indicators that have been used and the sources of data for the analysis.

Table 3.4: Judgement Criteria, Indicators and Data Sources Regarding Direct Payments

Judgement Criteria	Indicators	Data Sources
Maintaining producers in cereal farming (a) by specialisation (b) by size of holding, and (c) region	Changes in areas under cereals (a) by specialisation (b) by size of holding, and (c) region	FADN database Data over time on (a) production (b) farm income
Reliance upon direct payments as a proportion of farm incomes (a) Moderate dependence (b) Over-dependence	Direct payments as a share of farm Gross Margin 1 account for (a) 35%-50% (b) over 50%	from (a) the Commission (b) Member States (c) regional sources
Reliance upon direct payments to cover direct production costs	Direct payments account for 100% of direct production costs	
Changes in crop choice or farm management decisions	Share of cereals in arable areas Shifts from cereal crops with lower reference yields to higher yields	Case study interviews Producer questionnaires
Unexpected effects	Changed risk management	

Observations from the national and regional case studies form a particularly important element of the analysis. Almost 300 producers submitted answers to the questions that were prepared in the regional questionnaires regarding the effect of direct payments upon their farm practices.

The measures were intended to make EU cereal production decisions more sensitive to world prices at the margin, by introducing a source of revenue that was unrelated to cereal yields and market prices in a particular year. However, by tying area payments to arable crop areas, the payments were not true lump sum transfers, since they were related to crop choices and deterred diversification away from arable crops, *keeping* these holdings producing such crops.

If the magnitude of the riskless income from area payments is large as a proportion of overall producer incomes, these payments are judged to make cereal producers *over-dependent* upon such payments.

As Table 3.4 indicates, using analysis of FADN and national data to quantify the share of direct payments in producers' incomes, a threshold of 35% as the share of Farm Net Value Added (FNVA) or of Gross Margin I[1] derived from these payments is defined as moderate *over-dependence*; a value above 50% is defined as excessive *over-dependence* upon direct payments. Since detailed data on regional cereal producers' incomes and costs are collected in differing ways, we also employ an alternative definition of *over-dependence*. This is where area payments per tonne exceed the full direct costs of cereals production

[1] Defined, together with other measures of Gross Margins, in the Glossary earlier in this report.

2. INFLUENCE OF AREA PAYMENTS UPON CEREAL FARMING DECISIONS

The case study monographs include information about the extent to which direct payments *kept* cereal producers growing cereal crops when they would have made other production decisions in the absence of such payments.

The evidence is both direct and indirect. The monograph questionnaires included specific direct questions about the likely response of producers if direct payments had not been paid.

Indirect evidence is provided by regional farm accounts by type of cereal producer. These data make it possible to identify particular groups of cereal producers who would have earned negative levels of Gross Margin II from cereal production in the absence of direct payments.

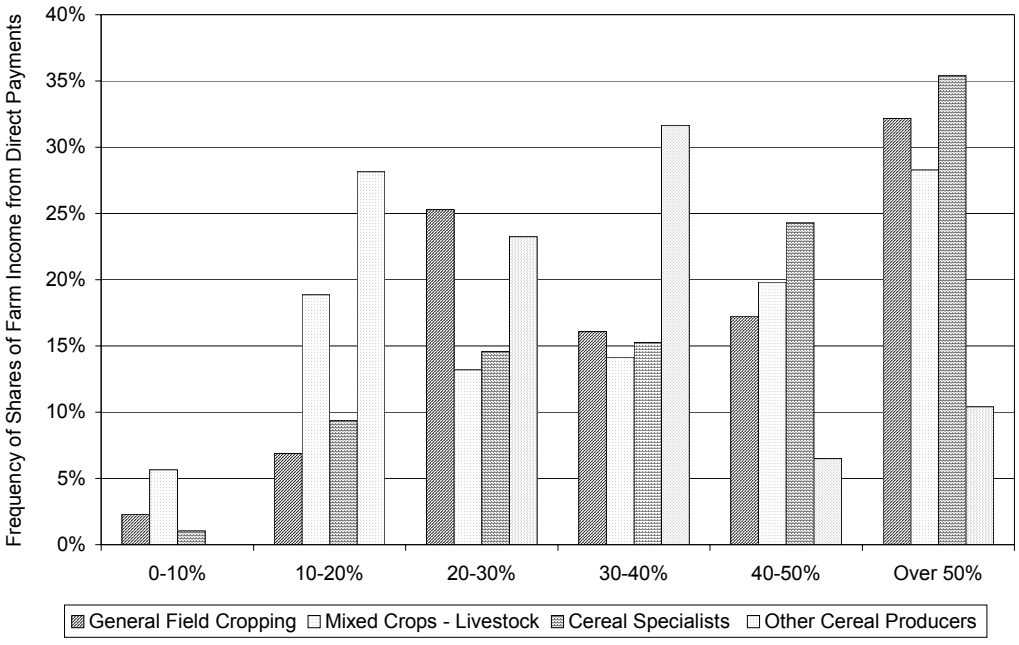
The hypothesis behind this analysis is that such producers would either have discontinued cereal farming or would have sold their holdings, rather than having to subsidise their cereal production, if they had not received direct payments.

2.1 Cereal Producer Questionnaires

Detailed analysis of the case study questionnaires completed by producers is presented both in the individual case study monographs, and also for the entire group of respondents as a whole, in Appendix 20.

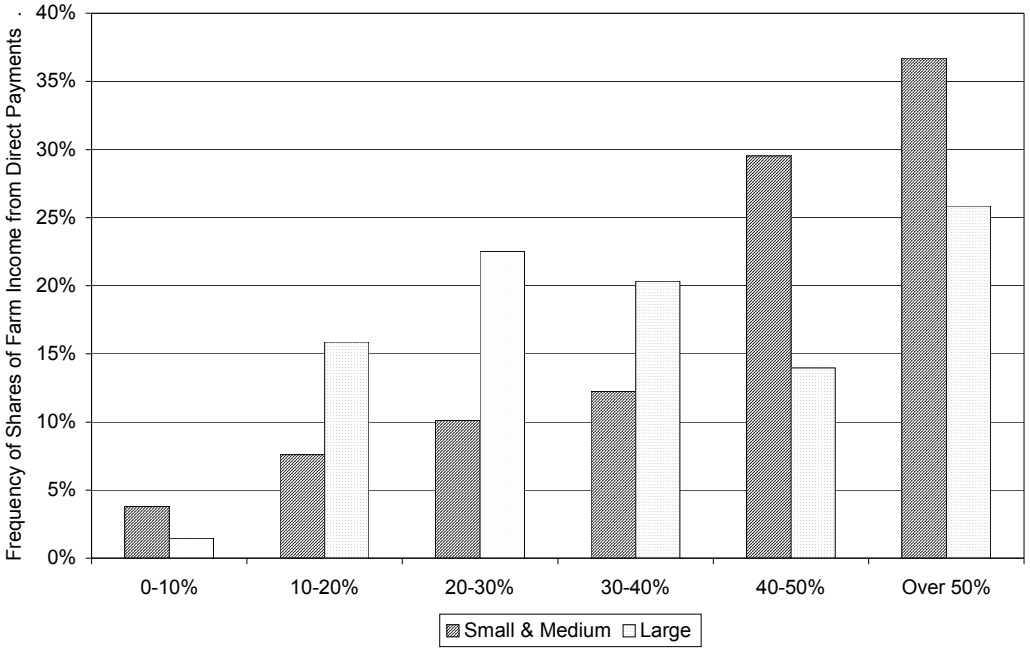
The results that are most relevant to the dependence upon direct payments are summarised in Diagrams 3.11-3.12.

Diagram 3.11: Frequency of the Percentage of Gross Margin I Derived from Direct Payments in 2004/05, by Specialisation of Producers



Source: Derived from analysis of questionnaires in ten selected regions in six member states

Diagram 3.12: Frequency of Percentage of Gross Margin I Derived from Direct Payments in 2004/05, by Size of Holding



Source: Derived from analysis of questionnaires in ten selected regions in six member states

Producers were asked about the proportions of their farm incomes (Gross Margin I) that derived from direct payments in the latest crop year, 2004/05.

In addition to the categories of cereal specialists, general field crop and mixed crop-livestock producers that were selected to correspond to the farm typologies employed in the FADN data, we also include a category of "Other Cereal Producers".

These comprise producers for whom it is known that cereals are a major share of their output, but whose questionnaire returns did not provide sufficient detail about their farming activities to enable us to allocate them to one of the other specialist categories.

The following Box describes the main results derived from analysis of the cereal producers' questionnaires about the influence of direct payments upon their farming decisions.

The replies provide evidence of excessive over-dependence (defined as more than 50% dependence) of a substantial minority of cereal producers upon direct payments, and moderate over-dependence (over 35% dependence) for a majority of the three farm types selected for special attention in the analysis of FADN data.

They also imply that a significant number of cereal producers were *kept* in cereal production by the direct payments.

If this measure had not been included as a central element of the 1992 reform of the Cereals CMO, then an appreciable number of producers, in particular those with smaller holdings, would have reduced their arable farm output by at least 50%. In practice, this probably may be interpreted as implying that many would have ceased arable farming altogether.

Analysis of the Producer Questionnaires

- For cereal specialists, general field crop and mixed crop-livestock producers, the modal dependence upon direct payments is over 50% of farm incomes.
- For cereal specialists, direct payments exceeded half their farm incomes for more than 35% of respondents. In all, roughly 60% of these specialists relied upon direct payments for more than 40% of their farm incomes.
- For both general field crop and mixed crop-livestock producers, the proportions relying upon direct payments for at least 40% of their incomes were almost 50%.
- Diagram 3.12 compares the results from large farms with those for small and medium farms combined. The last two groups are combined because the number of small farms that responded to these particular questions was only 10. For both groupings, the mode is again a dependence upon direct payments for more than 50% of their farm incomes. In terms of the overall distribution of results, the dependence of the small and medium producers is, on average, significantly higher than that for the large producers.
- In questionnaires, producers were asked about changes in their dependence on area payments since 1995. On average, approximately half the cereal specialists and general field crop producers stated that their dependence had risen "greatly", with one third of the cereal specialists saying that it had risen "slightly".
- They were also asked how they would reduce arable farming activity if direct payments were ended. This answer may be interpreted in either of two ways: either it implies a switch to alternative agricultural products or, in the case of those who stated that they would reduce their arable farming by at least 50%, it could imply that the producers would sell all or part of their holdings and reduce their overall involvement in farming.
- The mode for mixed crop-livestock producers was a drop of 15-30%, but the modes for cereal specialists and general field crop producers (42% of respondents in both cases) were a reduction "by at least 50%".
- The reactions differed noticeably between large and small/medium producers. Whereas 41% of all small and medium sized holdings, across all farm types, said they would reduce their involvement in arable farming by more than 50% if direct payments ceased, the proportion was 28% for large producers[2].

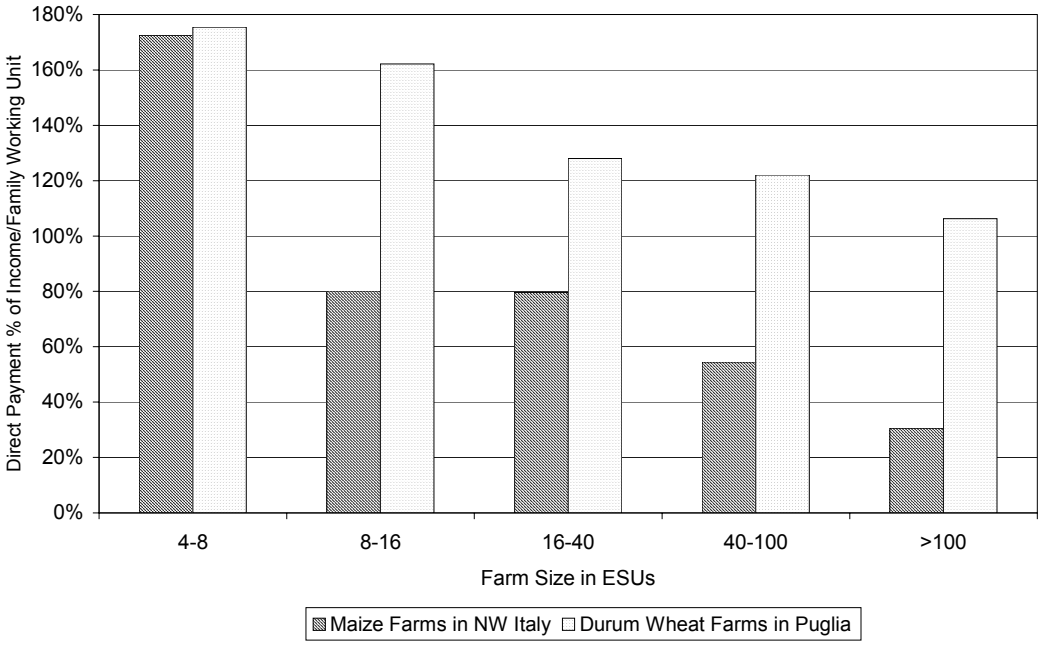
2.2 Cereal Producers' Farm Accounts

The Italian case study included details of the farm accounts, by size class, for producers of maize in North West Italy and durum wheat in Puglia in 2002. The accounts identified overall annual income per family working unit (FWU) earned from "family labour and the farm business"[3] and also the income from area payments. The shares of these payments in income per FWU are summarised in Diagram 3.13. This analysis is particularly valuable because it includes details about the smallest holdings.

[2] 25 small producers answered this question. Over half of those who were cereal specialists or general field crop producers said that they would reduce their arable farm activity by more than 50%.

[3] This is close to Gross Margin II, subtracting from Gross Margin I labour and capital costs, but also land.

Diagram 3.13: Shares of Direct Payments in Italian Cereal Producer Net Incomes per Family Working Unit, by Size Class, 2002



Source: Derived from data in the Italian case study monograph

Analysis of the Dependence of Italian Cereal Farmers upon Direct Payments

- Puglia durum wheat farmers were more heavily dependent than maize farmers in N.W. Italy upon direct payments.
- These exceeded 100% of producer net incomes for all size classes in Puglia. They only exceeded 100% for the smallest maize farms in N.W. Italy.
- The figure of over 170% of income/FWU derived from the combined payments for the smallest size class in both cases implies that the income/FWU in the absence of area payments would have been negative.
- Thus, the existence of the area payments must, at the very least, have reduced the pressures upon the families operating the smallest holdings to restructure, and helped to *keep* these holdings in cereal production.

2.3 Regionalisation Plans

Interviews with producers in both France and Spain revealed that the higher reference yields applied to irrigated maize over rain-fed cereals, led to a significant expansion in irrigation in the early years after the introduction of area payments.

The higher yields achievable with irrigation meant that, as a proportion of income, direct payments were often lower for irrigated crops than for unirrigated cereals (see Table 3.5), but in these instances the system of direct payments undoubtedly encouraged higher cereal output from a given plot of land than would have been the case if they had not existed.

In absolute, if not relative, terms, therefore, regionalisation plans made producers' incomes more heavily dependent upon area payments.

The regionalisation plans, which are discussed in several contexts later in this report, also often bias producers' choices between individual cereal crops, even where the choice is not affected by the availability of irrigation.

- Within the same small sub-region, the observed differences in direct payments per hectare for different cereal crops exceed €200 per hectare in some instances.
- Between some neighbouring districts, the differences in reference yields for the same cereal crops or between rain-feed and irrigated cereals are just as large.

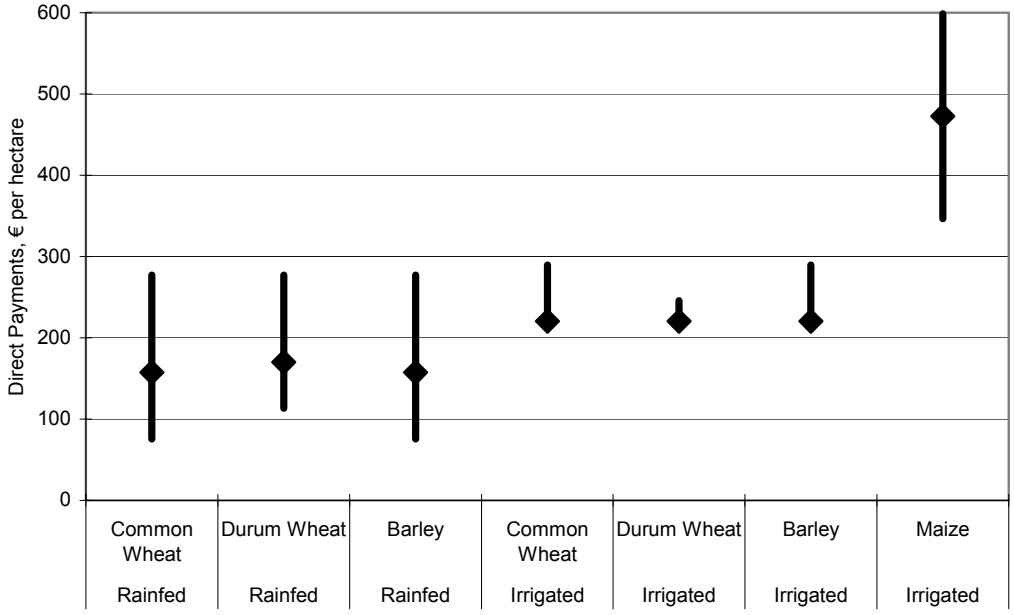
The next Box describes the effect of current regionalisation plans upon direct payments for alternative cereal crops and on set-aside land in two regions of Spain and France. I

n these two instances, the CMO measures, as implemented by member governments, have given rise to direct payments and associated cereal production decisions which have made production decisions heavily dependent upon the magnitude of these payments. Without them, their crop choices would have been likely to be quite different.

The Effect of Regionalisation Plans Upon Incomes from Cereal Crops

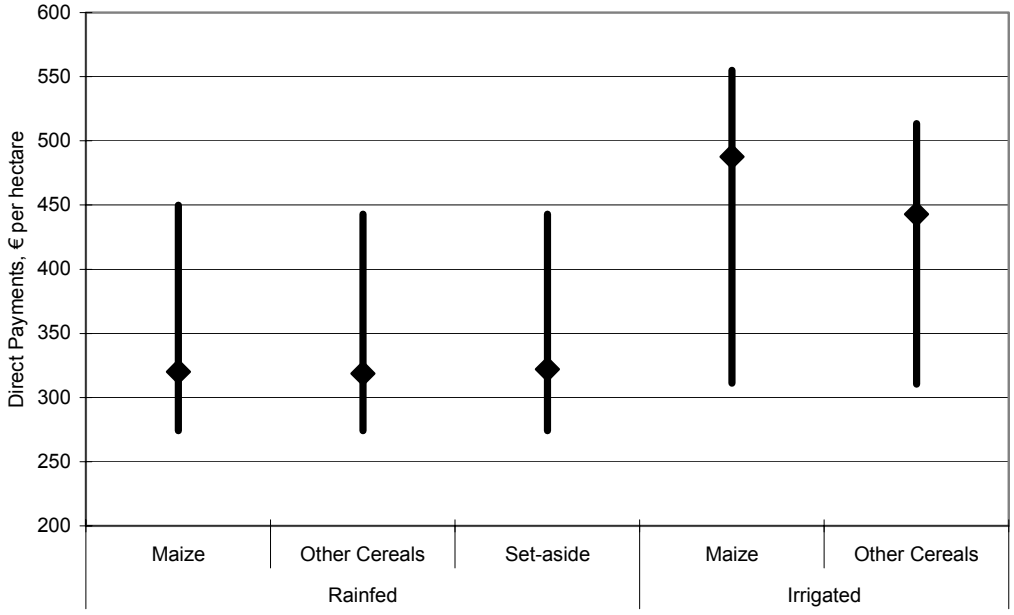
- Some national governments established regionalisation plans that set reference yields at levels that were identical, or included very little variation, between their regions and different arable crops and set-aside areas.
- For example, Denmark has just one reference yield; the UK has only a minor variation between regions.
- Other national governments proposed regionalisation plans that included significant variations in reference yields between individual cereal crops and set-aside areas, as well as between neighbouring regions.
- Diagrams 3.14 to 3.16 illustrate how direct payments vary in two member states.
- The Spanish example has been taken from one region. It depicts the maximum and minimum levels of direct payments for different rainfed and irrigated cereal crops in different sub-regions, as well as the regional modal value for each crop.
- For France, the data are taken from one region and neighbouring *départements*.
- Diagram 3.15 for this region indicates how widely dispersed are the maximum and minimum levels of direct payments in relation to the median across different sub-regions – for rainfed and irrigated cereals, as well as for set-aside areas.
- Diagram 3.16 describes the maximum, minimum and median values of the dispersion of direct payments per hectare within individual sub-regions in comparisons between different cereals and set-aside.

Diagram 3.14: The Maximum, Minimum and Modal Values of Direct Payments from Cereal Crops in Different Sub-regions Within One Spanish Region



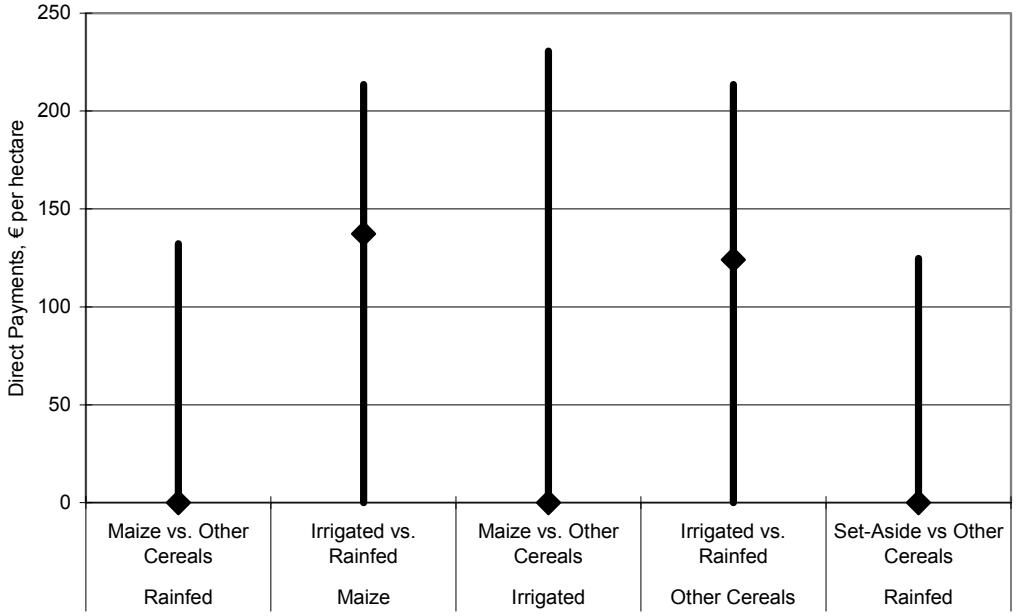
Source: Derived from analysis of data in national case study monograph

Diagram 3.15: Maxima, Minima and Medians of Direct Payments from Cereal Crops and Set-Aside in Different Sub-regions Within One French Region



Source: Derived from analysis of data in national case study monograph

Diagram 3.16: Maxima, Minima and Medians of Differences in Direct Payments from Cereals or Set-Aside Within Individual Sub-regions in One French Region



Source: Derived from analysis of data in national case study monograph

2.4 Changes in Cereal Producers' Attitudes Towards Risk

Many producers in interviews commented upon the way in which direct payments removed some of the risk from cereal farming, and tied them more closely to cereal production in order to retain these payments.

In both France and Spain, producers noted that the assurance of an important element of income, which in many cases covered their direct costs of cereal production, lessened the risk of cereal cultivation. Therefore, since the mid-1990s there has been observed a significant reduction in crop insurance for cereal areas in both countries.

Reductions in Crop Insurance

- In the case of France, producers have cut back their purchase of hail insurance.
- The Spanish case study provides data on the reduction in the participation in ENESA crop insurance by local cereal farmers since 1995. The absolute outlays for insurance premia in 2004 were nearly a quarter less than they were in 1995, while the share of cereal insurance in total crop insurance fell steadily from 37.2% to 16.7% of the total.
- The decline in the use of ENESA insurance might have been linked to the removal of government subsidies for such insurance, but producers remarked upon the changed nature of their income risks after the 1992 and Agenda 2000 reforms as an influence[4].

[4] An interesting contrast is provided by the US, where policy provides deficiency payments, but does not stabilise producer prices. In Illinois, over 85% of maize farmers take out basic crop insurance.

3. REGIONAL AND NATIONAL DATA FROM CASE STUDIES

The case study monographs provide data about the shares that direct payments represented of producer incomes in the past. Because different national and regional sources of information are used, the measures of income are not the same in each instance.

The main results obtained from the case studies regarding the shares of direct payments in the returns from cereal farming are summarised in Appendix 21.

The results may be grouped in terms of three alternative measures of the importance of direct payments in the economics of cereal production: as percentages of Gross Margin I; as shares of Gross Margin II; and as a proportion of direct (i.e., variable) production costs.

These are presented in Tables 3.5 to 3.7, where, as far as possible, comparisons are provided between an early period, just after the 1992 reforms were applied, and a recent period, when the Agenda 2000 reforms had been implemented in full. The results are presented by cereal and region.

Table 3.5: Summary of the Case Study Analyses of the Shares of Direct Payments in Cereal Producers' Gross Margin I Levels

	Coverage	Period	% Share	Period	% Share
Denmark	All Cereals	1993-95	30.7%	2001-03	46.8%
France (Centre)	Common Wheat	1994-96	36.1%	1999-2001	44.2%
	Durum Wheat	1994-96	33.8%	1999-2001	45.1%
	Winter Barley	1994-96	40.0%	1999-2001	52.7%
	Spring Barley	1994-96	38.0%	1999-2001	46.9%
	Non-Irrigated Maize	1994-96	40.0%	1997-98	63.1%
	Irrigated Maize	1994-96	32.1%	1999-2001	38.3%
Germany (Niedersachsen)	Soft Wheat	1998-2000	33.7%	2001-03	41.3%
	Rye	1998-2000	55.3%	2001-03	56.7%
	Barley	1998-2000	46.3%	2001-03	53.3%
Germany Mecklenburg-Vorpommern)	Soft Wheat	1995-97	31.7%	2001-03	41.7%
	Rye	1995-97	41.0%	2001-03	54.7%
	Barley	1995-97	40.7%	2001-03	50.3%
UK	Winter Wheat	1994-96	21.5%	2002-04	35.4%
	Winter Barley	1994-96	26.1%	2002-04	43.6%

Source: Analyses in case study monographs.

Analyses of Gross Margin I

- Direct payments have risen as a fraction of incomes since the mid-1990s.
- In the more recent period (the right hand column) in Table 3.5, for all 15 region/cereal combinations direct payments accounted for over 35% of the Gross Margin I. This is above the threshold proposed for *moderate over-dependence*.
- Six combinations had values above 50%, implying *excessive over-dependence*.

Table 3.6: Summary of the Case Study Analyses of the Shares of Direct Payments in Cereal Producers' Gross Margin II Levels

	Coverage	Period	% Share	Period	% Share
Denmark	All Cereals	1993-95	59.9%	2001-03	79.8%
Italy (Puglia)	Durum Wheat	1999-2000	86.1%	2001-02	114.0%
(North West)	Maize	1999-2000	118.5%	2001-02	100.9%
Spain	Rainfed Wheat			1999-2004	89.3%
(Castilla	Irrigated Wheat			1999-2004	61.7%
y Leon)	Maize			1999-2004	93.0%
	Rainfed Feed Barley			1999-2004	106.9%
	Irrigated Feed Barley			1999-2004	150.6%
	Rainfed Malting Barley			1999-2004	71.5%
	Irrigated Malting Barley			1999-2004	64.9%
UK	Winter Wheat	1994-96	38.8%	2002-04	85.8%
	Winter Barley	1994-96	55.7%	2002-04	155.2%

Source: Analyses in case study monographs.

Analysis of Gross Margin II

- Table 3.6 compares direct payments with Gross Margin II, which is closer than Gross Margin I to the true net income available to a farm household, since labour, machinery and overhead costs (but not land rentals) have been subtracted.
- For five of the 12 region/cereal combinations in the table, direct payments exceeded 100% of the gross margin in the more recent period. Without direct payments, these producers would not have covered their full production costs.

Table 3.7: Summary of the Case Study Analyses of the Shares of Direct Payments in Cereal Producers' Direct Production Cost Levels

	Coverage	Period	% Share	Period	% Share
Denmark	All Cereals	1993-95	54.2%	2001-03	75.7%
France	Common Wheat	1994-96	90.1%	1999-2001	90.7%
(Centre)	Durum Wheat	1994-96	96.4%	1999-2001	96.7%
	Winter Barley	1994-96	92.2%	1999-2001	88.9%
	Spring Barley	1994-96	127.6%	1999-2001	120.5%
	Non-Irrigated Maize	1994-96	87.2%	1997-98	78.2%
	Irrigated Maize	1994-96	79.6%	1999-2001	87.0%
Germany	Soft Wheat	1998-2000	76.6%	2001-03	78.6%
(Niedersachsen)	Rye	1998-2000	90.9%	2001-03	92.5%
	Barley	1998-2000	96.9%	2001-03	102.5%
Germany	Soft Wheat	1995-97	99.4%	2001-03	103.1%
(Mecklenburg-	Rye	1995-97	132.3%	2001-03	138.1%
Vorpommern)	Barley	1995-97	121.9%	2001-03	129.0%
UK	Winter Wheat	1994-96	81.9%	2002-04	96.0%
	Winter Barley	1994-96	100.5%	2002-04	113.4%

Source: Analyses in case study monographs.

Analysis of Direct Production Costs

- Table 3.7 contrasts area payments with the direct production costs of cereals.
- In the more recent period, all values exceed 75%.
- 6 of the 15 region/cereal combinations recorded area payments that more than covered their entire direct production costs.

4. EVIDENCE FROM REGIONAL ANALYSIS OF THE FADN DATA

The FADN data about farm incomes in different regions and for different typologies of holdings were introduced in Chapter 1, Part 1. Appendices 17 and 21 provide details of the changing composition of farm incomes and the importance of direct payments, and also set-aside payments, within their overall incomes. Table A21.1 in Appendix 21 provides a synthesis of these results in terms of dependence upon area payments in 1995-97 and 2000-02 by size and specialisation of producers.

This reveals that, for every category, direct payments rose as a share of farm income during the period under review.

- For all sizes of cereal specialists the arithmetic mean of the share of direct payments in farm income in 1995-97 exceeded 50%; in 2000-02 it exceeded 60%. Both levels we define as excessively dependent upon these payments.
- For general field crop and mixed crop-livestock producers the shares ranged from 26% to 30% in the first period and rose to 28% to 38% in the more recent period. At that time one category, medium-sized mixed crop-livestock producers, were moderately dependent upon direct payments.

Table A21.2 in Appendix 21 allows one to assess how dependence upon direct payments differs between smaller and larger holdings.

- For every single time period and specialisation, larger holdings receive a smaller share of income than the smaller holding as direct payments.
- Thus, larger units are less dependent upon area payments than smaller units.

5. CONCLUSIONS

The policy logic of the Cereals CMO from 1995/96 to 2003/04 was to bring internal market prices closer to world market levels and support producers' incomes via direct payments. Since these payments were tied to arable crops, of which cereals are by far the most important, the measures tended to *keep* many holdings in cereal production. For them, the marginal revenue from a hectare of cereals — if the choice was between cereals and a non-arable crop — was the market price *plus* area payment *minus* the loss of income on compulsory set-aside land, which applied only to larger producers.

Questionnaires and interviews with producers provide evidence that direct payments played a very major role in maintaining producers in cereal farming.

- Nearly half the cereal specialists in the survey stated that, were it not for direct payments, they would reduce their arable farming "by at least 50%". Small and medium producers were more likely to make such cutbacks than larger farmers.

- Among other types of farms, less reliant upon cereals, the scale of their cutbacks likely in arable farming in the absence of direct payments was only slightly less.

- Geographical location is a factor primarily where regionalisation plans magnify the incentives to remain in certain types of cereal production.

The extent of moderate over-dependence upon direct payments (cases where such payments exceed 35% of Gross Margin I) is very large for cereal farmers.

- Both FADN and national and regional data suggest that virtually all cereal specialist farmers are moderately over-dependent on these payments.

- FADN data imply that average cereal specialists are excessively over-dependent.

- Few producers less heavily reliant upon cereal farming are over-dependent.

Examining other measures of dependence, we discover that:

- For almost half the regional studies, direct payments accounted for more than the entire Gross Margin II and direct production costs. In other words, their entire net profit was contributed by direct payments, and they covered their full cash costs.

Regionalisation plans affected the choice of cereal crop to a substantial degree.

- There is strong evidence from national case studies that, where regionalisation plans establish higher reference yields for particular cereals (notably maize and irrigated crops), producers have switched areas to these crops in order to benefit from the higher direct payments that they offer.

- The higher area payments for durum wheat are a special example of the same phenomenon and induced an expansion in its areas after the 1997 reform.

Unexpected effects of the measures and the CMO reforms included the following:

- They encouraged many producers, especially smaller ones, to remain in arable farming, when they would not have done so in the absence of direct payments.

- They created many cereal specialist producers for whom direct payments provided their full net profits from farming.

- They provided an assured income that often covered all direct costs. As a result, producers were less inclined to take adopt precautionary risk management.

Chapter 3, Part 3: Production Structures on Holdings

Have the measures taken together, in particular the market support, direct payments and set-aside, encouraged more rational use of resources (land, labour, investment, etc.) on holdings?

1. INTRODUCTION TO ANALYSIS

1.1 Interpretation of the Question

In this question, *resources* are interpreted as factors of production, land, labour and capital. Analysis of the effect of the Cereals CMO upon the use of variable inputs, including consideration of environmental measures, is deferred until Chapter 4, Part 3.

The policy logic of the Cereals CMO measures was to enhance the competitiveness of domestic cereal production on internal and external markets. In this context, increased competitiveness is interpreted as reducing the differences between prices in these two markets, with the objective of making domestic producers better able to produce cereals profitably at world market prices, with a production technology (a less intensive one, since marginal revenues are reduced) that is more appropriate to world prices.

Market support was the main measure used to achieve this objective. To the extent that the CMO reforms reduced the disparity between EU and world market prices, there is a strong presumption that they promoted a rational use of resources. However, non-price measures, specifically direct payments and set-aside, influenced producers' response to the measures.

To assess the effect of the measures on the *rationality* of resource use, the basis for comparison is the resource allocation that would have been expected if arable crop prices were world market prices and no area payments or set-aside obligations existed.

While there is a distinction to be made between the *rationalisation* of holdings into larger units and the *rational* use of resources, other things being equal, any evidence from analysis of the structure of holdings in individual member states which reveals that the average sizes of the holdings involved in cereal production have increased since the 1992 reform is interpreted as an indication that land is being used more rationally, and that this is facilitating the more efficient use of other factors of production.

1.2 The Relevant Cereals CMO Measures

The relevant measures regarding reduced market support, border protection, direct payments and set-aside were introduced in the 1992 reform and developed further in Agenda 2000. The reforms continued in the Mid-Term Review of Agenda 2000.

1.3 Judgement Criteria, Indicators and Data Sources Applied in this Section

Table 3.8 lists the judgement criteria employed in this section, together with the indicators that have been used and the sources of data for the analysis.

Table 3.8: Judgement Criteria, Indicators and Data Sources Regarding Farmers' Incomes

Judgement Criteria	Indicators	Data Sources
Accelerated reductions in (a) capital intensity, and (b) labour intensity and a faster rate of structural change towards larger holdings vs. the period before the MacSharry reform and vs. the experience of major non-EU cereal producers Unexpected effects	EU intensity/hectare and /tonne (a) of capital equipment (b) of labour inputs The structure of land holdings by size of arable holding over time Intensity levels over time in Australia, Canada and the US Increasing intensity in some sectors	FADN database Data on factor use from (a) the Commission (b) Member States (c) regional sources Data on factor use from government agencies in (a) Australia (b) Canada (c) the US Case study interviews Producer questionnaires

2. THE STRUCTURE OF HOLDINGS

Diagram 3.17 illustrates the 2000 distribution of cereal areas by size of holdings in the six EU-15 countries selected for case studies. The changes that have occurred since 1990 in the size distribution of cereal holdings are summarised in Diagram 3.18[1]. Appendix 23 and the Italian case study monograph, which included special analysis of the structure in agricultural productivity in Italy and in the broader Community, provide fuller detail about these changes.

Diagram 3.19 explains why changes in the structure of farm holdings and increases in scale are so important in promoting more efficient labour use and higher levels of productivity. Farms of up to 8 ESUs are what we have described as "small"; farms from 8 to 40 ESUs are of a "medium" size; those with more than 40 ESUs are "large".

- On average, labour productivity on large cereal specialist farms is two to three times that of medium-sized holdings, which in turn are two to three times more productive than small farms.

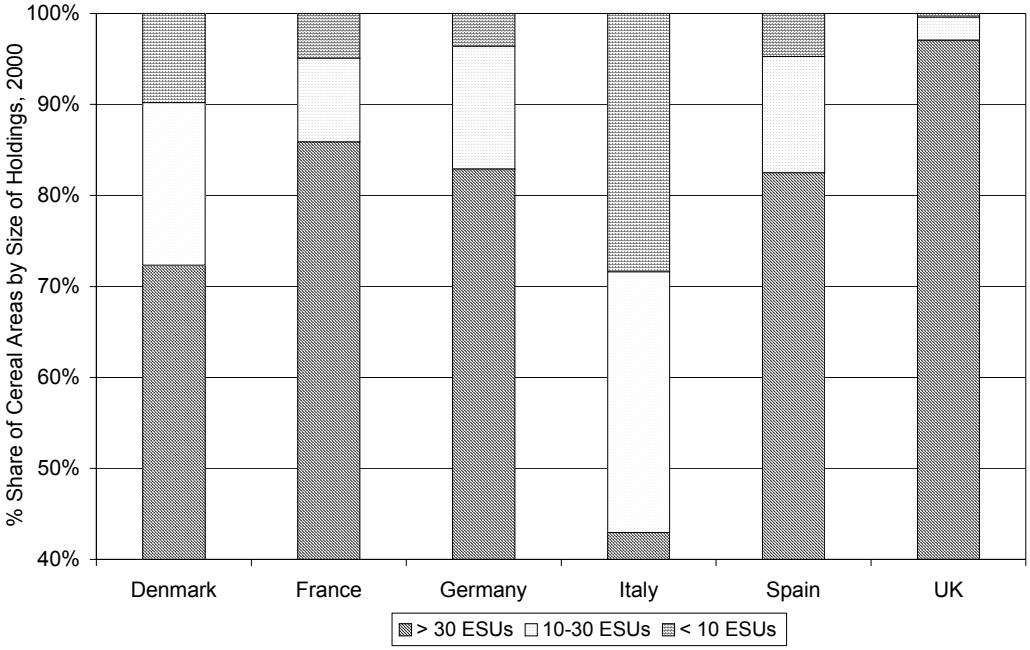
Diagram 3.18, which reveals that medium, rather than small, holdings experienced the greatest reduction in their proportion of the overall cereal area, is significant.

- The CMO compulsory set-aside measures do not apply to the smallest holdings, but were often mentioned in interviews as a constraint to medium-sized farms, which find it difficult to acquire extra land to offset the effect of set-aside on their cultivated areas and do not have the flexibility of large holdings to adapt their factor use and land use to accommodate set-aside obligations.

- Also, medium-sized farms are often too large to be farmed on a part-time basis by non-professional producers; but such producers are important among small farmers, where farming may represent only a small fraction of family incomes.

[1] It should be noted that the rates of change in Diagram 3.2 are proportional growth rates in market shares, so that a 0.1% increase on a value of 1.0% or a 2.5% increase on a value of 25.0% would both be described as having a growth rate of 10%.

Diagram 3.17: Distribution of Cereal Areas in the Six Selected Member States by Size of Holdings, 2000

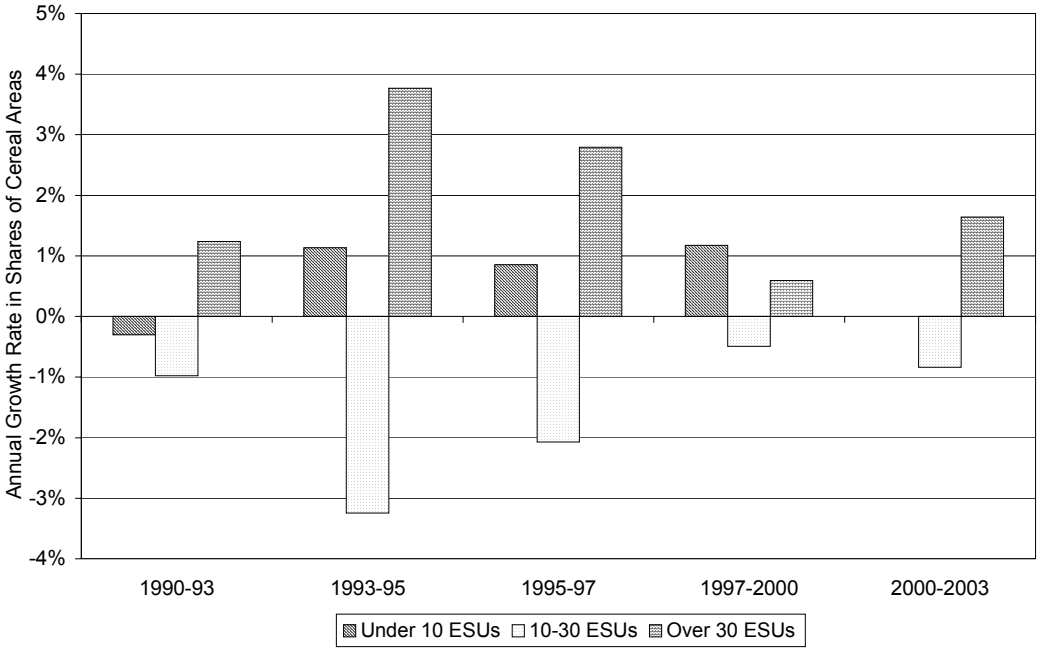


Source: Eurostat, where sizes of holdings are defined in Economic Size Units, defined in the Glossary to this report

Changing Structures of Cereal Holdings

- There is a wide disparity between countries in their structures of cereal holdings.
- At one extreme, the UK and France now have 97% and 94%, respectively, of their cereal areas on farms of over 30 ESUs. The percentage for Denmark is 86% and the proportion for both Germany and Spain is 84%.
- At the other extreme is Italy, with only 43% of total cereal areas represented by holdings of over 30 ESUs, with 15% on holdings of less than 5 ESUs.
- The general trend since 1990 was in the direction of larger holdings. However, this movement was most pronounced in 1993-95 and 1995-97, after three years (1990-93) when little change occurred in the distribution of cereal holdings.
- Case study interviews suggest that, in the period immediately after the 1992 reforms, many small and medium scale farmers took a gloomy view of their ability to survive.
- Later on they found that the new regime was not as harsh as feared. The pace of rationalisation then slowed. The period 1997-2000 saw an unusually slow pace of structural change in Denmark, France and Spain.
- The UK experience is illuminating in that, because of exchange rate movements, producers stated in interviews that the effects of reduced market supports were not felt at first. The UK was the only country in the comparisons in Appendix 23 that saw no evidence whatever of rationalisation in holdings in 1995-97.

Diagram 3.18: Growth in the Shares of Total Cereal Areas in Selected Member States[1] Accounted for by Different Sizes of Holdings, 1990-2003

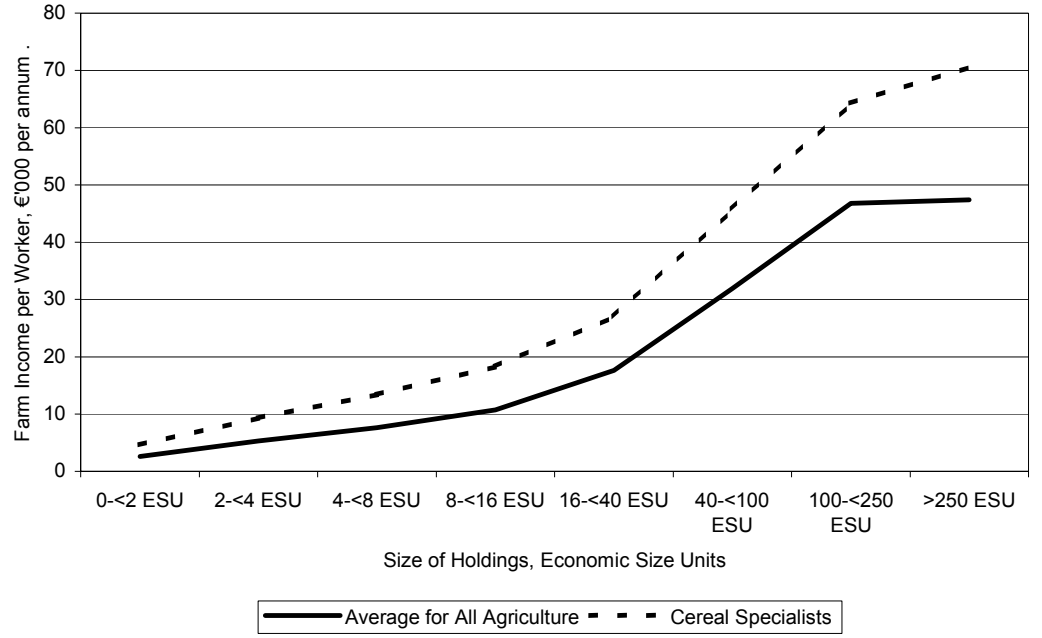


Source: Eurostat, where sizes of holdings are defined in Economic Size Units

Notes: 1. The countries are Denmark, France, Italy, Spain and the UK, since data exist only for 2000 for Germany. Growth rates are weighted by their cereal areas. The only countries with 2003 data are Denmark, France and the UK.

2. Growth rates are the proportional annual rates of change in the overall market share of the relevant category. Because the largest holdings account for a large share of total cereal areas, the growth rate in the diagram is represented by the rate of contraction of the combined market share of all other holdings (below 30 ESUs in size).

Diagram 3.19: Comparison of EU-15 Farm Income per Worker by Size of Holding for Cereal Specialists and for All Agriculture, 2000



Source: DG Agriculture Farm Structure Survey

2.1 The Growing Importance of Non-Agricultural Incomes for Farm Households

The rise in non-agricultural sources of incomes for cereal specialists is not confined to the smallest farms[2]. The German, Danish and UK case study monographs analyse the trends in non-agricultural incomes, and the first two distinguish between the structure of the incomes of full-time ("professional") and part-time ("non-professional") farms.

Non-agricultural Sources of Cereal Specialists' Household Incomes

- In Germany, "professional" farms, which rely upon cereals for a substantial proportion of their incomes, saw non-agricultural sources of incomes grow from 12.6% to 29.1% between 1993/94 and 2003/04. "Non-professional" farmers, who are important cereal producers in some Länder, received, on average, less than 15% of their total income from agriculture over the same decade.
- The non-farm share of incomes for full-time Danish cereal specialist households averaged 20% in 1993-95, but was 24% in 2002-03; while the non-farm income share for all part-time holdings rose from 72% to 79% in the same period.
- Scottish data for cereal specialists in 1998/99-2003/04 reveals that the non-farm sources of income in that period were substantially higher than those from farm operations. On-farm, non-agricultural incomes, such as rental income from the hire of farm buildings for non-agricultural activities, rose markedly in this period.

The changing structure of farm household incomes makes the FADN's narrowly defined definition less valid, over time, as a measure of the incomes of producer households. Diversification into non-farm activities does not only yield extra income, it also (as the Scottish experience demonstrates very clearly) introduces a major element of stability into household incomes via a form of portfolio diversification.

2.2 The Influence of National Policies upon the Structure of Farm Holdings

National policies related to land tenure often inhibit moves to better resource allocation. Examples summarised below and taken from national case studies illustrate this.

The Influence of Regional Policies Regarding Land Tenure Upon Structures

- In Scotland, reforms giving tenants the right to buy their land have led to new forms of contract between farmer and land-owner that make transfers of ownership more difficult than they were previously.
- In France, some *départements* retain long-standing regulations concerning maximum farm sizes and the administrative permission needed in order to allow individual producers to expand beyond these area limits.
- In Mecklenburg-Vorpommern, it might be argued that large farms created during the DDR era represent efficient units, towards which other regional structures of landholding will evolve with lower internal prices; but political and social change has led to a reduction in the importance of large holdings in that region.

[2] The OECD, Paris (2003), Farm Household Income, Issues and Policy Responses, study indicates (on p. 14) that, using a broad definition of farm household incomes, all four member states for which they had such data relied on non-farm sources for over half their total income in the most recent period.

2.3 Methods Adopted to Adapt Farm Operations to the Structure of Holdings

The legal, institutional and social barriers to the pace of rationalisation of the structure of holdings have encouraged the development of techniques to exploit economies of scale, within the constraints that exist.

One response, noted in several case studies, has been the growing role of contractors, who undertake a range of activities, from single operations to the entire management of holdings, on a contract basis.

- Contractors are able to specialise and attain economies of scale in the use of crop-specific capital machinery by spreading fixed costs over a larger area than may be found on individual farms.
- In effect, contractors make it possible to farm smaller holdings in much the same way as larger holdings that are able to internalise these economies of scale.
- As Part 1 notes, a larger role for contractors means that Farm Net Value Added, which is taken to be farm income, tends to understate farm incomes over time[3].

The structural constraints that have increased the role of contractors have also led to other developments that suggest that the official estimates of the structure and costs of individual holdings may understate the effective scale and income of these holdings.

- Taxation and social security systems often create biases in the ways in which farm activities are managed in formal legal terms.
- In France, reforms to the social security system created incentives for some producers to introduce a legal distinction between the farm, as a business, and the hire of machinery and some labour services to the farm. In both cases, income is transferred away from the farm to other legal entities, reducing the declared return from farming in the process.
- More generally, the officially reported structure of landholdings, based upon land ownership and tenancies, probably gives rise to an over-estimate of the *de facto* number of separate farm units in terms of their actual day-to-day operations.

3. CHANGES IN LABOUR AND CAPITAL UTILISATION IN THE EU

Later we consider why non-price measures, notably set-aside and direct payments, may have limited the impulse given towards more rational resource use by the move towards world prices. We now consider the results derived from FADN data and presented in Appendix 36 on labour and capital use by EU cereal specialists, to observe the changes that have occurred in their use. Comparisons of changes in intensity levels by member state are depicted in Diagrams 3.20 and 3.21.

In the case of labour intensity, the labour use per hectare is based upon the number of full-time equivalent workers (both paid and family workers) that are employed. The capital intensity estimates are based upon the real depreciation costs per hectare.

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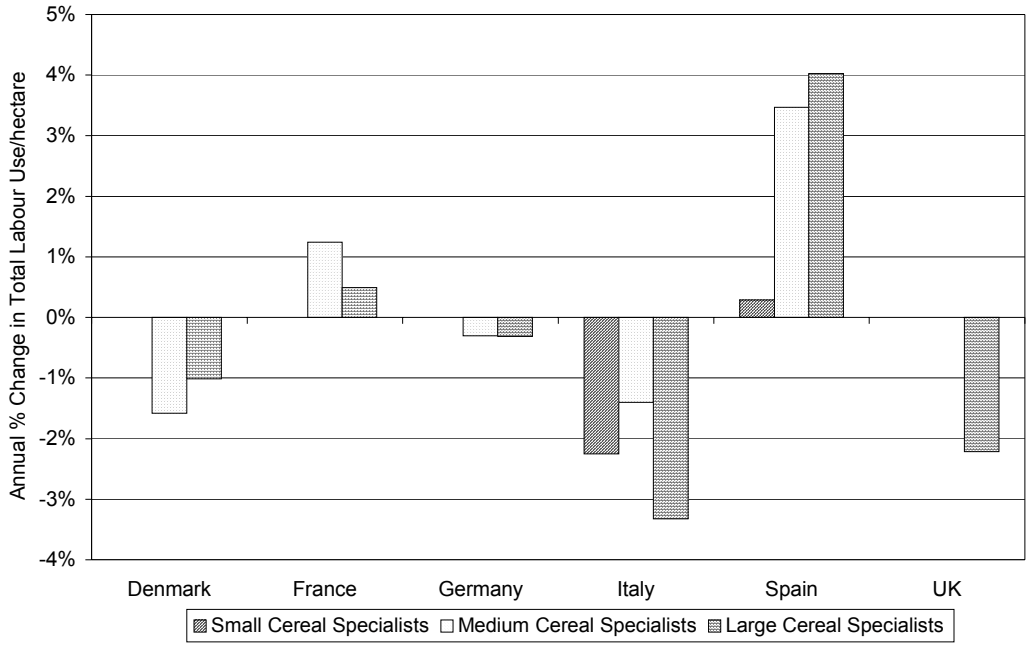
[3] This is because fixed costs borne by contractors and included in their fees are all treated as a direct cost in FNVA; however, some of the same costs, if borne by the farmer, would not be included in direct costs.

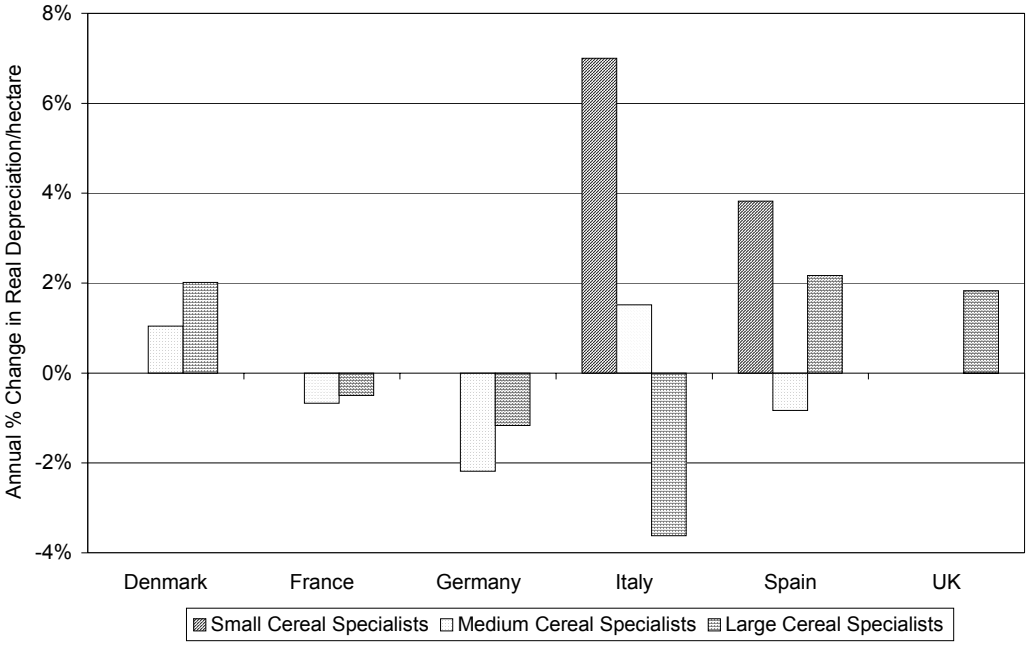
- In general, inputs of labour per hectare have been declining. This suggests improved resource allocation in response to lower internal market prices. There are two main exceptions to this.
- In Spain the intensity of both variable and primary inputs increased since 1995. This reflects the effect of the regionalisation plan in that country, which encouraged cereal cultivation to shift from low yielding and low productivity rainfed crops, such as barley, towards intensive irrigated crops, notably maize, and towards durum wheat. It also reflects the increase that was granted in the Agenda 2000 reform in its national reference yields.
- In France, the French case study suggests that labour intensity rose because, immediately following the 1992 reform, there was a shift of resources away from cereals until 1995. This was then partially reversed once farmers found that the profitability of cereal farming had not been as badly hit as they had feared.
- For capital inputs, intensity increased in the UK and Denmark, as well as small and medium Italian cereal specialists. In these cases, higher capital intensity could reflect the partial substitution of capital for labour, whose use declined.
- For both the UK and Denmark, Appendix 37 provides more detailed and longer runs of data on capital and labour intensities. For the East Anglian region of the UK, comparing the 1981-1992 and 1992-2003 crop years, there has been a general slowdown in the pace of decline in the two intensities, both per hectare and per tonne.
- The Danish case study provides data, by size of holding and by cereal crop from the 1991 to 2003 crop years. The main cereal crops reduced their labour inputs per hectare fairly steadily, but capital inputs were typically reduced most strongly from 1991 to 1995, and often increased from 1995 to 1999, possibly reflecting the boost to capital investment that followed the initial period of over-compensation in the MacSharry reform. Since 1999, they have declined again.
- Danish data also permit one to compare the performance of different scales of cereal specialists. Over the full 12 years, medium-sized farms, from 20 to 70 hectares, made less progress than either smaller or larger holdings.
- A further influence highlighted by the Danish experience is the increased use of contractors on all sizes of holdings. Their greater role means that the overall reduction in factor intensities noted above may overstate the true situation, since both labour and capital are provided indirectly with contractor services.

Diagram 3.20: Annual Growth in Intensity of Total Labour Use/hectare for Cereal Specialists by Farm Size in the Six Selected Member States, 1995-2002



Source: FADN

Diagram 3.21: Annual Growth in Intensity of Real Depreciation Costs/hectare for Cereal Specialists by Farm Size in the Six Selected Member States, 1995-2002



Source: FADN

4. ANALYSIS OF THE PRODUCERS' QUESTIONNAIRE RETURNS

Appendix 22 presents a summary of the responses of a sample of cereal producers in the selected member states to questions posed about production structures.

- On average, the cereal areas on their holdings have increased since 1995. Large farms reported greater growth than small and medium producers.
- Most producers (again biased towards the larger holdings) acknowledged that they had changed their farming practices in response to lower institutional prices.
- Around 40% of producers said that they were now investing less in machinery than in 1995, as against 10-20% who were investing more heavily, with little distinction in responses by size.
- Labour use per hectare fell, on average, but the declines were most marked on larger holdings.
- The answers about the use of irrigation, a specific form of investment encouraged by the regionalisation plans in several member states, were illuminating. The use of irrigation tended to rise, and there was a similar distribution of replies between larger and smaller holdings.
- In terms of the frequency of irrigation, the balance was heavily in favour of more intensive water use, presumably partly to meet the minimum threshold to qualify as an irrigated cereal for the purposes of reference yields.

5. NON-EU DATA ON LABOUR AND CAPITAL INTENSITIES

Australia, Canada and the US were selected as leading high income cereal producers, whose use of capital and labour might provide a valuable comparison with the EU.

- The US was included as a country where cereal producer prices are supported. Data on cereal factor intensities reveal an inconclusive picture. Both labour and capital inputs per hectare rose from 1995 to 2003 for wheat and barley, but fell for maize. Unlike the UK East Anglian experience of declining cereal factor intensities, US trends since 1975 (see Appendix 38) reveal little common pattern between crops or between periods.
- Canada operates with a more liberalised cereal market, and farm budget data were analysed for Manitoba and Saskatchewan since the 1980s. Unexpectedly, in common with the US data, they displayed relatively little change per hectare.
- Australian factor intensities were much more sensitive to world prices, to which Australia is exposed. Two periods were studied, 1990-1997 and 1997-2003, with 1997 selected as the cut-off point since real Australian producer prices for wheat peaked in 1996, and it was assumed that producers respond with a year's delay to prices. Also two types of specialisation were compared: wheat and other crop producers, and mixed livestock-crop producers, with similar results for both groups in terms of their intensities of cereal cultivation.
- In the first period, Australian labour and capital inputs rose, as did world prices; in the second period, labour and capital inputs fell, as world prices declined.

6. INFLUENCE OF NON-PRICE MEASURES ON RATIONAL RESOURCE USE

The narrower gap between internal and world cereal prices, taken on its own, will have had a beneficial influence on resources allocation, by reducing the incentive towards over-intensification. In this section, we examine whether non-price measures, in particular set-aside and area payments, have contributed towards this goal.

6.1 Set-Aside

The impact of set-aside has been the subject of a separate Evaluation study. Within the context of a given holding, the effect of set-aside on rational land use is normally positive, since the land chosen for set-aside will be the part whose productivity in cereals is lowest. (It should be noted that this was an unintended outcome of the reform, since it reduced its effectiveness as a supply control measure.) One might expect, therefore, that set-aside would have improved resource use. However, the country case studies and interviews raise some caveats about this conclusion.

Resource Allocation Efficiency and Set-Aside

- While set-aside land is likely to be the least productive in any given farm, there is no guarantee that the overall effect is to remove the least productive land.
- One reason is that compulsory set-aside applies only to large holdings. Because of economies of scale, resources are more effectively used on larger holdings. The exemption of smaller farms from compulsory set-aside therefore tends to have a perverse effect on resource use (though it has administrative simplicity).
- While the land that a larger holding chooses to set aside is less productive than the land it keeps in production, there is no guarantee that it is less productive than land that a small farm, exempt from compulsory set-aside, keeps in cereals.
- The allocation of set-aside does not differentiate adequately between more and less productive regions. Within regions, limitations (eased under the Mid-Term Review) upon the transferability of set-aside obligations between individual farms also restrict the degree to which the least productive land is put into set-aside.
- Compulsory set-aside and, in particular, changes in set-aside rates from one year to another reduce the efficiency of factor use over time. They introduce a sub-optimal degree of variability into the utilisation of fixed inputs in farming decisions.
- Some regionalisation plans establish reference yields for set-aside land that are higher than those for rain-fed cereals. This generates distortions in resource allocation in the cereals sector in the case of voluntary set-aside decisions.

6.2 Direct Payments

The last topic mentioned above, in the context of set-aside, related to regionalisation plans and reference yields. An impression emerging from many of our country studies is that, in the immediate aftermath of the 1992 reforms, cereal producers expected the outcome to be worse than it turned out to be. They discovered, however, that area payments made a significant contribution towards stabilising their income.

Our interviews revealed what a powerful role the direct payments have played in producers' decisions whether to remain in the cereal farming sector.

In some cases, area payments covered all the direct production costs, but, even when this was not so, the assured level of income was, as would be expected, highly valued.

- It is inevitable that the area payments create an incentive to remain cereal producers, since cereals constitute the major share of COP crop production, which is the basis for area payments, and the discussion in Part 2 demonstrates that many less efficient producers who would have quit have been induced to stay by the prospect of area payments.

- The rationale for the area payments is to mitigate the adverse effect on farmers' incomes of reducing the disparity between internal and world prices. As long as these payments are linked to cereal farming, they ensure that many of those who, on purely resource allocation grounds, would have left the sector in the absence of direct payments, will continue as cereal producers.

- Regionalisation plans can cause resource misallocation. Higher area payments for irrigated than dry land encouraged investment in irrigation facilities. To some extent the use of base areas to determine whether producers of a certain crop should collectively be penalised, via reduced area payments, for overshooting the base area, may be considered a form of market discipline.

- However, initial base areas established in the 1992 reform, and amended after enlargement, were far above the actual levels of arable aid applications (including set-aside) by EU producers. In 1993/94, producers' applications accounted for only 90.5% of the base area. In 2003/04, the proportion had risen to 95.1%.

- Even if base areas are a constraint upon areas, the nature of specialised capital equipment, such as pumps and pivots, makes decisions about intensification unlikely to be reversed in the short run. Once such equipment has been acquired, decisions about its use are based more upon variable than full costs.

- Overall, differing area payments for different crops and regions gave incentives that were not necessarily consistent with a rational use of resources.

7. CONCLUSIONS

The overall effect of the CMO measures on resource utilisation is the net outcome of:

- The generally positive impact of the policy logic behind lowering market support and narrowing the gap between internal and world prices, and

- The generally negative impact of the combination of non-price measures, notably direct payments and set-aside.

In the period immediately after the 1992 reform, the measures did appear to cause a temporary acceleration in the movement towards more rational resource allocation, in terms of an increase in the importance of large holdings and in the pace of declines in both capital and labour intensities.

- Many producers state that uncertainty about the effect of the reform on their incomes hastened these changes, but they also report that the failure of the more dire predictions to materialise caused them to slow the process of resource reallocation from the second half of the 1990s.

- In the structure of landholdings, medium-sized farms lost share in cereal areas, both because compulsory set-aside was hard for them to accommodate in their farm planning and because larger holdings were more efficient and competitive.

- Large farms gained ground, but so also did small farms.

- The reallocation of cereal areas away from medium to large farms is judged to reflect improved resource allocation; but, over the period since 1995/96, the pace with which this reallocation occurred has not been faster than in earlier periods.

- The increased importance of the smallest category of holdings reflected, in part, the growth in part-time farm households, for whom agriculture provides only a minor part of household income.

- We conclude that the measures did not make a lasting contribution towards hastening the improvement in efficiency in land allocation. However, national legal and social barriers to change make rapid change difficult to sustain.

The changes observed in capital and labour intensities on cereal farms supported the conclusion that the immediate aftermath of the MacSharry reform was a general effort to reduce intensities fairly fast; but subsequently, the pressures for change lessened.

- In general, but not everywhere, labour intensities fell for all sizes of holdings

- Capital intensities displayed a less clear direction, possibly because of the substitution of labour with machinery.

- For neither factor, do we conclude that there is strong evidence of more efficient resource allocation as a result of the measures.

- Instead, it is clear that regionalisation plans have often led to more inefficient resource allocation. This is partly because they encouraged producers to shift from rainfed, low yielding cereals to irrigated cereals and crops with higher direct payments. It is also because two member states had their cereal reference yields increased in the Agenda 2000 reform.

Environmental measures have affected production technologies, but they relate principally to variable inputs, such as fertilisers. These are considered in Chapter 4.

Unfortunately, comparisons with the situation in other major cereal producing countries provide few insights into the efficiency of trends in resource allocation in the EU.

The unexpected effects of the CMO measures are threefold:

- The increase in the share of small holdings; this is a demonstration of the growing importance of non-agricultural incomes for farm households.

- The greater intensification observed in member states whose regionalisation plans contain large differences in reference yields among cereals, and in particular in those whose reference yields increased in the Agenda 2000 reform, reflected the non-rational incentives created by these direct payment systems.

- The implementation of compulsory set-aside has placed special pressure upon medium-sized cereal holdings. Small producers are exempt; while large farms tend to have more flexibility than medium-sized farms to accommodate set-aside in their production systems.

Chapter 4, Part 1: Market Equilibrium of Cereal Growers

Corn is not high because a rent is paid, but a rent is paid because corn is high. *David Ricardo, On the principles of Political Economy and Taxation, Chapter 2, London, 1817*

Have producers responded to the market signals expressed by prices in the relevant locations and at the relevant times when deciding which types and qualities of cereals to produce, where the qualities are those viewed as appropriate by end-users? If not, what is preventing supply from adapting to demand in the EU?

1. INTRODUCTION TO THE ANALYSIS

1.1 Interpretation of the Question

The CMO reforms since 1992 have attempted to reduce market support and tighten quality standards for cereals eligible for sale to intervention. This should mean that producers and end-users are making decisions on the basis of price differentials, between crops and between different qualities of cereals, that more closely reflect world and domestic market signals. An important market signal is that provided by end-users, by way of demand for different types and qualities of cereals for different end-uses. In a smoothly functioning market, producers will respond to end-users demands and produce the appropriate cereals, balancing supply and demand fundamentals without the extreme price gradients indicative of shortages and gluts. Where shortages and gluts exist, market distortions and constraints can usually be identified.

1.2 The Relevant Cereals CMO Measures

The 1992 and Agenda 2000 reforms heralded important changes to the system of intervention and threshold prices, and also introduced direct payments for arable crops, as well as compulsory set-aside for commercial producers, though crops could be grown for non-food uses on set-aside areas. The associated border measures were also relevant, and were adapted in 2003 by the introduction of tariff rate quotas on lower quality grades of wheat and on barley.

The logic of the CMO reforms since 1992 has been to reduce market support and tighten quality standards for cereals eligible for sale to public stores. Border measures reinforced internal market support.

A single intervention price was applied for all eligible cereals in all member states from 1993/94, in contrast to the previous system with different prices for different cereals. The logic of this reform is assumed be its administrative simplicity, since it runs counter to world market realities, with fluctuating price relativities between cereals. The establishment of the same intervention price for all member states has applied since the 1960s. It is presumably retained to ensure fairness between producers in different member states. However, other CMOs (for sugar, for example) have different intervention prices for surplus and deficit member states.

Other Cereals CMO measures affect planting decisions. Direct payments may differ between cereals under regionalisation plans, and will be weighed by producers against differences in market revenues from these crops, including quality premia. Set-aside obligations also affect cereal output levels for commercial producers, but the scope for growing crops for industrial uses on set-aside land has offered potential new outlets.

1.3 Judgement Criteria and Indicators

The Cereal CMO reforms, particularly decreasing price supports, were intended to produce a closer alignment of EU and world market prices. This should:

- Promote the influence of world prices on producers' decisions
- Improve the competitiveness of domestic cereals against imported cereals and cereal substitutes, inducing greater demand for cereals of a suitable quality.

In order to assess the degree to which this was achieved, we have adopted the judgement criteria and indicators presented in Table 4.1.

Table 4.1: Judgement Criteria, Indicators and Data Sources for Market Equilibrium

Judgement Criteria	Indicators	Data Sources
Cereal output in line with demand by type and quality	Supply/demand balances by cereal type	Eurostat and FAO output & demand data
Feed cereal price relative to feed substitutes	Trade balances by cereal type	DG Agriculture price statistics
Feed cereal and cereal substitute imports	Public and private stocks	National government statistics
	Supply response to price premia	Case study interviews and questionnaires

The judgement criteria form the basis of the analysis of the question, and are considered in turn in the discussion below.

2. INTERNAL CEREAL PRICES IN RELATION TO WORLD MARKET PRICES

This report uses the following indicators of the differentials between internal and world market prices at the relevant points[1]:

- Average export refunds for cereals in which the EU is a net exporter (common wheat, barley, rye, oats and durum wheat)
- Average differentials between internal market prices and c.a.f. import prices for imported cereals (notably maize).

Diagram 4.1 plots average export refunds from 1996/97 (the earliest year for which data were available for all cereals) to 2003/04. It reveals that differences between world market and internal prices, as revealed by export refunds, were reduced over the period from 1996/97 to 2003/04. For common wheat and barley, refunds averaged no more than €10 per tonne for all cereals in 2000/01-2003/04. Rye is an exception, with export refunds averaging more than €40 per tonne over this period.

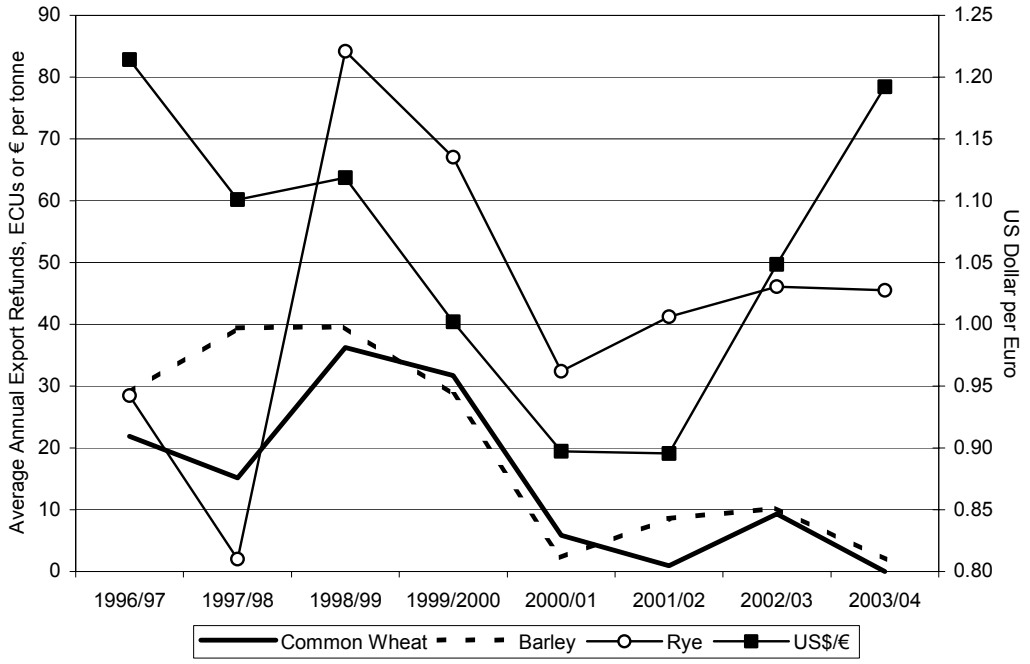
The diagram suggests that prices in the relevant locations for cereals other than rye were not yet fully *appropriate*, in the sense of being fully aligned with world prices in 2003/04, but they are much better aligned than they were on average prior to Agenda 2000 reforms.

[1] The relevant points are the main ports where EU cereals compete most directly with external products.

Despite this positive conclusion, the picture is complicated by exogenous factors. Export refunds are influenced not only by the levels of internal and world market prices, but also by the exchange rate of the Euro against the dollar. Diagram 4.1 includes the US dollar/Euro exchange rate, revealing the decline in the export refund with the weakening of the Euro from 1998/99 to 2001/02. However, the relationship is less notable with the strengthening of the Euro in recent years.

Diagram 3.8 in Chapter 3, Part 1 compares EU common wheat export prices with the same prices plus export refunds from 1995/96 to 2002/03. The diagram reveals that world prices were unusually weak in 1998/99, which partly explains the peak in the export refunds of that year shown in Diagram 4.1.

Diagram 4.1: Average EU-15 Cereal Export Refunds and Euro versus US Dollar Exchange Rates, 1996/97-2003/04



Source: DG Agriculture marketing year data

3. INTERNAL CEREAL PRICES AT RELEVANT TIMES OF THE YEAR

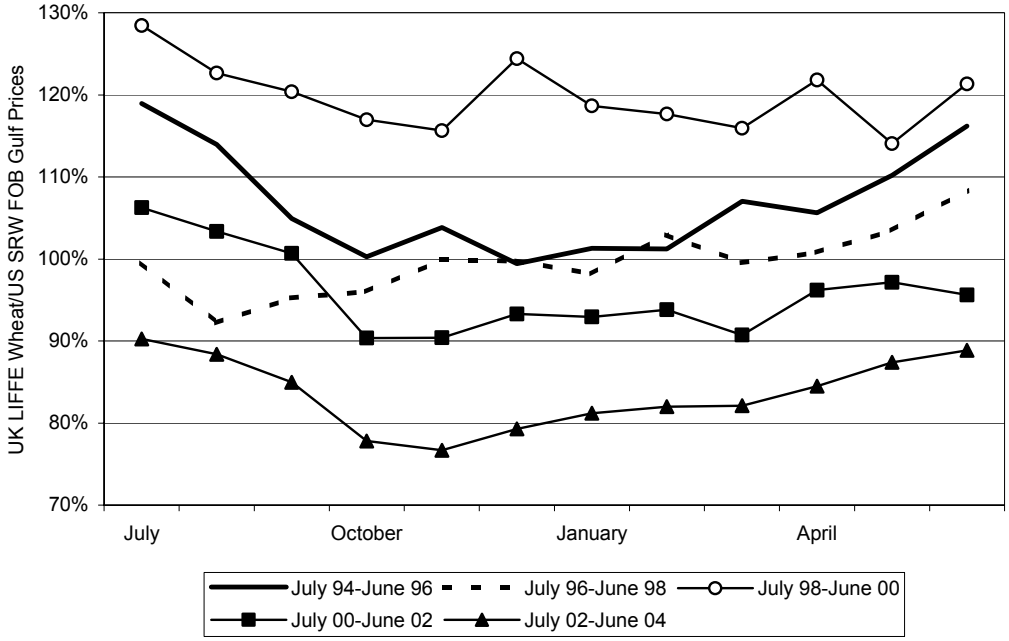
Part 2 of Chapter 5 considers the extent to which there are times in the marketing year when the rules regarding sales into intervention affect the behaviour of internal prices. For the UK wheat market, the chapter concludes that the end of the period for intervention buying causes a sudden reduction in prices. In this section, in order to determine whether there are periods within the year when market signals are providing less appropriate price signals, we have prepared Diagram 4.2. This analyses the behaviour of UK monthly wheat prices in relation to f.o.b. US Gulf Soft Red Winter (SRW) wheat export prices, by convention, an indicator of world price levels.

The price data analysed for Question 5.2 reveal that UK wheat futures prices typically fell significantly in June, the month in which intervention purchases ended. However, the diagram does not suggest that the ratios of internal to world market prices at the end of the crop year behaved in an unusual way. It is apparent that the UK prices have, on average, fallen below US levels since July 2000.

UK LIFFE and US Gulf Wheat Prices

- The LIFFE first position futures is used here as a representative guide to EU market prices. LIFFE prices are highly correlated with market prices in other member states, and more consistent monthly series are available for the LIFFE contract. The LIFFE series is also used in Chapter 5 for the analysis.
- The US Gulf SRW wheat price is selected as the export quality most similar to EU soft wheat. The data points for the US series are those relating to shipments that would arrive in the same time period as that for LIFFE futures quotations.
- UK prices are slightly below US Gulf prices. This reflects lower UK wheat quality and the freight charges needed to make the two prices equivalent to one another.

Diagram 4.2: UK LIFFE First Position Wheat Futures Monthly Quotations as a Percentage of US Gulf SRW Wheat Export Prices, 1995/95-2003/04



Sources: UK LIFFE and US Department of Agriculture

4. OBSERVATIONS FROM NATIONAL CASE STUDIES

Germany, Spain and the UK were the case studies selected to examine this question in detail. These examples reflect a wide diversity of cereal production conditions in terms of climate and sizes of holdings. Between them, they provide a good number of examples both of instances where producers have responded to market signals in deciding upon the qualities and types of cereals to produce and occasions where they have not done so. Several of these examples are discussed below.

4.1 Feed Sector

Chapter 5, Part 5 considers patterns of feed demand for domestic cereals. The main conclusions from that analysis are that sales of cereals for feed have risen appreciably,

both in volume terms and as a share of compound feed ingredients. The increase in cereal sales was achieved primarily as a result of greater price competitiveness of domestic cereals *vis-à-vis* cereal substitutes (energy feeds), in particular. There was also some substitution of oilseed meals ("protein feeds"). For cassava pellets, a very close cereal substitute, the greater competitiveness of domestic cereals was reflected not in changes in price relativities, but in decisions by pellet exporters to switch their processing activities to other more remunerative outlets, such as starch exports.

Case Study Examples of Feed Substitution

- UK on-farm feed use of both wheat and barley has increased significantly, with on-farm retention rates in 2002/03 61% higher than in 1995/96. In the most recent years, this trend has been accelerated by the increasing cost of delivering cereals to feed mills for sale and of delivering compound feed to producers.
- In Germany, by contrast, no clear trend was discernible in on-farm feed use, but there was a near doubling in the incorporation rate of cereals into compound feed from 1992/93 to 2002/03. This rise was not solely a response to more competitive cereal prices; major retailers and meat producers have become much more stringent in their standards regarding feed production processes and ingredient use. Also, new regulations regarding traceability and GMO labelling have favoured the use of locally grown inputs, with short supply chains, over imported products, such as soybean meal.
- Spain was similar to Germany, with no noticeable change in on-farm feed use. Overall, in feed demand for cereals, Spain suffers from relatively high cereal prices by EU standards, being penalised by the expensive infrastructure links between the main cereal growing areas inside the country and the major regions of demand on the coast. It also does not enjoy the full benefits of its proximity to France, since railway gauges are different in the two countries. A further special factor in Spain is the importance of GM maize in domestic supply. A sizeable area of GM maize is grown for feed uses in Spain. In addition, a substantial proportion of the two million tonnes per annum of maize imported into Spain at reduced tariffs following the Blair House Accord is in the form of GM cultivars.

4.2 Direct Payments

In combination with cuts in intervention prices, direct payments were intended to facilitate producers making production decisions on the basis of market prices that were closer to world market levels than they were previously. However, the implementation of direct payments systems influenced producers' willingness and ability to respond fully to market signals in several respects, including, notably, regionalisation plans and base areas.

Regionalisation Plans

A strong example of how market signals can be distorted by direct payments is where regionalisation plans created differences between reference yields and area payments for different cereals. These differences were at the discretion of national authorities but, because the regulations permitted distinctions to be made between irrigated and unirrigated cereals and between maize (and other minor cereals) and all other cereals, the greatest differentiation is found where maize is grown and irrigation is widely used.

Case Study Examples of Impact of Regionalisation Plans on Output Decisions

- In one region of France, analysis of the latest area payments in different *départements* reveals that the payments for irrigated cereals were up to €186 per hectare higher than those for unirrigated cereals in the same locality. When irrigated maize was compared with other irrigated cereals, the difference reached €238 per hectare in one large cereal-producing *département.*
- Where the comparison is made between unirrigated maize and other cereals, the extra payment for maize was as high as €132 per hectare.
- Areas under set-aside also benefited from regionalisation plans, receiving as much as €125 per hectare more than unirrigated cereals, other than maize.
- Differences in area payments on this scale were acknowledged by cereal producers to play an important role in stimulating production of irrigated crops, notably maize. They also favoured maize output over that of other cereals.
- In Spain, the case study reveals that the maize area expanded rapidly (from 4.2% of the total cereal area in 1993/94 to 8.0% in 2001/02, before falling back slightly to 7.3% in 2004/05).
- It was clear from interviews that this development was not a reaction to price signals, but instead was a response to more favourable area payments for maize, and particularly for irrigated maize.

Base Areas

Expenditures on area payments are linked to base areas (maximum guaranteed areas) for each eligible cereal. Before the 1992 CMO reform, forage maize cultivation did not receive official support, other than the implicit support from the prices of other feed cereals. The reforms made this grade of maize eligible for area payments, and this has created distortions for producers in responding to purely market signals.

Case Study Examples of Impact of Base Areas on Output Decisions

- In damp maritime climates, such as those of the UK and Denmark, the previous low level of maize cultivation led to the establishment of small base areas for maize. The attractions of the cultivation of maize in the UK may be gauged from the extent to which UK cereal producers regularly exceeded the maximum guaranteed areas.
- Since 2000/01, UK farmers have on average put over 100,000 hectares under maize or in its associated set-aside, although their MGA was only 33,200 hectares. This reveals that they were willing to cultivate maize with less than one third of the area payment paid on other cereals. Indeed, to the extent they were also penalised on set-aside payments, the attractions of maize cultivation were even greater than this comparison of area payments implies.
- UK fodder maize areas rose from 43,000 hectares in 1990-92 to 121,000 in 2002. Danish growth was from 19,000 hectares in 1990-92 to 118,000 in 2003.
- Durum wheat plantings in Spain and, to a lesser extent in Italy and France, were boosted by revisions to the measures for durum wheat that took effect in the 1999/2000 crop year, with the introduction of new Maximum Guaranteed Areas.

The choice of particular cereals, for example between durum and common wheat, is not necessarily one that relates specifically to quality. For many producers, the difference in area payments is a major determinant of planting decisions. In the case of durum wheat, it is constrained by the MGAs, as described in the box above.

4.3 The Trade-off between Quality and Yields in Cereal Crops

Other factors contribute to the farm output decision and the willingness and ability of producers to respond to market signals. One is the difficulty within the constraints imposed by the EU climate of meeting the full demand for highest quality breadmaking cereals, despite greater addition of local wheat gluten to raise protein levels. Therefore, as Part 6 of Chapter 5 reveals, imports of this grade of wheat have risen since 1995/96.

Varietal developments have often played a major role in decisions made by farmers about the qualities of their output. A key element of producers' calculations is the form of the quality premium. If it is an absolute amount, the combined market value and area payments for higher quality production may have increased, as a result of the CMO reforms, in relation to total income from lower quality cereals. Evidence drawn from the case studies includes:

- The uniformity of direct payments has encouraged some UK barley producers to cultivate lower yielding, but higher quality, cereals, attracting a premium.
- In common wheat, Germany has witnessed a shift from high quality to high yield varieties as a result of varietal development.
- In the UK, however, there has been a contrasting shift from lower quality feed wheat to higher quality varieties. Producers suggest this is due to improved seed varieties and marketing flexibility for higher quality UK wheat.
- A strong correlation is evident between the production of UK breadmaking wheat and the level of the breadmaking wheat premium in the previous year.

The analysis of UK breadmaking wheat output suggests a marked responsiveness to market signals, rather than the support measures under the CMO. Farmers interviewed in the UK were unanimous in stating that this responsiveness had increased since the 1992 reform. However, the evidence of other case studies suggests that the degree of responsiveness is limited by the parameters of varietal development and agro-climatic conditions. Moreover, much of UK wheat output does not meet intervention specifications, thereby heightening the importance of the market in that sector.

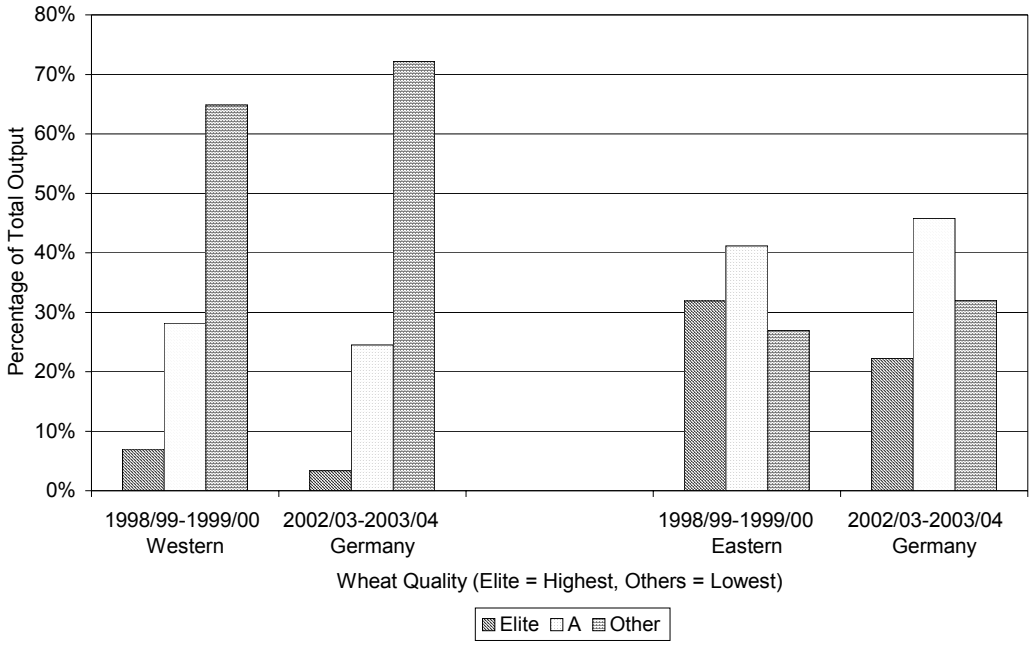
Where intervention more forcibly underpins the sector, as in Germany for example, particularly for rye, a greater degree of price rigidity is observable. In the case of UK barley, the significant presence of the domestic whisky distilling sector is also felt to have created a more divided, two-tier market between malting and feed qualities, thereby strengthening barley market premia. This is less true for wheat, where different qualities can be blended to obtain sufficiently high cereal quality for end-users in some industries. Case study evidence for these trends is described in detail in the box below.

Case Study Examples of the Quality and Yield Trade-off in Output Decisions

- Some UK barley producers remarked that, when choosing malting or feed barley varieties, the uniformity of direct payments has encouraged them to cultivate lower yielding, but higher quality cereals, attracting a premium.
- Prior to the reforms, when price supports were the main measure used to sustain cereal production, producers said that their primary objective was output maximisation, which tended to favour lower quality crops, which often had lower input costs per tonne than higher quality and lower yielding alternatives. However, the reforms have redressed the balance.
- However, the UK experience has been in sharp contrast with that of Germany, which demonstrates the importance of the availability of varieties and, in the UK case in particular, climate, which determines how wheat grown from exactly the same seed variety is graded after harvest in different years.

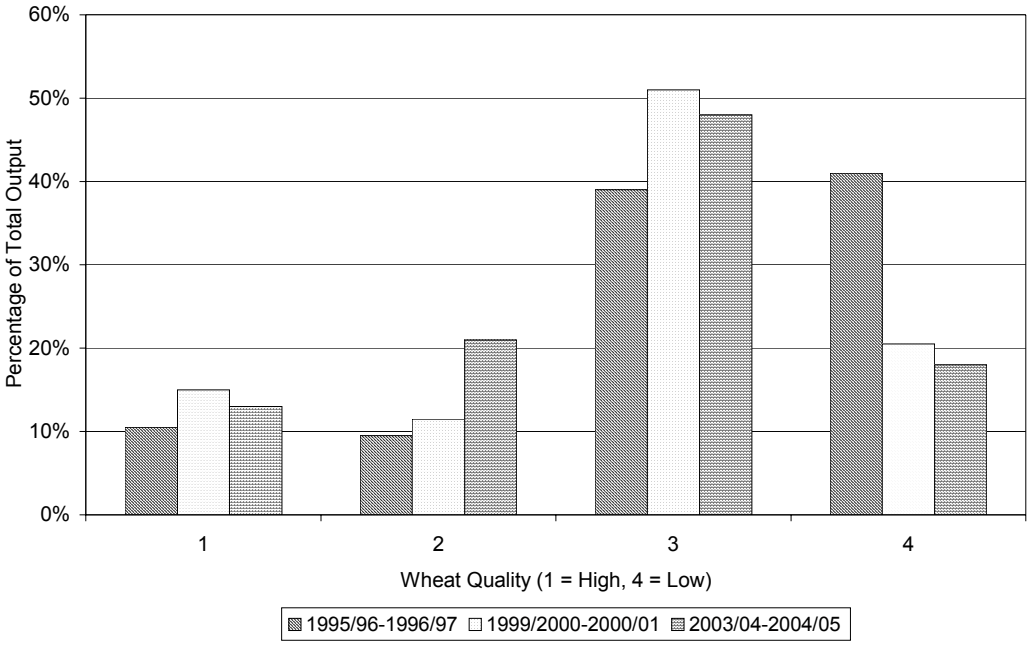
Diagrams 4.3 and 4.4 compare the experience of Germany and the UK in the quality of their common wheat crops.

Diagram 4.3: Changing Qualities of German Common Wheat Output, 1998/99-2003/04



Source: German case study monograph

Diagram 4.4: Changing Qualities of UK Common Wheat Output, 1995/96-2004/05



Source: UK case study monograph

German and UK Experience Regarding the Quality of Common Wheat Output

- For **Germany**, there is a strong regional difference, due to climate, in quality, with the drier eastern region producing a much higher proportion of its output as quality common wheat.
- Yet, the cultivation of quality wheat has suffered a major setback between 1998/99 and 2003/04 in all parts of Germany, and this was most marked at the top (E-wheat) end of the market.
- The main reason for this change in wheat quality was the successful adoption of the B-wheat variety Ritmo from the mid-1990s.
- In addition, higher standards for high quality wheat increased their costs more than the rise in quality premia. Thus, Germany has witnessed a shift from high quality to high yield varieties.
- In the **UK**, there has been a steady shift from lower quality feed wheat to higher quality breadmaking varieties.
- Reasons given by UK farmers are the availability of better seed varieties for good quality wheat; premium prices for this quality wheat; more marketing flexibility than with feed wheat; and difficulties in selling UK feed wheat into intervention.
- From 1984/85 to 1995/96, UK millers increased the share of home grown wheat in their throughput from 61% to 86%. Since 1995/96, this share has stabilised, because the top qualities cannot be grown locally.
- Therefore, farmers have responded to their maximum extent to the users' demand for higher quality supplies, aided by improved varieties.

- Producing bread-making wheat is more costly than feed wheat, both per hectare and per tonne; but one would expect its output to respond, with a year's lag, to its premium over feed wheat.
- The analysis undertaken in the UK case study between the annual percentage change in breadmaking wheat production and its price premium over feed wheat in the previous year reveals a correlation of 0.78. There was a negative correlation of 0.72 between feed wheat output and the breadmaking premium lagged a year.
- This suggests a marked responsiveness to market signals, rather than the support measures under the CMO.
- Farmers interviewed in the UK were unanimous in stating that this responsiveness had increased since the 1992 reform. They also felt that this trend would increase in importance under the new Single Farm Payment system.

4.4 Sales to Private and Public Stocks

In the UK, where intervention plays a less active market role, cereal producers appear to be responding to market signals in their decisions on output quality. However, the market would be failing if commercial outlets were not available for this production, and surplus production accumulated as stocks. In the UK case study, we analysed end-of-year private and public stocks for wheat, barley and oats (the latter are not eligible for intervention). In no instance was there evidence of the accumulation of stocks, other than on a short-lived basis.

The German experience has been different. Intervention stocks are much higher there than in the UK, partly because it is easier in the climate to produce cereals that meet intervention quality standards, but also because local cereal surpluses create downward pressure on prices in many years, which results in public stocks acting as the buyer of last resort. Traders and processors interviewed agreed that the intervention system distorted production decisions, by narrowing the local premia for quality cereals. In the case of rye, it had generated a false demand, with some producers growing this crop solely for intervention, without regard for market needs.

5. EVIDENCE FROM PRODUCER QUESTIONNAIRES

Producers in Germany, Spain and the UK were approached to complete questionnaires about how they adapted supply to demand. Detail is provided in Appendix 27.

- Asked about the influence of direct payments and set-aside upon their cereal planting decisions, over half the respondents said that direct payments did have an effect, but most said that the effect was slight, rather than great, and few large farmers said that the impact was great.
- In the case of set-aside, half of the large farmers said that it affected their cereal planting decision directly, as against only one sixth of the small and medium sized producers, many of whom may have been too small to be liable for compulsory set-aside.
- When asked how premia for quality affected their own decisions on cereal quality, the answers were even distributed between "not at all", "slightly" and "greatly", with the first slightly more common than the other two.

- Whereas small and medium producers were heavily biased towards the answer "not at all", large producers tended to state that quality premia affected their own production decisions greatly or slightly.
- Responsiveness to customers' quality needs was more evident among larger producers, but for all sizes of cereal farmers, the mode in the distribution of the answers was "slightly", with "greatly" the next most common answer.
- Quality standards of cereals for intervention were said to have had no effect upon the practices of producers for roughly 60% of producers, a slight impact for 30% and a great effect for 10%. Again, large farmers were more responsive than their smaller counterparts.
- Respondents were asked how the CMO reforms influenced cereal use in on-farm feed. Approximately half said that the impact was slight, but a quarter said that it was great, though the proportion in this last category was lower for cereal specialists and higher for other specialists, who were more likely to own livestock.

6. CONCLUSIONS

Evidence from producer questionnaires, sector interviews and data analysis reveals that the measures are considered to have improved the responsiveness of internal production to market signals and the requirements of users.

However, there are also indications that non-price CMO measures, such as area payments and set-aside, have affected cereal production decisions.

There is particularly strong evidence that, in the animal feed sector, the CMO measures have improved the competitiveness of cereals against other feed ingredients.

As a result, there have been sizeable increases in the share of cereals in feed ingredients since 1992/93, reversing a decline in the absolute tonnages of cereals used in feed that occurred between 1984/85 and 1992/93.

Evidence from the UK, comparing its monthly wheat prices with US Gulf world market prices, also suggests that these prices track one another quite closely.

There is no indication from the comparison that producers are responding to inaccurate price signals at the relevant times.

Despite these positive developments, factors other than demand influence supply, and, therefore, the ability of supply to respond fully to demand.

The experience of the German and UK common wheat sectors demonstrates that the development of more productive new varieties can have a major impact upon the quality of cereals cultivated by producers, downwards, as well as upwards.

Regionalisation plans yielding differentials between the area payments for different crops have often led to crops, such as irrigated maize, being chosen, not on the basis of price signals, but on the basis of the signals generated by these area payments established by the regionalisation plans.

Producers stated that set-aside, too, has affected their cereal planting decisions to a certain extent.

Chapter 4, Part 2: Land Use and the Choice of Crop

Have all the measures taken together (intervention, trade arrangements, direct payments, aid to other crops, set-aside) had any impact on the relative profitability of the different cereal crops and alternative land uses (mainly oil and protein crops and set-aside)? If so, which uses are most/least favoured, and in which cases?

The crops to be covered are common wheat, durum wheat, barley, maize, rye and other cereals

1. INTRODUCTION TO ANALYSIS

1.1 Interpretation of the Question

The logic of the Cereal CMO reforms since 1992 was to improve the competitiveness of domestic cereal production. Reduced market supports, complemented by border measures, were a major strand in implementing this logic. Direct payments, by providing some compensation to producers for lower producer prices, facilitated the changes. However, direct payments were not applied to cereals alone; they were also applied to oilseed and protein crops, and were paid on set-aside land, as well.

Together, these measures influenced the relative profitability of the individual cereal and other COP crops, both against one another and against set-aside. In the case of set-aside, the generalised system required set-aside on the part of larger farmers, but the simplified system, for smaller producers, allowed these producers to set-aside their land solely on a voluntary basis, thereby creating a difference between the effect of the measures on small and large holdings.

Using the hypothesis of a fully liberalised market, without any CMO measures, as a basis for comparison, the *most/least favoured uses* are interpreted as those whose gross margins were improved most/least by the effects of the CMO measures.

1.2 The Relevant Cereals CMO Measures

The Cereals CMO measures affecting crop choices are the major themes of both the 1992 and Agenda 2000 reforms. These are market supports, notably the institutional prices; the border measures, insulating internal market prices from the world market; direct payments to cereals and to other COP crops, as well as to set-aside; and the set-aside requirements for larger and smaller producers, with provision for the cultivation of non-food crops on land that is placed in the set-aside scheme.

1.3 Judgement Criteria and Indicators

Gross margin analysis and the concept of profit-equalising prices (as explained in Appendix 8) analyse changes in the profitability of cereal crops against each other, and against alternative land uses. These instruments reveal optimal theoretical crop choices for producers over time.

The implications of two particular components of the measures are singled out for special attention: direct payments and border measures.

The analysis determines whether, and in what ways, removing these measures would affect the relative profitability of cereals and other land uses in the selected member states.

This enables one to deduce how crop profitability would have altered, within the present structure of holdings, if world prices were the benchmark for comparison, revealing the most and least favoured land uses across member states in terms of these measures, and identifies how particular measures influence this judgement.

Table 4.2 presents the judgement criteria and indicators to be applied in the analysis of these issues.

Table 4.2: Judgement Criteria, Indicators and Data Sources Regarding Choice of Crop

Judgement Criteria	Indicators	Data Sources
Gross margins under CMO vs. those in a liberalised market	Effect of CMO on gross margin Profit-equalising prices Crop area changes over time Changes in prices over time	National research institutions LMC's Gross Margin Database Commission, national and region data on crop areas and prices over time

2. ANALYSING THE EFFECT OF MARKET SUPPORT AND DIRECT PAYMENTS ON CROP PROFITABILITY

Appendices 28 to 33 compare estimates of Gross Margin I (defined in the Glossary presented earlier in this report), profit-equalising prices and crop areas from the 1995/96 to 2003/04 marketing years for cereal and oilseed crops in the six selected member states.

These estimates are national averages; thus the comparisons are not necessarily indicative of individual farmers' crop choices, which reflect local agro-climatic conditions.

The appendices also present estimates of the effects upon the gross margins earned from different crops of:

- Removing area payments
- Removing border measures.

Appendix 34 compares SPEL's estimates of individual crop gross margins from 1990/91-1998/99 with those estimated by LMC for the same period, to establish that, in most instances, the two sets of estimates move more or less in parallel with one another (since the measures are not identical, they would not be expected to have the same values).

Member State and Crop Coverage

The comparisons in these Appendices have been made for the following crops:

- Denmark: *rye, barley, rapeseed, common wheat*
- France: *maize, common wheat, barley, durum wheat, rapeseed, sunflowerseed*
- Germany: *barley, rye, maize, common wheat, rapeseed*
- Italy: *common wheat, durum wheat, soybean, maize, sunflowerseed*
- Spain: *common wheat, durum wheat, barley, maize, sunflowerseed*
- UK: *barley, common wheat, rapeseed*

Protein crops were not modelled as a separate land use.

This was partly because they account for a small share of the total cereals, oilseed and protein (COP) crop area (close to 2.5% in recent years), but also because interviews with producers revealed that their inclusion in the crop rotation was usually for agronomic reasons, which were little affected by even fairly sizeable changes in relative prices.

2.1 Treatment of Set-Aside Land

Gross margin simulations are more difficult to prepare for set-aside than for other choices of land use because, typically, the least productive land is used for set-aside.

- Also, producers state that there are tangible benefits to the succeeding crops planted on the same land after a fallow period.
- A further practical issue with set-aside land is that energy crops are permitted on set-aside land, whose crop economics appear to be determined by specific national tax advantages.

Despite these qualifications, the attractions of set-aside land may be deduced in part by analysis of the estimates of gross margins and of the contribution that is derived from different measures.

Instances where crops would have generated negative gross margins in the absence of area payments and border measures are likely to be good indications of circumstances where set-aside (even on land of average quality) would be expected to be more profitable than crop production in a liberalised framework.

This is because the direct costs of maintaining set-aside land as fallow are small, and may well be counter-balanced by the rotational benefits in subsequent COP crops.

2.2 Comparisons of Gross Margins Generated by the CMO Measures

The analysis of Gross Margin I and of the profit-equalising prices reveals that, with the full benefit of the CMO measures, the crops yielding the highest and lowest gross margins, comparing 1995/96-1997/98 with 2001/02-20003/04, were split along geographical lines.

- In northern Europe, soft wheat yielded the highest margins in Denmark, Germany and the UK.
- Maize tended to generate the highest margins in the southern countries in the comparison — France, Italy and Spain.
- The lowest margins were recorded most often for barley, but rye, in the two countries in which it was an important crop, consistently generated lower gross margins than barley.

Oilseeds, in general, recorded high gross margins in the early period, helped by area payments that were larger than those paid on cereals. As a result, soybeans were the most profitable crop in Italy in those years. By the second period, oilseed direct payments were approaching those for cereals, and oilseeds tended to be lower in the gross margin comparisons than they were earlier; indeed, sunflowerseed returned the lowest gross margins of all the crops in Italy and Spain.

2.3 The Effect of Direct Payments

Direct payments influence the attractions of alternative crops via their different effects upon their profitability. They affect the choice between COP and non-COP alternatives, since the latter are not eligible for such payments; this particular bias will cease as the Single Farm Payments are introduced in the Mid-Term Review.

Within the class of COP crops, direct payments affect crop choice, notably between maize and other cereals, and between irrigated and unirrigated cereals, by virtue of being differentiated under many regionalisation plans[1], which themselves were modified in Agenda 2000 so as to increase reference yields in Italy and Spain. In addition, durum wheat and protein crops receive higher payments than other cereals; and, as noted above, oilseeds received higher payments than cereals until 2002/03.

The application of base area limits and reductions in area payments when these are exceeded also affect the relative profitability of alternative COP crops.

The Appendices confirm that oilseeds' higher area payments in the earlier period were a vital element of their appeal to producers in the mid-1990s. For four of the six countries, oilseeds would have recorded the lowest margins in 1995/96-1997/98 in the absence of area payments. France and Italy were the exceptions; durum wheat would have displaced oilseeds as the lowest margin crop, if no direct payments were paid.

By 2001/02-2003/04, with the convergence of oilseed area payments and those for rain-fed cereals, the absence of area payments would have caused a wide range of crops to record the lowest gross margins: durum wheat would have remained the least profitable crop in both France and Italy, but in the four other countries, rye, maize, barley and sunflowerseed would have been the crops with the lowest margins.

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[1] Differences between cereal crop direct payments in one region of France approached €200 per hectare.

Assuming no area payments, the highest margins in both periods were for maize (helped by irrigation) in France, Italy and Spain. In Germany and the UK, soft wheat was the most profitable; and in Denmark, barley would have been the choice.

2.4 The Effect of Border Measures

The assumption made in this report is that the average export refund, in the case of barley, rye, common wheat and durum wheat, is a fair indication of the effect of border measures upon internal prices. This is because it reflects the competitively determined sum needed to compensate exporters for the difference between internal prices and export prices at the point of export.

For maize, the relevant measure is the difference between the c.a.f. import price and the internal market price, as reported by the Commission.

These sums are applied in the Appendices to determine the effect upon gross margins of removing border measures. In the earlier period (1995/96-1997/98), the gross margin of barley, wherever it was produced, would have decreased most following the assumed ending of border measures. In the second period (with 2001/02-20003/04), the gross margin of rye would have decreased most after ending border measures.

2.5 Assessing the Returns from Set-Aside

Rye in Denmark and barley, rye and maize in Germany[2] would all have recorded negative margins in 2001/02-2003/04 in the absence of the measures.

The analysis also reveals that durum wheat and barley in France; rapeseed in Germany; sunflowerseed, durum wheat and soft wheat in Italy; sunflowerseed, durum wheat and barley in Spain; and barley in the UK would all have yielded gross margins of under €100 per hectare without the measures.

In these instances, especially for the group with negative margins, set-aside would appear a more attractive option in a liberalised market. This would remain valid if area payments were made (subject to imbalances between payments for different crops as a result of regionalisation plans), since set-aside land receives such payments.

The possibility of cultivating energy crops on set-aside land would have reinforced the attractions of set-aside in those circumstances in which energy crop production yielded a higher gross margin than some COP crops on non-set-aside land.

3. CROP PROFITABILITY AND PLANTING DECISIONS

Statistical analyses were undertaken of the relationship between one year's individual crop profitability and planting decisions the next year to establish whether profitability of the individual crop influenced the relative share of the area planted to the crop the following year.

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[2] It was observed that German gross margins, whether derived from SPEL or our own independently derived data (see Appendices 30 and 34), imply lower margins than those reported in most other member states.

Statistical Testing Method

The test employed for the analysis was that for Granger Causality. Granger Causality is defined as follows: With two variables X and Y, X "Granger-causes" Y if the value of Y at time t is predicted better by using past values of X than by not doing so, assuming all other variables are included in the model.

The time series were first expressed as differences to eliminate any stochastic trends; next causality tests were carried out by regressing the relative share of the area planted to a specific crop on past values of the area and relative profitability of the crop up to order 1 for both lagged variables.

Finally an F test was used to ascertain the statistical significance of the coefficient of the variable expressing the relative profitability.

In all, 28 tests were performed for all the country/crop combinations listed above, and none failed to reject the null hypothesis, which was the absence of Granger causality. This means that we can conclude that the value one year of the relative share of area planted to a specific crop is not "Granger-caused" by the relative profitability of the crop the previous year, i.e., changes in the relative profitability of a specific crop will not tend to be reflected in the area planted to the crop the following year.

In the case of oilseeds, in particular, the importance of their cultivation on set-aside land was considered as a possible complicating factor, since a significant proportion of the total rapeseed area in some member states, notably Germany and France, occurs on such land. Therefore, the analysis was repeated excluding estimated plantings on set-aside land from the total oilseed area. The revised analysis still failed to establish a significant causal link between profitability one year and plantings the next year.

These results are not very unexpected, in view of the limited time series analysed and the agronomic importance of crop rotation, which effectively constrains a producer's freedom to switch crops from one year to another.

4. EVIDENCE FROM PRODUCER QUESTIONNAIRES AND INTERVIEWS

Appendix 27 presents a summary of the aggregated answers, from all the relevant regions, to the questionnaires prepared regarding the choice of crop. The results are prepared in two formats, by specialisation of the producers and by size of the holdings. A clear majority, in both formats, stated that the relative profitability of cereals had not changed in relation to other crops over the past ten years, but slightly more said that the relative profitability had fallen than said it had risen.

The effect of set-aside on cereal plantings was neutral, but direct payments had an undoubted effect upon producers' decisions regarding cereal crops, for all types and sizes of farms; smaller farms were more affected than larger farms in this respect.

Agronomic constraints were mentioned as influences upon planting decisions by over 85% of farmers, other than COP specialists; among them, over 70% were affected by these constraints. Environmental constraints (including the use of fertilisers and chemicals, and requirements for benefits under the CMO) had slightly less impact upon planting decisions, but were still a major determinant of farmers' choice of crops.

5. CONCLUSIONS

Regarding the impact of the Cereal CMO measures on the relative profitability of different cereal crops and alternative land uses, the analysis fails to reveal a statistically significant causal relationship between the relative profitability of individual crops in one year and planting decisions in the following year.

Because of the lack of significance from the statistical analysis, the evidence of impact of the measures, via crop profitability, on crop choice is mainly by observation from the case studies.

The case studies suggest that the measures have affected crop choice, in particular the choices::

- Away from non-set-aside oilseeds towards cereals, as higher oilseed area payments have ceased.
- Towards simplified farming systems, with shorter and less varied rotations, which have been adopted to reduce the fixed costs of equipment for minor crops.

Within the limitations of the data analysis, the measures affected the relative gross margins of individual crops in the following ways:

The Effect of Area Payments: The influence of area payments upon gross margins was particularly strong for oilseeds in the earlier period. For cereals, too, they often provided a sizeable element of the overall gross margin.

We conclude from the analysis that the direct payments element of the CMO was most important for the maintenance of rye and durum wheat production, and had its lowest impact upon the profitability of soft wheat and maize farming.

Regionalisation plans affected the outcome considerably; their effects were greatest for irrigated *versus* rain-fed cereals.

The Effect of Border Measures: Border measures played by far their most important role in supporting gross margins in 2001/02-2003/04 for rye.

The ending in 2004/05 of its eligibility for intervention may help to end this disparity between its treatment and that of other crops.

The Effect of Set-Aside: Several factors have tended to raise the economic attractions of set-aside.

Set-aside land is concentrated, where possible, on less productive fields and, where outlets exist, a growing share of the set-aside area is now used for energy crops; also, fallow periods on set-aside land have rotational benefits for succeeding crops.

Because small farms are exempt from compulsory set-aside, these remarks apply primarily to larger holdings.

Chapter 4, Part 3: Intensification

Has combining cuts in institutional prices with direct payments based on historic yields limited the intensification of cereal cultivation? If not,why not and to what extent?

The crops to be covered are common wheat, maize and rye.

1. INTRODUCTION TO ANALYSIS

1.1 Interpretation of the Question

The previous part of this chapter considered the choice of crops facing producers; this section considers the crop management decisions taken by producers once they have selected cereal crops. In particular, the discussion analyses the intensity of cultivation practices. These decisions reflect the trade-off between the costs of increasing the intensity of input use, and the value of extra output that is derived.

The logic behind the Cereal CMO reforms instituted after 1992 was that, by separating direct payments from current yields, producers would treat such payments as a form of lump sum transfer. This would enable producers to adopt the reduced level of internal market prices as the relevant value of the marginal revenue in determining their production technology. They would be expected, therefore, to adapt the intensity of factor and variable input use so as to equate marginal costs to their average selling price of the cereal in question.

The hypothesis is that a reduction in institutional prices will reduce the intensification of cereal cultivation to reflect the lower marginal revenues on sales from a given area.

The changing intensification of cereal cultivation can be interpreted in terms of input use per hectare or per tonne of cereals. Both measures are considered here.

The intensity of input use per hectare is the more important statistic, since producers' main planting decision affects their areas, which are also the basis for direct payments. The variable inputs and factors for which the intensity of input use is examined are fertiliser, chemicals, fuel, labour, capital equipment and irrigation; for the last items, we draw upon the discussion in Chapter 3 of the rational use of factors of production.

1.2 The Relevant Cereals CMO Measures

Both the 1992 and Agenda 2000 reforms reduced institutional prices for cereals and combined them with area and set-aside payments.

The regionalisation plans have influenced the intensification of cereal agriculture, via their effect upon the use of irrigation in cereal farming, where different reference yields were adopted for irrigated and non-irrigated cereals, and via different reference yields for maize and other cereals, which have influenced the choice of cereal crop and the associated input use.

Environmental measures are also relevant. The 1991 Nitrate Directive has influenced the use of nitrogenous fertilisers. National governments have also introduced their own environmental controls upon the use of phosphate fertilisers and upon pesticides.

1.3 Judgement Criteria and Indicators

The extent to which intensification (which relates to rates of change, not levels, of intensity) has been influenced by the measures can be assessed in both an historical and cross-sectional, or international, context.

In the global comparison, we consider three other high income cereal producers, Australia, Canada and the US, the first two of which operate with prices closer to those in the world market than the EU or US.

Table 4.3 presents the approach adopted in assessing this question.

Table 4.3: Judgement Criteria, Indicators and Data Sources Regarding Intensification

Judgement Criteria	Indicators	Data Sources
Reduction in EU intensification rate of inputs	Rates of changes in factor use	FADN data
Measured per hectare and per tonne	and variable input use per tonne	National data provided by Member States
Convergence with intensification rates	and per hectare	Case study interviews and questionnaires
of major exporters	Comparative indicators for Australia, Canada and the US	National and provincial data for the US, Australia and Canada

2. INTENSIFICATION OF INPUT USE IN EU CEREAL FARMING — FADN DATA

Changes in the input use per hectare, derived from FADN data and covering the period since 1995, are summarised in Appendix 36.

The data are expressed in rates of change of the real value of inputs per hectare, except in the case of total labour, where the measure used is a physical one (full time equivalents per hectare). The data show substantial variations between countries and between types of farm.

2.1 Fertiliser Use

The FADN data indicates that fertiliser use has declined in many cases, but there are several exceptions to this rule.

The greatest rates of decline are found in Denmark, while Germany and Italy have also observed reductions in fertiliser use. However, several countries have observed increases in fertiliser use, including the UK (though only slightly, and in contrast to other available data from UK regional sources), France, and, most notably, Spain.

The box below considers each of the national observations in more detail.

Case Study Observations of Fertiliser Use

- **Denmark:** The rate of fertiliser use decline is most striking in Denmark, where national measures limit fertiliser applications for environmental reasons.
- **Germany:** The same tendency can also be seen in the German data, though in this case it cannot be attributed to any such national measure, but instead provides support to the general hypothesis that input intensity is falling in response to lower prices.
- **France:** In France, however, there was some tendency to increase fertiliser use, particularly in larger farms specialising in cereal production. Producers remarked upon this as a reflection of the initial realisation that the 1992 reform was less draconian than had been feared. After a brief period when the use of most inputs was reduced sharply, intensity levels recovered.
- **Spain:** In Spain, the FADN data show a marked increase in the intensity of input use per hectare, not only for fertilisers but also for most inputs, including total labour. The increase in fertiliser use is less pronounced in the case of large cereal specialist farms, but is pronounced for large general field crop farms.
- **Italy:** Italian data show a general pattern of reductions in fertiliser use, in line with, though on a smaller scale than, that seen in Denmark and Germany.
- **UK:** The UK FADN data shows small increases, though we will comment on the UK case in greater detail below, in the light of a longer and more consistent time series.

2.2 Other Inputs

Plant protection chemicals show a general, though not universal, tendency to greater intensity of inputs per hectare. This is associated in part with the reduction in labour inputs, noted below, as manual and mechanical cultivation operations were replaced by chemical applications. The relative costs and efficacy of the alternatives available to producers have tilted in favour of the use of chemicals.

Energy inputs have generally become less intensive, with the exception of the UK and Spain. Labour inputs also show a downward trend, though here too Spain provides an exception, with greater intensity of use of this, as of most other inputs. Spain also shows clear evidence of greater use of machinery. Here, too, it contrasts with the downward trend that characterises most other countries.

The French experience illustrated the importance of structural change upon the outcome. Many farmers took up an early retirement option offered by the government. This phenomenon led to many new farmers entering the sector, which provided a short term boost to structural change, which is evident from the use of many inputs. However, since that time, in the absence of other measures to hasten structural change, French intensification patterns have stabilised once again and appear to have returned to the longer term trends evident before the early retirement scheme.

In summary, FADN data are broadly consistent with the hypothesis that there has been a general reduction in intensity of cereal farming, but the evidence is neither clear-cut nor particularly strong. In certain cases national measures appear to have been more important, and in several cases there has been a trend towards greater intensification.

The following case studies highlight the rather inconclusive findings from the FADN data and alternative data sources. The boxes present examples of increased intensification, in the example of the Spain; the relatively minor and fluctuating changes apparent in the UK; and the decreased intensity of cereal farming in Denmark.

Case Study of Spanish Input Intensification

- The Spanish results warrant special consideration, since they indicate different trends from other member states.
- An important statistical reason for this anomaly lies with the data and reference period. The beginning of the comparison period in the mid-1990s coincides with a severe Spanish drought. In these conditions, many farmers reacted by lowering input usage in affected fields, and abandoning crops, once they realised that they would fail. In this context, increases from the low point of these base years are, therefore, less surprising.
- A further explanation for the difference is provided in Appendix 32, in which crop profitability is related to areas planted to cereal and oilseed crops.
- Within Spain, the balance of COP output has altered significantly since the early 1990s, with a decline in the total COP crop area, alongside a movement away from extensive, lower yielding crops, most notably sunflowerseed and barley, towards more intensive, higher yielding alternatives, often with irrigation, such as maize.
- The changes in choices of crops were encouraged by the regionalisation plans. These provided much higher reference yields and direct payments for irrigated cereals, and reduced the difference between area payments for oilseed crops and rainfed cereal crops, until the gap disappeared during the implementation of the Agenda 2000 reforms.
- In addition, durum wheat areas rose substantially from 1999/2000 after the measures adapting maximum guaranteed areas for this crop.
- A further special factor was the increase introduced to Spanish average reference yields in the Agenda 2000 reform. This magnified the incentives provided by regionalisation plans to switch from less intensive cereal crops to those requiring higher levels of input use.

Table 4.4: Annual Changes in Input Intensities per Hectare and per Tonne in Soft Wheat Production, 1981/82-1992/93 vs. 1992/93-2003/04, East Anglia, England (% per annum)

Per Hectare	1981-1992	1992-2003	Per Tonne	1981-1992	1992-2003
Seed	-1.1%	-3.2%	Seed	-2.3%	-4.2%
Fertiliser	-3.6%	-0.2%	Fertiliser	-4.8%	-1.3%
Sprays	-0.3%	-0.5%	Sprays	-1.5%	-1.5%
Miscellaneous	-0.8%	5.6%	Miscellaneous	-2.0%	4.5%
Total Variable	-1.6%	-0.7%	Total Variable	-2.8%	-1.8%
Machinery Costs	-4.7%	-4.0%	Machinery Costs	-5.9%	-5.0%
Fixed Costs	-3.1%	-0.2%	Fixed Costs	-4.3%	-1.3%

Source: Derived from Cambridge University, *Farming in the Eastern Counties*.

Case Study of UK Input Intensification

- A long and consistent time series, prepared in real terms, is available from Cambridge University concerning farm inputs in East Anglia, the major cereal-growing region of the UK.
- The evidence from this time series is summarised in Appendix 37, which describes annual rates of change in input intensities from 1977 to 2003 for winter wheat, with winter barley, spring barley and oilseed rape included for comparison.
- In general, these data reveal a marked increase in intensification at the start of this period, which followed UK accession and the period of exceptionally high cereal prices in the mid-1970s.
- There has been a general decline in input intensity since 1983, both measured in terms of inputs per hectare and per tonne of output.
- Thereafter, intensity declined quite rapidly in the 1983-1989 period, followed by more modest declines in the 1989-1995 and 1995-2003 periods.
- Although the focus of this report is the period between 1995/96 and 2003/04, 1992/93 may be considered to represent the watershed year, after which the 1992 reforms started to be implemented.
- Table 4.4 compares the trends in intensities for wheat production in East Anglia in the 11 years, 1981/82-1992/93 and 1992/93-2003/04.
- Once again, the evidence, though broadly consistent with the hypothesis of reduced intensification, lends only weak support to the notion that changes in the Cereals CMO have had an important impact on intensification.
- The trend towards lower intensity that is apparent in the more recent data represents a continuation of a more long-standing trend, with no discontinuities in terms of sharper reductions in intensities associated with changes in the measures.
- On the contrary, Table 4.4 implies that reductions in intensities occurred at a slower rate after 1992, with the sole exception of seed inputs.
- This result is repeated for the other main COP crops cultivated in the same region, namely winter and spring barley, as well as rapeseed (see Appendix 37 for details of their changing input intensities).
- The case of seeds is a special one, not only in the UK, but in other member states, too. In a number of interviews for the case studies, in the UK and elsewhere, most notably Spain, there were comments upon the growing practice of farmers retaining seeds for planting.
- The main exception is maize, for which producers rely upon F1 hybrid varieties, for which they have to purchase seeds every year.
- The decline in real UK expenditures on wheat seed inputs is therefore interpreted as an indication of increased farm retention of seeds, rather than a reduction in the use of seeds per hectare, for which there is no evidence from the interviews.

Case Study of Danish Input Intensification

- Appendix 2 explains that average nitrogenous fertiliser purchases in Denmark fell at an annual rate of 2.1% in the decade to 1993/94, the start of the implementation of the MacSharry reforms; in the subsequent decade, the decline was a steeper 4.2%.
- The rate of decrease was accentuated by the stability of the nitrogen derived from animal manure spread in the fields. Where this is included, the annual decline in fertiliser consumption was 1.3% per annum until 1993 and 2.4% in the most recent decade.
- Environmental measures have come to the fore in nitrogen use only since national regulations were introduced, which were based on the EU nitrate directive, in 1995.
- Under these rules, each individual farm holding is given a nitrogen quota for the season, where the calculation of the total quota is based on the precise crops in the rotation, the soil quality (sand or clay) and the geographical location.
- The physical rate of application of chemicals, in active substance, declined steadily from the 1980s until 2000, first in response to market pressures and then in response to the national pesticide plan since 1995.
- However, this physical reduction is not evident from the expenditure data, since the rising unit cost of these chemicals has lifted overall outlays on these products.

3. OTHER FACTORS AFFECTING INTENSIFICATION

In addition to the national examples described in previous sections, certain other factors, both arising from the measures themselves, and extraneous to the measures, may have affected intensification and contributed to the mixed evidence revealed by the FADN data.

- One such factor relates to the way in which higher area payments for irrigated maize have favoured the use of irrigated land for cereals, while also stimulating investment in irrigation (see the case study monographs for France and Spain).
- Higher returns to the use of fertiliser on irrigated land may have pushed up average fertiliser intensity. While it is hard to prove rigorously, we believe that this may account in part for the high increase in intensity observed for Spain.
- An additional factor is the continued technical progress in the development and use of hybrid seeds, particularly for maize. These new varieties tend to offer higher returns to input use.
- A further effect of the CMO measures has been “slippage” as a result of the set-aside measures.
- Evaluations of set-aside identify slippage (in the sense of the selection of lower productivity land for set-aside and the concentration of the use of a holding’s fixed inputs, such as labour and machinery, upon the more productive land that is planted to COP crops) as a factor that has tended to increase the intensity per hectare of cereal cultivation on non-set-aside land.

4. SPECIFIC COMMENTS ON WHEAT, MAIZE AND RYE

The FADN data do not permit us to distinguish specifically between the inputs used for different crops. However, a few conclusions may be drawn from knowledge of national cereal sectors:

- Irrigation is relatively more important for maize than for the other crops, and the data suggest that the impact of declining prices on intensity may have been less for maize than for other crops.
- The countries tending to specialise in maize show the weakest declines in their input intensity levels, and, in the case of Spain, we have noted the reverse tendency, towards growing input intensity in step with an increased share of maize in the cereal crop area.
- While we suspect that irrigation is an important consideration for maize, it is of little relevance to rye cultivation.
- The main producers of rye in the EU-15 are Germany and Denmark. In both of these member states, we have observed a marked decline in overall intensity, and this is likely to be representative of rye production decisions as a whole.
- Common wheat cultivation is so widespread and in volume terms so important that the general observations in this section may be taken as applying also specifically to wheat.
- This is supported by the specific evidence for wheat from the UK, which covers the full period back to the 1970s.

5. COMPARISON OF INTENSIFICATION IN THE EU AND ELSEWHERE

The evidence provided by the Australian, Canadian and US situations presents some interesting insight into the inconclusive EU data.

Australia and Canada represent major cereal economies with prices highly exposed to world market movements.

The US is of interest, since it is a major cereal producer which operates an interventionist policy, and therefore may be considered to share this characteristic with the EU.

However, it should be noted that farming conditions in these countries, particularly in Australia and Canada, are very different to those of the EU.

Most significantly, the land resource is far more abundant in these sparsely populated countries, putting less pressure on farm intensification practices.

The key conclusions from these major cereal producers are:

- **Australia:** Crop input usage increased significantly from 1990 to 1997, and contracted from 1997 to 2003. The data are consistent with the hypothesis that intensification is a response to major changes in market prices.
- **Canada:** Canadian data is inconclusive on intensification trends.
- **USA:** Changes in real US cereal prices have had only a weak impact on input intensities, such as fertiliser and chemical use in wheat. However, the US deficiency payments programme may lead farmers to ignore low market prices.

Details of these case studies are provided in the following boxes.

Case Study of Australian Input Intensification

- While the EU data do not tell an unambiguous story about changes in intensification in response to economic stimuli, the Australian data plotted in Appendix 39 has a markedly higher "signal-to-noise" ratio.
- It can be seen that the use of all inputs per hectare, apart from repairs and maintenance (which declined very slightly), increased significantly for the category of "wheat and other crop" producers over the period from 1990 to 1997.
- This contrasts with the period from 1997 to 2003, when there was a decline in the use of all inputs.
- The corresponding data for mixed livestock producers, who were less heavily dependent upon cereal production, were not as striking; however, they, too, revealed slower growth or larger declines in the use per hectare of every input in the latter period, when compared with 1990-97.
- What was the reason for these large swings in input use?
- These data are strongly consistent with the underlying hypothesis that intensification is a response to changes in the price of the product.
- During the first period, from 1990 to 1996, the real price of wheat received by Australian farmers rose rapidly by an average of 9.2% per year. In the latter period it fell by 3.7% per year.
- As was discussed in the section on price stabilisation, the scale of the fluctuations in internal prices in the EU, bearing in mind the reductions in institutional prices and hence the increased EU exposure to world market price volatility, is much more limited than the fluctuations faced by those who, like Australian farmers, are exposed to world prices.
- The conclusion drawn from comparisons of the Australian data with the experience observed in the Community is that unambiguous and significant changes in intensity are observed in response to major changes in prices, but not in response to the smaller changes that have faced EU cereal farmers.

Case Study of Canadian Input Intensification

- We have examined Canadian data for evidence of the same trend, but the results are inconclusive.
- In Manitoba, farm survey data are available for 20 years, but new surveys are carried out irregularly.
- Therefore the Manitoba farm budgets assume constant physical inputs per year for long periods, thus throwing no light on changes in intensity.
- In Alberta, data suggest an increase (of 3.2% per annum, on average) in provincial fertiliser inputs per hectare over the period 1998-2004, but it should be noted that Alberta is mainly a livestock-rearing province.

Case Study of US Input Intensification

- The US is of interest, since it is a major cereal producer which operates an interventionist policy, and therefore may be considered to share this characteristic with the EU.
- Although the nature of its intervention is different from that in the Community, it does share the reliance upon a form of market price supports, in its case, via deficiency payments, and provision for publicly held cereal stocks, via the system of marketing loans.
- Appendix 38 illustrates the annual percentage changes in US input intensities for wheat, maize and, for comparison, barley over the crop years 1975-1981, 1981-1988, 1988-1995 and 1995-2003.
- The data for maize appear broadly consistent with the hypothesis that input intensity is related to price: fertiliser use per hectare rose only in the first of these periods, and fell more sharply in the final period, while chemical use also declined in the most recent period.
- The use of energy naturally responds more to energy prices than to other factors. US labour and capital inputs display a very varied pattern of growth per hectare across the different cereals, which is difficult to relate to external factors.
- At first sight it may be considered noteworthy that changes in real US cereal prices have had only a weak impact on input intensities, such as fertiliser and chemical use in wheat, which continued to grow, albeit at a decelerating rate slightly, in the latter two periods, despite lower real wheat prices.
- The explanation lies in the system of deficiency payments to the producers of many crops, including cereals.
- As a result, producers should display an asymmetric response to domestic market price signals; they should ignore low prices, since their revenues are topped up by the government, but will benefit from high prices.
- Unfortunately, the irregular timing of the USDA farm budget surveys makes it difficult to test this hypothesis with the data presented in Appendix 38.

6. CONCLUSIONS

In general, the use of variable inputs per hectare of cereals appears to have decreased under the Cereals CMO since the 1995/96 crop year. This is what would have been expected, in view of the decline that occurred in cereal producer prices. However, the causal relationships remain somewhat unclear.

The contrasting examples of rye and maize offer some insight into the extent to which cereal CMO reforms have influenced these outcomes.

Rye appears to have reduced in intensity, while maize, although the FADN data make it difficult to differentiate between crops, has moved somewhat in the opposite direction.

We hypothesise, though the data do not establish this conclusively, that this is due, first, to the more favourable area payments for irrigated maize, and second, to greater progress in hybrid seeds which are more demanding of inputs.

For wheat and rye, as well as for barley, the evidence is that the CMO measures have tended to reduce the intensity of production, per hectare or per tonne, but the rate of intensification, i.e., the rate of change in intensities, has not displayed a change from earlier periods.

Observations of member state and international cereal producers' experiences include:

- *Spain and France:* In certain countries, most notably Spain, the trend seems to have been towards greater intensity, and in recent years this applies in some measure also to France.

- *Denmark:* This country has seen the greatest rate of reduction in the use of nitrogenous fertilisers; the primary reason has been national environmental regulations.

- *Germany and Italy:* Represents the "best-behaved" case, with intensity falling in line with falling prices, and the changes in Italy, though minor, are also in the expected direction, with lower intensity.

- *UK:* In the UK, the FADN data are inconclusive, but the more detailed data for wheat, as well as barley and rapeseed, available from regional sources suggests a decline in intensity in recent years. However, this decline pre-dates the current Cereals CMO, which does not appear to have brought a change in trend. Indeed there is evidence that the pace of the decline in input intensities has slackened since 1992/93. The detailed UK data imply that intensification, in the sense of reduced levels of intensity, has occurred at a slower pace since the 1992 reform.

- *Australia:* When comparing intensification in the EU with other developed countries, we find that only in Australia does input intensity appear to match the movement in prices.

Chapter 5, Part 1: Market Equilibrium and Price Stability

The simple life as a wheat farmer was not always so simple. It was a hard life…a life which demanded perseverance…It demanded first things first. *Harry Truman, Jackson County, Missouri, 1906, citation in: David McCullough, Truman, Chapter 3, The Way of the Farmer, p.74*

Have the cuts in institutional prices (intervention price, threshold price for imports) and the measures defining the qualities eligible for intervention resulted in a sufficient drop in internal market prices to ensure that Community cereal production is competitive on the internal and export markets?

1. INTRODUCTION TO ANALYSIS

1.1 Interpretation of the Question

In both internal and external markets, full competitiveness requires that internal market prices equal the relevant (export or import parity) world market border prices of cereals. If these conditions are met, i.e., if the price fall has been sufficient, EU cereals will be able to compete on a price basis with cereal imports in the domestic market, and with non-EU producers in external markets. In some important markets for cereals, notably the animal feed sector, EU cereals compete not only with non-EU cereal producers, but also with substitute feed ingredients such as protein meal, citrus pulp and corn gluten feed. Again, a sufficient price fall would realign EU cereal prices against the price of substitutes, and improve the competitiveness of domestic cereals in these end-uses.

1.2 The Relevant Cereals CMO Measures

The logic of the Cereals CMO 1992 and Agenda 2000 reforms include measures to reduce market support in order to improve the competitiveness of domestic cereal production. This followed a nine-year period (1984-1992) in which internal cereal demand in general, and feed demand for cereals in particular, had fallen in absolute terms. Reductions in institutional prices and the associated border measures gave rise to a sizeable decline in producer prices for cereals (see Appendix 57).

The 1992 reform and the Agenda 2000 reforms both included measures that reduced the intervention and threshold prices for all eligible cereals. The 1994 Marrakech Treaty, implementing the agreements reached in the WTO Uruguay Round, led to measures to establish a new structure of tariffs, calculated from Margins of Preference (until the 2003 amendment which transformed these tariffs into tariff rate quotas for barley and low and medium grade wheat). The same treaty also led to the introduction of limits upon subsidised exports.

Moreover, within the life of the Agenda 2000 reforms, the Commission raised quality standards of cereals eligible for intervention. (The changing minimum protein requirements for common wheat are described in Appendix 26).

These measures were designed to remove lower quality feed cereals from the direct influence of the price floor provided by intervention prices, and enable prices to find an internal market- determined level. This would permit feed cereals to compete better with the increasing volumes of imported feed cereals that flowed into the EU from Black Sea ports from 2000 to 2002, before tariff rate quotas were imposed on feed and malting barley and on low and medium quality common wheat from January 2003.

On external markets, export refunds and subsidised exports of intervention stocks assist cereal exports to secure outlets. Subject to the limits set down in the EU's WTO subsidised cereal export commitments, these measures ensure that EU cereals are

competitive in external markets. The decline in institutional prices after 1992 helped to narrow the differential between world and internal market prices.

1.3 Judgement Criteria

The Cereal CMO reforms described above, particularly decreasing market price support, were intended to increase competitiveness of EU cereals *vis-à-vis* alternative cereals and cereal substitutes. Table 5.1 presents the judgement criteria and indicators applied for this question, together with the data sources that were employed.

Table 5.1: Judgement Criteria, Indicators and Data Sources Regarding the Market Equilibrium and Price Stability

Judgement Criteria	Indicators	Data Sources
Internal Markets:	Feed use of local cereals	COMEXT
Falling internal cereal prices	and of major substitutes	Eurostat
relative to those of substitutes	Market prices of local cereals	DG Agriculture
Substitution by domestic cereals	and of cereal substitutes	National government data
in internal end-use markets	Cereal consumption in end-uses	UN FAO
External Markets:		Case study interviews
Reduced export refunds	Export refunds	Producer questionnaires
No accumulation of intervention stocks	Intervention stocks	

In the judgement made on this subject, a *sufficient level of a drop in internal market prices* will be judged to have occurred if internal market prices equal the relevant (export or import parity) world market border prices of cereals.

2. COMPETITIVENESS IN THE DOMESTIC MARKET

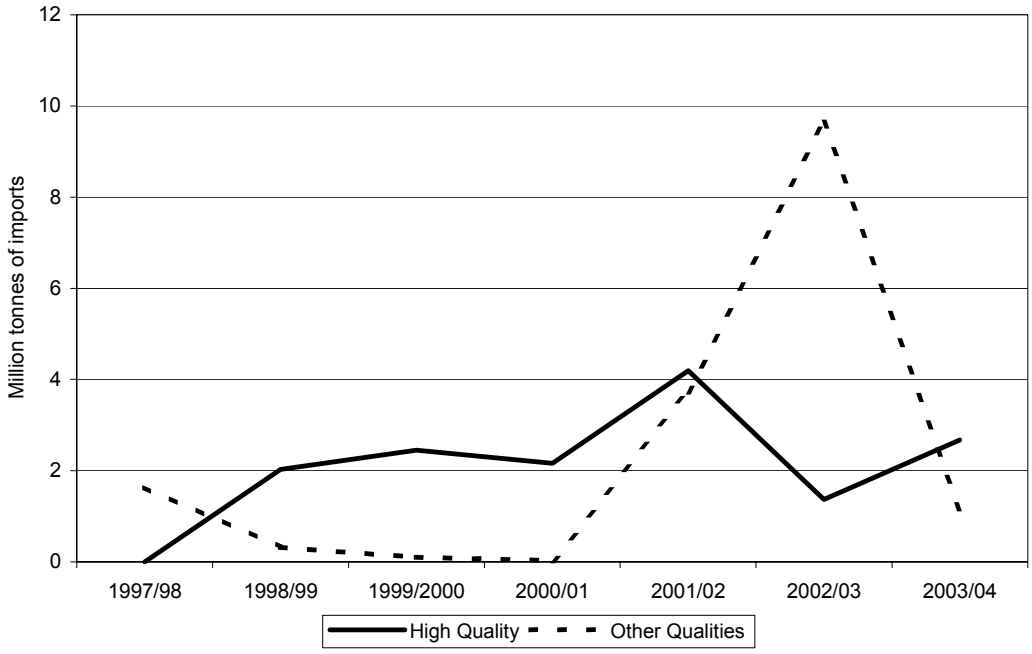
For the internal market, the competitiveness of domestic cereals may be assessed by examining the changes in the relative use of domestic versus imported cereals, as well as the relative use of cereal versus cereal substitutes. These measures can then in turn be subdivided between human, industrial and animal feed consumption.

2.1 Human Consumption

Human consumption of cereals occurs primarily in the use of common wheat for baking and durum wheat in pasta production. In the case of durum wheat, the Community market is more or less balanced between imports and exports; therefore, the self-sufficiency ratio is very high. For bread-making common wheat, the picture is more complex, with differing trends in different member states (discussed in Chapter 4, Part 1, and summarised in box below).

Diagram 5.1 presents the evolution of common wheat import volumes into the EU-15 by quality, revealing that high quality common wheat imports have fluctuated around the two million tonne level since 1998/99. The peak in imports of lower quality wheat (overwhelmingly supplied from Black Sea exporters, namely Ukraine, Russia and Kazakhstan) is also clearly apparent.

Diagram 5.1: Common Wheat Imports into the EU-15 by Quality



Wheat Quality and Import Requirements

- The discussion in Chapter 4, Part 1 reveals contrasting experiences in the changing quality of wheat produced in Germany and the UK. Whereas UK producers moved away from lower quality varieties, their German counterparts went in the opposite direction.
- The highest qualities of domestic wheat are still unable to satisfy the full needs of local bakers. Greater supplies of wheat gluten, a by-product of wheat starch processing, allow it to be added increasingly to wheat flour made from average qualities of bread-making wheat, to compensate in part for the absence of adequate supplies of high quality local wheat. Yet, this remains insufficient for the needs of local bakers, and imports of very high quality wheat are essential.
- Eurostat data, although not comprehensive beyond 2001, tend to support the observation that there is a small, but growing, share (now 8%) of the human use of common wheat that has to be filled by high quality imports for bread-making, with domestic output unable to supply the desired quality at competitive prices.

2.2 Industrial Consumption

The discussion in Part 5 of this chapter reveals that there has been an important shift in the structure of cereal use in the domestic starch sector since 1993 calendar year. In that year, 5.5 million tonnes of maize were used to manufacture starch (in the EU-12); in 2003, this is estimated to have risen to 6.8 million tonnes (in the EU-15). In the same period, the sector's use of common wheat rose from 2.5 to 6.8 million tonnes.

Typically the EU is a net importer of maize; hence a higher reported level of maize use in starch represented a greater dependence upon imported cereals. The more rapid growth in wheat use than maize use in the sector is interpreted as an indication of greater competitiveness of domestic cereals in the internal market.

The policy permitting crops to be grown on set-aside land for non-food uses benefited primarily biofuel production. The discussion in Part 5 of this chapter demonstrates that, whilst the area dedicated to cereals for this purpose increased as a result of the policy reform, it still remains a small fraction (well under 10%) of the area planted to oilseeds for energy uses.

The discussion in Part 5 demonstrates that it is primarily demand constraints, notably the reluctance by fuel companies to encourage the substitution of cereal-derived ethanol for petrol, that has dictated the pace of cereal use for biofuel, rather than any lack of price competitiveness of cereals, in this instance in relation to rapeseed.

2.3 Animal Feed Consumption

The use of cereals in animal feed is both direct and indirect, in on-farm feed use as well as compound feed production. Part 5 of this chapter presents an analysis of the use of cereals in feed, and its relevant conclusions are summarised in the box below.

The discussion demonstrates the large increase that occurred in the cereal share of feed ingredients after the 1992 reform, reversing the decline that was recorded in absolute volumes of cereals used in feed from 1984 to 1992.

Cereal Use in Animal Feed

- Cereals increased their share of feed ingredients largely at the expense of imported cereal substitutes. For some important ingredients, such as corn gluten feed, the decline in their use occurred alongside a rise in their price relative to that of cereals in the internal market. For others, like cassava pellets, their prices followed those of feed cereals downwards, since pellets are very close substitutes for cereals; however, they still lost a large proportion of their sales as overseas suppliers reduced their exports.

- There was a sharp increase in the relative prices of protein feeds vis-à-vis those of cereals after the MacSharry reform, but their share of feed ingredients changed very little. Analysis of the composition of livestock production revealed, however, that protein feeds lost some of their market share to cereals, once allowance is made for the shift in the balance of meat output away from cattle and sheep towards pigs and poultry, which would have been expected to have increased the protein share of overall feed rations for all species.

- The larger feed market for cereals was, for a while, of benefit to both domestic and overseas cereal suppliers. Import licence data for medium and low grade common wheat reveal that imports, having fallen from 1.63 to 0.03 million tonnes from 1997/98 to 2000/01, then soared to 9.65 million tonnes in 2002/03 (see Diagram 5.1 above).

- Separate licence data are not published for feed and malting barley, but total imports of barley in calendar 2002 were 1.23 million tonnes (which compare with a figure of 13.95 million tonnes for common wheat).

- The main change in the pattern of cereal imports was a very sharp increase in shipments from Russia and Ukraine. The Commission introduced measures to respond within the framework of its commitments to the WTO (of which neither Ukraine nor Russia are members) by applying global tariff rate quotas of 2.981, 0.30 and 0.05 million tonnes, respectively, for low and medium quality wheat, feed barley and malting barley, which took effect from January 2003.

Appendix 40 analyses producer questionnaires completed in connection with this issue. Regarding the effects of the reforms on the use of on-farm feed, the results reveal that COP specialists (who are likely to have only limited involvement in livestock farming) were the group least likely to have changed feed sources since 1995.

Most mixed crops-livestock farmers, with a major involvement in the livestock sector, reported a movement towards increased use of their own cereals for feed since the 1992 reform. This could also be interpreted as farmers responding to the eligibility of silage maize for area payments, a point made during several case study interviews.

The case studies of the experiences in different member states after the CMO reforms illustrate the importance of national structural differences in determining the fortunes of their cereal sectors' competitive positions as internal prices fell.

UK cereals captured market shares from competing ingredients in the compound feed sector. Germany, too, saw an increase in the share of domestic cereals in compound feed output. This applied to all types of cereals other than oats.

In contrast, Spanish cereals have proven to be competitive in neither the internal nor external arenas. Infrastructural inadequacies, with local cereal output tending to be located in the interior, away from the coastal belt where intensive animal farming is centred, and with incompatible rail gauges, which make rail freight costly from France, have contributed to this uncompetitive position, with market prices remaining well above the EU averages.

2.4 Responsiveness of Producers to Cereal Quality Requirements

The questionnaires asked samples of cereal producers in Germany, Spain and the UK about their responsiveness to the quality requirements of their domestic customers and to the tighter specifications of the qualities eligible for intervention.

The results revealed that over 95% of cereals specialists were influenced in their decisions on the quality of the cereals they cultivated by their customers' wishes. Over 50% stated that this was a "great" influence upon their decisions. Larger farmers, who supply most cereal output, were more sensitive to customers' quality needs than small and medium producers.

They were specifically asked about biofuel outlets as an influence upon their cereal production decisions (in practice, on set-aside land) and, although both Germany and Spain have fuel ethanol programmes, well over 90% of producers stated that the existence of this outlet had little or no effect on their cereal production decisions.

More rigorous intervention quality specifications were undoubtedly a factor in changing producers' behaviour, encouraging them to improve their average quality to be able to retain sales to intervention stores as an option.

Three quarters of the COP specialists admitted that more rigorous intervention quality specifications had affected their production planning, though only slightly more than 10% of this group (and all other specialist producer groups) stated that the effect had been great. Once again, larger farmers were more affected than smaller producers. In interviews with German producers, several of these producers revealed in addition that they had cultivated rye solely for sale to intervention.

3. COMPETITIVENESS IN THE EXTERNAL MARKET

Part 6 of this chapter presents a detailed consideration of the effect of the CMO measures upon the competitiveness of domestic cereal output in the export market. The results of this analysis are described in boxes below. The most important are:

- *Export Refunds:* Refunds for common wheat and barley fell to an average of under €10 per tonne in 2000/01-2003/04. For rye, refunds averaged over €40.
- *Export Market Share:* In terms of net exports as a share of world trade in barley, rye and common wheat, the EU lost competitiveness from 1995 to 2003; but the EU's position improved in some nearby markets. Black Sea export growth since 2000 has intensified competition in the EU's main traditional export markets.
- *Intervention Stocks:* Intervention stocks were very high at the start of the implementation of the MacSharry reform, and again in 1998/99. From then until 2003/04, stocks were reduced substantially for all cereals, apart from rye.

Export Refunds and Import Protection

- If there were no export refunds, the causal relationship between competitiveness and export share of the world market would be direct. Export refunds makes the relationship an indirect one and thus provides another measure of performance, that of the level of refunds afforded producers. For both common wheat and barley, export refunds were low in the mid-1990s, because of high world cereal prices. They then rose before falling to under €10 per tonne from 2000/01. Rye as noted above was an exception, with average refunds remaining above €40.
- Protection from imported maize has been provided via tariffs based upon the threshold price, which has declined in step with the intervention price, thus narrowing the differential between internal prices and world import parity prices, and thereby increasing the competitiveness of domestic production.
- For cereals, like common wheat and barley, in which the Community is a net exporter, protection from imports was provided after the Marrakech WTO agreement via Margins of Preference. Yet, the period until calendar 2002 was characterised by substantial increases in imports, notably from the Black Sea, and these enjoyed a competitive advantage in the EU Mediterranean region over imports from traditional major wheat exporters in the Americas and Australia. The introduction of tariff rate quotas on low and medium quality common wheat imports and on feed and malting barley imports from 2003 limited these imports.

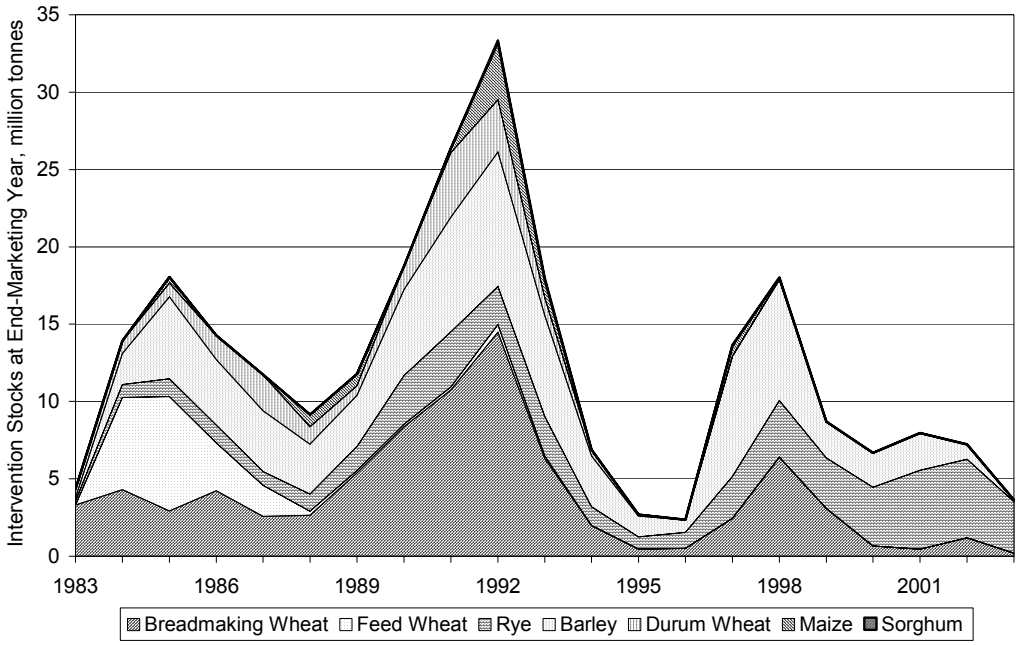
Export Market Share

- Judged by net exports as a share of world trade in common wheat, barley and rye, the EU lost competitiveness from 1995 to 2003. This does not tell the full story, since its market share rose in certain markets whilst losing ground in others. Those markets in which its share improved were those logistically most economically efficient to supply, such as non-EU West Europe and North Africa.
- Growing Black Sea exports of cereals since 2000 have intensified competition in the EU's main traditional export markets. The EU tariff rate quotas on imports of barley and wheat took effect in 2003, and will increase the direct competition that Black Sea exporters pose to EU exports in the Mediterranean region.

Intervention Stocks

- Diagram 5.2 depicts year-end EU cereal intervention stocks from 1983/84. From this it is evident that intervention stocks were very high at the start of the MacSharry reform.
- At the end of 1992/93, EU-12 intervention stocks exceeded 33.3 million tonnes, of which 15.0 million were of wheat and 8.7 million barley and 2.5 million rye.
- By the end of 1996/97, helped by a strong world market price, EU-15 stocks were down to 0.5, 0.8 and 1.0 million tonnes, respectively, with the total at 2.4 million.
- The subsequent weakness in the world cereal market, exacerbated by a strong ECU, saw stocks climb rapidly to a peak in 1998/99 of 18.0 million tonnes, comprising 6.4 million of wheat, 7.8 million of barley and 3.7 million tonnes of rye.
- From then until 2003/04, stocks were reduced substantially for all cereals, apart from rye. By June 2004, the stocks of bread-making common wheat were down to 0.2 million tonnes, of barley down to 0.1 million, but for rye, they were 3.3 million tonnes, taking the overall total to 3.6 million tonnes of cereals.
- With the exception of rye, there was no net accumulation of intervention stocks during the period of the MacSharry and Agenda 2000 reforms, which might have been used as a mechanism to hold back cereals that could not be exported because of a lack of competitiveness.

Diagram 5.2: EU Cereal Intervention Stocks at the End of the Marketing Year, 1983/84-2003/04



4. CONCLUSIONS

Institutional price cuts, in combination with more stringent conditions on qualities sold to intervention (which acted to reduce the effective price floor for lower quality cereals), significantly improved the competitiveness of domestic cereals in the internal market in two important end-use sectors.

- In animal feed, there was strong evidence of the substitution of feed cereals for cereal substitute energy feeds, as well as weaker evidence of the substitution of cereals for protein meals. There was also some increase in on-farm use of cereals on holdings that combined cereal farming with livestock operations.
- The other end-use where a significant increase in competitiveness was observed was starch manufacture, where common wheat has made major gains in its market share at the expense of maize, in which the EU is a net importer.

In two other end-uses, the evidence is less clear.

- In biofuel, cereals have lagged behind oilseeds in benefiting from the measures permitting non-food crops to be cultivated on set-aside land, but this is due to the preferences of fuel companies, rather than cereals' lack of competitiveness.
- For bakery products, the experience of the UK, which moved towards higher quality common wheat output, contrasted with that in Germany. Overall, the EU need for high protein wheat for baking has not been met in full from the increased availability of vital wheat gluten as a by-product of starch processing. The share of imported hard wheat in the total EU common wheat market in human uses has increased since the 1992 reform to its current level of roughly 8%.

Institutional price cuts have led to an underlying pattern of declines in export refunds for common wheat and barley and lower import protection for maize. This supports the view that the competitiveness of EU cereals has improved in the external arena. Rye is the one major exception to this pattern. The ending of rye's eligibility for intervention buying from 2004/05 should redress the balance in the sector.

The final indicator of the success of the measures in enhancing competitiveness of domestic cereals is the behaviour of intervention stocks. This has been due both to the lowering of institutional support prices and due to the more stringent quality conditions for sales to intervention. Rye is again the exception. For all other cereals, public stocks have fallen substantially during the period to 2003/04. Rye stocks remained fairly close to their historical highs towards the end of the Agenda 2000 period. The ending of rye's eligibility for intervention buying should end this anomaly.

Considering these developments, the price reductions initiated by reforms can be said to have been sufficient in the internal market, where significant import substitution has occurred, yet insufficient in the external market, where export refunds remain necessary and EU global market shares have not been promoted.

Post Script on Recent Developments

Despite the reductions in intervention stocks to 2003/04, the accession of the ten new members states from 2004/05 has raised the issue of cereals intervention once more. 15 million tonnes of cereals were held in intervention stores in late 2005. The new member states have highlighted structural problems of the intervention system, raised elsewhere in this report. Hungarian maize, for example, is often produced with intervention in mind, as was the case with German rye. Similarly, the application of one intervention price underpins the over-production evident in central Europe, as is demonstrated in Part 4 of this chapter. The period after 2003/04 is, however, outside the scope of this Evaluation.

Chapter 5, Part 2: Effects Restricting Competition

Does the system allow private initiatives conducive to artificial increases in the internal market price, such as stockpiling?

1. INTRODUCTION TO ANALYSIS

1.1 Interpretation of the Question

The Cereals CMO included, as two of its major objectives, the provision of market support and stabilisation of the cereals market. The system of intervention prices and publicly held intervention stocks provided a mechanism for market support, complemented by border measures.

In order to induce the private sector to store cereals, rather than the public sector, via intervention stocks, while also ensuring the orderly marketing of cereals during the marketing year, monthly increments are paid for cereals delivered into intervention during the relevant months of the marketing year. In this manner, it was intended that private holders of cereal stocks would undertake their own storage of cereals for eventual sale.

There is a danger that the monthly increments could be so high that they encourage private sector companies to hold supplies off the market in the knowledge that intervention buying provides them with a “free put option”, by guaranteeing an outlet at the basic intervention price plus monthly increments. Changing the risk profile for such companies in this way may lead them to store cereals as long as monthly increments are paid, and thereby create a scarcity of supplies and raise prices artificially, in the sense that they are increased by more than would occur in a internal market where the sole market support was a fixed intervention price over the marketing year.

Although such action may raise prices in the short term, it is interpreted here as a market distortion, as opposed to restricting competition *per se*. This conclusion is made where there is evidence that these crops are released to the market as the monthly increments come to an end, thereby *delaying* the sale of crops to the market, rather than restricting competition in the sector.

The CMO’s logic in its application of export licences and export refunds to stabilise the internal market may also affect the behaviour of private traders and stockholders. Successful bidders for export licences have several months within which they may use the licence and associated refund. This, too, functions like a “put option” (though not a free one in this instance) and provides opportunities for exporters to profit from differences between price movements in the internal and external markets. As export refunds have been reduced by the CMO measures, the scope for such trading profits has altered. This may have contributed to increasing the concentration of ownership within the trading sector, and this may have contributed to artificial increases in prices.

1.2 The Relevant Cereals CMO Measures

The relevant CMO measures are management of the system of intervention stocks and fixed monthly increments in the cereal intervention price, raising the intervention price steadily from November to May. The monthly increment has been reduced in the period since 1995/96.

1.3 Judgement Criteria

Table 5.2 presents the judgement criteria, indicators and data sources used in the analysis in this section.

Table 5.2: Judgement Criteria, Indicators and Data Sources Regarding Effects Restricting Competition

Judgement Criteria	Indicators	Data Sources
Sales to intervention peak late in year	Monthly increments in cereal intervention prices	Eurostat DG Agriculture
Returns to storage exceed monthly increments in the intervention price	Monthly returns implied by internal cereal futures market quotations Costs of commercial storage	UK HGCA UK LIFFE commodity futures exchange
Concentration in storage and trading	Changes in the structure of cereal trading and ownership of storage capacities	

The measures could be said to have allowed private initiatives conducive to artificial price increases if analysis reveals that sales from private to public stores are made late in the marketing year to capture any private storage premium. This would also be the case if the return from storage in the period when monthly increments are paid exceeded the cost of storage over the crop year. Although this criterion may artificially raise prices, it is judged as *market distorting*, rather than *anti-competitive*.

2. STOCKHOLDING BEHAVIOUR IN RELATION TO INTERVENTION PRICES

The UK case study monograph analyses private sector marketing of barley and wheat for both final sale and into intervention in relation to the returns to storage offered by the pattern of monthly intervention prices. For feed wheat, it is possible to compute the implied monthly returns from hedging all price risks on the LIFFE wheat future market against the monthly returns obtainable by deferring sales into intervention by a month and earning the monthly increment. It emerged from this analysis that

- At the start of the reforms, from 1993/94-1995/96, monthly returns were closely related to the institutional monthly increments. Since then, the return on the futures market has been greater than that to be earned from the monthly increments. However, just before the final intervention date in June, the market return falls sharply, and is nearly always negative.

- The analysis of monthly physical sales of UK feed wheat and feed barley support the view that intervention monthly increments have a significant effect upon stockholding activities. For both cereals, the patterns of sales off-farm are at a peak immediately after the harvest, and are at their lowest levels at least nine months after the start of the harvest. However, UK intervention sales of cereals rise fairly steadily during the period of eligibility for such sales, reaching a monthly peak in the last possible month for deliveries.

- This suggests that private agents find it profitable to hold stocks, financed at their own expense, and deliver them as late as possible to intervention. This provides evidence of a market distortion via the monthly increments in intervention prices.

3. THE STRUCTURE OF TRADING IN LOCAL GRAIN MARKETS

The French case study monograph describes the manner in which, prior to the decline in export refunds as a result of the CMO measures introduced in 1993/94, smaller risk-averse traders could earn a living relatively simply by providing what were, in effect, brokerage services. They bought cereals at a high internal price, which was relatively predictable, and sold them for export with the benefit of a transparent export refund. Since the reforms, the internal price has become much more closely aligned to world prices, with the associated uncertainties. Also, export refunds are much lower, reducing the opportunities to earn money trading against a position in these refunds.

Smaller internal traders had not developed the skills in the use of hedging mechanisms for more volatile markets, and were confronted by an increasing willingness on the part of producers to hold onto cereals in their own storage facilities. In interviews, producers stated that the direct payments often covered their direct production costs in full, or came close to doing so; consequently, they felt they could afford to speculate on cereal prices, without jeopardising the financial viability of their farm.

The French monograph reveals that the producers' own marketing organisations, in the form of local cereal cooperatives, increasingly acquired or squeezed out smaller traders and enabled producers to participate more directly in downstream operations, among which cereal storage was a major activity.

The result has been a noticeable concentration in the number of local traders and wholesalers in the French cereal *filière*, which has reduced the competition for cereals sold by producers. Within the cooperative sector, consolidation has occurred, larger cooperatives have acquired their smaller counterparts.

There is evidence that the French example of increasing concentration of sales via cooperatives is mirrored elsewhere in the EU. Eurostat data for 1997 (the latest year for which this information is available) revealed that for over half the member states, cooperatives marketed more than 50% of the national cereal sales by farmers; and these percentages had been rising until then. Table 5.3 presents volumes of different agricultural products sold via cooperatives in the EU.

Table 5.3: Agricultural Production Sold Through Cooperatives, 1997 (%)

Member States	Cereals	Pigmeat	Beef/Veal	Poultry Meat	Eggs	Milk	Sugarbeet	All Fruit	All Vegetables
BE Belgium	30	20	0			53		75	85
DA Denmark	60	91	66	0	52	94	0	80	80
DE Germany	50	27	28			52	80	40	28
EL Greece	49	3	2	15	2	20		57	3
ES Spain	22	8	9	25	28	30	23	45	20
FR France	68	85	30	30	25	47	16	40	25
IR Ireland	57	66	20	20		100		14	18
IT Italia	20	13	12	35	8	40	7	43	8
LU Luxembourg	79	37	38			81			
NE Netherland	65	34	16	9	14	83	63	76	73
OS Austria	60	15	5	70		90	100	18	28
PO Portugal									
SU Finland	46	68	65	81	54	97			
SW Sweden	75	78	73	0	32	100	0	20	50
UK United Kingdom	24	28		25		67		67	26

Source: DG Agriculture, *Agricultural Situation in the European Union*

4. PRODUCERS' RESPONSES TO QUESTIONNAIRES

The questionnaires returned by the sample of producers in France and the UK included specific questions about marketing and storage.

- Analysis of the questionnaires revealed that approximately three quarters of the COP specialists felt that transport costs were, to some extent, restricting their ability to supply their markets, with larger producers identifying this as a larger factor than smaller ones.
- 60% of the COP specialists use forward sales or futures markets (predominantly the former) to a degree in their cereal sales.
- Within this group, a higher proportion of the larger producers made such sales.
- On-farm cereal storage was practised by only 40% of the COP specialists, but there was a distinction evident between small and larger farmers.
- In the latter case, there was a growing tendency to store crops on farm in the hope of realising the best price, with almost two thirds doing this.
- It was reported in French interviews that area payments, which were often viewed in the mid-1990s as a windfall created by the CMO, helped to finance investment in new storage facilities.

5. RETURNS FROM OPERATING CEREAL STORAGE WAREHOUSES

The Council determines the monthly increments in intervention prices during the annual price review. At the practical level, the remuneration to warehouse owners for providing their facilities to store public stocks is a national government decision.

The Commission determines its contribution towards these payments on the basis of surveys across member states.

- If a member state reports average storage costs that are below the EU average, it simply receives a contribution that reflects its national average.
- If it faces storage costs that are above the EU average, the EU budget merely pays the EU-wide average level of storage costs, and does not pay the relevant agency in the member state the sum in excess of the overall EU average.
- National governments have to make up the difference in such cases.

In interviews, traders and warehouse operators stated that there was a fairly wide range of efficiency in warehouse operations. In their view, efficient owners ought to be able to run their warehouses at costs significantly below the national average.

This means that traders (many of whom are also owners of warehouses approved for the storage of intervention stocks) should be able to make a profit from the storage aspect of the intervention stocks of cereals that are stored in their own warehouses.

This should have enabled them, at least until the reduction made in 2004/05 in the monthly increments, to make money from the provision of storage for public stocks, which improved the economics of their overall cereal storage and trading activities.

6. CONCLUSIONS

Just as intervention prices can be arbitraged between different locations in space by means of transport costs (see Part 4 of this chapter), so they can be arbitraged between different points in time by means of storage costs.

- Analysis of the UK inter-temporal price structure for feed wheat leads us to conclude that, in the initial period of the implementation of the 1992 reform, the monthly increments over-compensated traders for storage costs and, in practice, the monthly increments determined the contango, the forward price premium.

- At that time, therefore, the measures were artificially raising the internal price during the months when monthly increments were made (November to May).

- Subsequently, monthly increments have been below the futures market contango, but the evidence from the timing of sales into intervention suggests that it is profitable for sellers to hold back these sales until the latest months in which the increments apply.

This leads us to conclude that, although the incentives were weaker than they were until 1995/96, the measures in effect until 2003/04 did artificially raise the internal price by an amount sufficient to induce traders and producers to delay sales to intervention until the last moment.

Although this measure may artificially raise prices, it is best interpreted as a market distortion, delaying the release of stocks to the market, rather than an anti-competitive practice.

In this calculation, the value of the "free put option" provided by the intervention price undoubtedly played a part, since sellers impute a value to the ability to sell in the internal market at a higher price, when they are secure in the knowledge that the default (sales into intervention) is assured of a rising price.

Changes in the structure of cereal trading within the Community have led to an increase in concentration within the sector. At the same time, there has been concentration in the ownership of storage facilities, with producer cooperatives becoming increasingly important in both respects.

- This is seen as an unexpected effect of the measures, in that the reductions in market supports, by lowering export refunds and increasing the risks associated with internal market purchases of cereals, are viewed as having pushed smaller traders and cooperatives, which possess fewer skills in price risk management, from the market.

- The consequence of this increase in concentration has been to raise the market power of the remaining traders, which may have increased the wholesale prices of cereals, and/or reduce producer prices, during certain periods in the cereal marketing year.

Chapter 5, Part 3: Price Stability

Does the system allow sufficient price stability on the internal market?

1. INTRODUCTION TO THE ANALYSIS

1.1. Interpretation of the Question

This group of questions concerns the effects of the measures on consumers, and in this context we will consider the issue of price stability for users, rather than price or income stability for producers, which are discussed elsewhere, including in Chapter 3.

The logic of the CMO reforms in reducing market support was to make domestic cereal output more competitive in the internal market. However, the measures did not leave internal market prices fully exposed to world market volatility. Intervention buying created a floor to the domestic price for eligible qualities of cereals, which influenced prices of other qualities of cereals through substitution in both production and consumption. Monthly increments in intervention prices were intended to encourage the orderly marketing of cereals during a major part of the marketing year. Border measures applied import tariffs so as to enable imports to enter at a landed price that was 155% of the intervention price[1]. Control over sales of intervention stocks onto the internal and external markets and Management Committee decisions on export licences also provided some influence over the behaviour of the internal market price.

The main issue of interpretation is the meaning of *sufficient*. We propose to consider the degree of price stability to be sufficient if this stability compares favourably with (i.e., is greater than) the stability of prices on the international market.

Any attempt at stabilising internal prices clearly runs the risk of "exporting" instability by varying the volume of net trade in order to bring domestic demand and supply into balance without excessive price fluctuations. However, this issue is not considered here, since the present question focuses explicitly on the internal market.

One potential source of price instability is fluctuation in relative currency values. We avoid this issue by expressing all prices in € per tonne.

There are various dimensions to price stability, and we differentiate between *intra-year* price fluctuations on the one-hand, and *inter-year* fluctuations on the other.

1.2. The Relevant CMO Measures

The CMO measures that influenced the stability of prices in the internal market were the market supports, which were reduced under the 1992 and Agenda 2000 reforms, and the changes made to the monthly increments in intervention prices during the annual price reviews. These were complemented by the border measures, notably the determination of the import tariff via the computation of the Margin of Preference, which, for low and medium quality wheat and feed and malting barley, was replaced in January 2003 by a new system of tariff rate quotas.

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[1] The landed price will be above this level if the c.i.f. price of cereal imports exceeds 155% of the intervention price, unless the Commission exercises its power to subsidise imports.

1.3 Judgement Criteria and Indicators

Table 5.4 presents the judgement criteria, indicators and data sources used in the analysis of this issue.

Table 5.4: Judgement Criteria, Indicators and Data Sources Regarding Price Stability

Judgement Criteria	Indicators	Data Sources
Greater EU price stability than in world market prices (a) Inter-year (b) Intra-year	Coefficients of variation of prices in the EU and world cereal markets Ratios of maximum/minimum price ranges to mean values of prices Within and across marketing years	Eurostat IMF USDA

Since intra-year price movements tend to reflect the different circumstances of individual crop years, the analysis of price stability is undertaken in terms of July-June marketing years, rather than calendar years. The inter-year comparisons permit examination of the effects of these differences in conditions across crop years.

2. MEASURES OF PRICE STABILITY

The results of the investigation are fairly unambiguous. Across all the cereals that are examined in Appendices 42 and 43 to this Question, for intra- and inter-year comparisons, respectively, the stability of the internal EU market prices was in a clear majority of the comparisons greater than that of the corresponding world prices.

2.1. Intra-Year Price Stability

Reviewing four separate periods, 1990/91-1994/95, 1995/96-1997/98, 1998/99-2000/01 and 2001/02-2003/04, the intra-year analysis in Appendix 42 indicates that:

- Stability was consistently greater in EU internal market prices than in world market prices for feed and breadmaking wheat, and for feed barley.
- For maize, EU prices were slightly less stable than world prices in 1990/91-1994/95 on one of the two measures, though not the other.
- Since then, EU internal prices have always been the more stable.
- For malting barley, the comparison reveals greater volatility on both measures in the final period, 2001/02-2003/04. This is not interpreted as a significant finding, since the world market prices are for feed barley; also, the difference in the values of volatility is small.
- Most important, however, was the experience in the EU market in 2003/04, when the poor EU cereal harvest caused prices to rise considerably[2].

[2] The rise in prices and volatility within 2003/04 was observed for all other cereals, too, but this was not sufficient to alter the overall relativities between internal and world market prices in 2001/02-2003/04.

- The 2003/04 marketing year was exceptional; subsequent price behaviour suggests that price volatility in the EU internal market is typically less than that in world prices.

2.2. Inter-Year Price Stability

Appendix 42 contrasts volatilities for average annual prices across the full set of 14 marketing years, during which internal prices in the Community were reduced by the cuts in market support, which might have led one to expect some indicators of volatility, such as the maximum-minimum price ranges, to have been magnified by the measures. The Appendix reveals that:

- The mean values of EU prices were all above the world market equivalents, with the gap much less for wheat than barley or maize.

- However, the absolute values of the standard deviations of annual prices (an absolute indicator of inter-year volatility) are lower in the EU than in the corresponding world value, except for maize.

- The coefficients of variation (standard deviations divided by the means) for EU cereal prices are all below those of the world market prices for the same cereal.

A similar pattern is observable in the diagrams plotting the maximum-minimum ranges for cereal prices.

- It is significant that, in spite of the Cereals CMO measures that led to a sizeable reduction in institutional prices during the period under review, the absolute EU values of the maximum-minimum ranges were below those of world market prices for wheat and barley, and were only slightly larger for maize.

- When divided by the mean value, however, the values of all the ratios for EU cereals were below those of the world market prices for the same cereal.

3. OTHER CONSIDERATIONS

3.1. Price Risk Management

Price stability induced by policy measures is not the only way in which users can be helped to cope with the instability of market prices. Indeed, too much price stability may cause the production and consumption of particular types and grades of cereals to fail to respond appropriately to imbalances. Furthermore, various mechanisms exist for offsetting price instability in commodity markets.

Futures markets, and the use of forward contracts that are often linked with futures markets, are the most important of these.

- In those developed markets in which a higher degree of price instability exists, most particularly the USA (for which we have analysed internal market prices and confirmed that their measures of volatility are very similar to those in US Gulf export prices), futures markets are widely used by traders, end-users and producers to hedge themselves against the risks posed by this instability.

- These futures markets tend to be more active and more liquid than their counterparts within the EU.

It is natural that, with less price instability against which to insure, the relevant EU derivative markets have found it difficult to develop liquidity. From the producer side, the case studies revealed that the guaranteed income provided by the direct payments actually induced cereal producers to accept a higher degree of risk in their operations, for example, by reducing their use of crop insurance and by building larger storage capacities, to enable them to be exposed to price movements for longer within the crop year. These actions militate against increased producer involvement in futures markets.

Evidence of the effect of the Cereals CMO measures upon use of hedging mechanisms in the cereals market is provided by the experience of Hungary since accession. The Budapest Commodities Exchange has suffered a major loss of trading volume in products such as cereals since internal market prices entered a more stable and less risky environment created by the CMO.

A further interesting insight is provided by the use of insurance against crop failures. In Illinois in the US cereal heartland, over 85% of farmers take out basic crop insurance on maize and soybean crops. Although exact data is unavailable in the EU, all indications from interviews are that equivalent figures for the EU are considerably lower. In Spain, there is some tentative evidence that producers have reduced crop insurance since the implementation of direct payments, although this may in part be because the government formerly paid part of the insurance premium. In France, interviews revealed that farmers cut back on crop insurance (principally against hail damage) after the 1992 reforms, largely because direct payments were introduced.

3.2. Evidence from Interviews with Processors

In our interviews with processors, there was mixed evidence of concern about price instability itself. In some sectors, when concerns were voiced, they were more often about the availability of particular special types and grades of cereals, for example, the malting barley required for whisky distilling or the supply of assured non-GM maize for industrial users, than the price premia associated with their procurement. However, in bulk commodity sectors, such as maltsters and semolina manufacturers, price was an overriding concern, with its instability considered a problem.

Where special cereal qualities are sought, new forms of contractual arrangements have evolved between consumers, traders and producer groups (large cooperatives often help in this respect). In return for guarantees regarding the supply of special grades of cereals, users may agree to offer guaranteed prices or guaranteed premia over other grades of the same cereal, but use the services of traders as intermediaries in the direct contacts with producers and the collection and supply of the relevant cereals.

During interviews, some of the largest users described how their concerns about the supply of particular premium quality cereals had led them to become actively involved in the economic research work being undertaken to develop farm budgets for the range of major alternative crops. This work has enabled them to cooperate with producers in designing annual contracts that should provide the producers with the desired degree of stability of income from the cultivation of these crops, incorporating into the contracts elements that take account of non-price factors, including yield variations, as well as changes in the economics of competing crops.

Some users who face competition in third country export markets for cereal-derived products commented upon the uncertainties created in their export operations by the lack of stability in the predictability of the granting of export refunds for the cereal content of these exports.

WTO commitments on the maximum values of refunds available for these processed outputs in non-Annex 1 products, in aggregate, mean that exporters cannot predict with any certainty what proportion of their request for export refunds that will be granted. This has led to the practice of over-bidding for such refunds, in the hope that the actual quantity they require will be covered once the Commission has scaled down the bids.

The extent of this source of instability in exporters' activities is closely correlated to the scale of cereal export refunds. Therefore, as refunds have been reduced in scale by the CMO measures, the problem has lessened considerably. Moreover, many exporters who would be eligible for cereal-related refunds do not bother to apply for them if the actual refunds per tonne are small, to save on administrative time and cost.

4. CONCLUSIONS

The main issue of interpretation is the meaning of *sufficient*. We have considered the degree of price stability to be sufficient if it compares favourably with (i.e., is greater than) the stability of prices on the international market. By the criteria chosen, it is clear that the level of stability afforded by the CMO measures must be judged to be sufficient.

- *Inter-Year Stability:* The inter-annual comparisons of internal and world market cereal prices over the marketing years from 1990/01 to 2003/04 revealed that both the coefficients of variation of annual prices and the maximum-minimum price ranges as percentages of the mean prices were almost always lower in the EU than on the world market. Indeed, the absolute values, in € per tonne, of the standard deviations and maximum-minimum ranges of EU cereal prices over this period were often lower than those in the world market, which is significant, given that the CMO measures reduced institutional prices after 1992/93.

- *Intra-Year Stability:* The comparisons of intra-year price movements for July-June marketing years also reveal that the level of price stability is to be considered sufficient. During the period of the comparisons, the only year in which internal market prices were significantly less stable than in the world market was 2003/04, which was greatly affected by the poor EU cereal harvest that year, which had a larger effect upon the internal market than the world market.

Because the measures have helped to stabilise prices, the development of the financial instruments, such as commodity futures contract, that enable users to manage price risk has developed little in the internal market. For producers, the combination of income stability provided by direct payments and price stability via other elements of the CMO has been a particular barrier to the greater use of risk management techniques; indeed, there are indications that cereal producers have chosen to become riskier in some of their activities, which may be interpreted as an indication of the over-stabilisation of their incomes. For example, basic crop insurance in the EU exists at a far lower level than in the USA. In Spain and France, there is evidence that producers have reduced crop insurance in response to the introduction of direct payments.

In some sectors, notably malting barley for distilling, processors expressed more concern about the lack of stability in the availability of particular grades of cereals than about price stability, as such. However, they have devised strategies to cope with this particular form of instability, notably direct contracts with producers and traders, offering guaranteed prices in return for assurances of supplies. In other sectors, however, such as semolina manufacture from durum wheat and maltsters in the brewing sector, price and its stability were indicated as overriding factors.

Chapter 5, Part 4: Geographical Segmentation of the Market

Do the answers to the three previous questions apply to the entire territory of the EU? The response will take account of transport costs and other factors restricting the fluidity of the market. The crops that will be covered are common wheat and maize.

1. INTRODUCTION TO THE ANALYSIS

1.1 Interpretation of the Question

The logic behind the Cereals CMO reforms was to boost the competitiveness of EU cereal production by reducing market price supports and bringing internal prices closer to world prices. The main instrument used to achieve this was the intervention price, which was lowered and set at a single value for all eligible cereals after the 1992 reform.

- If the effects of the CMO are judged against a liberalised world market system, in circumstances when intervention prices were above export prices for cereals in which the EU was a net exporter, there was a barrier to the market's *fluidity.*

This is interpreted as the combination of both relative cereal price adjustments (and internal production and consumption responses) and also flows of cereals from surplus to deficit regions that would occur in a liberalised market at world prices. A key feature of a liberalised market is that cereal prices are free to adapt to market imbalances.

- A further obstacle to the *fluidity* of the internal market is the application of a single EU-wide intervention price, unlike the Sugar CMO, for example.

When intervention prices have been above the export prices applicable in surplus regions, regional price differentials may be too low to cover freight costs from regions with cereal surpluses. This gives rise to private and public stockpiling.

For maize, import tariffs hold internal prices above world prices. Therefore border price relativities in North West Europe between maize and other major feed cereals are not consistent with those on world markets and prevent the convergence of internal and external markets.

In Spain and Portugal, 2.5 million tonnes of imports made at reduced tariffs are a permanent feature of supply; however, regional maize deficits still occur. Transport costs link prices in northern and southern Europe, affecting the extent to which internal and external maize market prices converge in maize surplus regions.

1.2 The Relevant Cereals CMO Measures

The CMO measures relevant to this question are the reductions in market supports introduced in 1992 and extended in Agenda 2000, allied to public intervention stocks.

The harmonisation of intervention prices for all cereals was part of the 1992 reforms.

Border measures for cereal imports, including the maize and sorghum tariff rate quotas (TRQs) for Spain and Portugal, and wheat and barley TRQs introduced in 2003, are also relevant.

1.3 Judgement Criteria

The geographical segmentation of the cereals market reflects freight cost differentials between surplus and deficit centres, subject to the constraints that market prices near intervention stores do not fall significantly below the intervention price for eligible grades and a single export refund applies to all member states for a given cereal. The main exception to these constraints is where subsidised exports are made from intervention stocks, when the Commission covers the transport costs to an export port.

Table 5.5 presents the judgement criteria, indicators and data sources used to analyse this issue.

Table 5.5: Judgement Criteria, Indicators and Data Sources Regarding Geographical Segmentation

Judgement Criteria	Indicators	Data Sources
Price differentials in EU market for wheat and maize (a) vs. Results of the transport algorithm (b) vs. Liberalised market	Internal price differentials Results of the algorithm	National transport companies Traders DG Agriculture Eurostat

The benchmark against which the *fluidity* of the internal market is judged is the outcome of a liberalised market in which national supply/demand balances for the 2000/01-2002/03 crop year are applied to current internal freight costs. The resulting price differentials are modelled using a transport algorithm, which is explained below.

1.4 The Transport Algorithm

The key elements of the algorithm are twofold: (a) the combined freight costs to supply the market are minimised; (b) inter-regional price differentials cannot exceed freight costs from surplus to deficit regions. We compare the results in situations with

- Liberalised market outcomes, and
- Where the intervention prices are set as a minimum in all regions and border measures are applied, in the form of price thresholds for imports

Differences in national prices and stock levels between these two outcomes are judged to be an initial indication of the expected impact of the CMO measures on fluidity.

These estimates are compared with actual observed price differences and stock levels in member states to determine how much, and in which locations, factors, other than transport costs, restricting the fluidity of the market have caused the outcome to differ from that expected to prevail as a result of constraints imposed by CMO measures.

Actual foreign trade volumes are a further constraint. In the analysis, we take national supply/demand balances as exogenously given, and do not try to determine the full range of production and consumption responses in a general equilibrium framework.

In the calculation of cereal price differentials between member states,

- Internal prices in deficit regions are set by the wheat price in surplus regions *plus* the freight costs of transporting wheat, as identified in the least cost algorithm.
- Net surplus regions for common wheat are assigned internal prices, set by the lower of two values: (a) effective[1] intervention prices or (b) price levels in deficit regions to which a region's surplus is shipped *minus* associated freight costs.
- In the first simulation, it is assumed that exports with open market refunds are all made from French and German ports, the two main exporting nations at present.
- This assumption is relaxed in the next simulation, that of a liberalised market.

Transport Costs

Transport companies and traders emphasise the complex array of transport modes used for intra-EU cereal haulage. Logistical constraints, e.g., incompatible national railway gauges, necessitate additional handling, adding to costs.

- Moving cereals from Hungary to Spain today costs €60 per tonne.
- Even less complicated transfers are also costly. Within France, taking wheat from Nievre to Brest (roughly 700 kilometres) costs €26/tonne.

Poor internal infrastructure within Europe is a barrier to the creation of a fluid single market. Comparisons with the US, another major cereal producer with a large land area reveal the logistical disadvantages under which the EU cereal market labours.

- Freight rates within the US for wheat shipped from the Mid-West to the US Gulf (1,900 kilometres) in mid-2005 were €15 per tonne (a year earlier, they were €9).
- The ability to transport cereals by river barge in the US plays an important role in this competitive advantage, but grain is also transported by rail on this route at a far lower cost than in the EU over long routes (at a rail freight rate equivalent to only 30% of intra-France freight costs per tonne-kilometre).
- East-West US cereal rail freight is more expensive than North-South transfers.
- From Minneapolis to Portland (2,800 kilometres) costs €36 at present. This is the same distance as for Hungary-Spain, on which freight costs are 67% higher.

In the absence of regional cereal supply/demand balances within member states, our analysis is made at a national level. This limits the precision of the linear programming models and the results they generate. Even at a national level, supply/demand balances do not allow rigorous differentiation between grades of particular cereals.

These shortcomings in detailed data make it difficult to comprehend fully current trade flows. For example, Germany is consistently both an exporter and importer (intra-EU) of large quantities of common wheat. These two-way flows may reflect: outflows from one region and inflows elsewhere that are logistically more efficient than transporting wheat across Germany; *and/or* outflows of one grade of wheat and inflows of another. The modelling is unavoidably constrained by limitations on the availability of such data.

[1] These are calculated as the intervention price *minus* the transport/handling costs associated with putting wheat into intervention. These are assumed to be a uniform €4 per tonne.

Appendix 44 depicts the average net surplus/deficits for common wheat, barley and maize, for all EU-25 member states, apart from Cyprus and Malta. The main net exporters and importers within the EU-25 identified there form the basis for the first transport algorithm used in this analysis. Including members that are trade-neutral or have irregular flows of cereals would reduce the clarity of a comprehensive algorithm.

Linear programming is used to identify the trade pattern that would cause cereals to move from surplus to deficit member states at the lowest overall transport cost.

1.5 Modelling a Liberalised CMO for Common Wheat

After modelling the current state of the market, the next stage of the analysis is to simulate the optimal pattern of regional flows and price levels under a less restrictive system of intervention buying and exporting. The structure of such a system could take a variety of forms.

One could be to establish fixed regional differentials in intervention prices (somewhat akin to the Sugar CMO) to improve fluidity. However, the market structure of the EU is characterised by high freight costs, and these inevitably change over time. The design and implementation of a system of regional intervention prices would require anticipation of (and reaction to) changes in freight market conditions. Such "second-guessing" the market would be imperfect, with any administrative failures resulting in inefficient regional flows that in the longer term would result in unwanted surpluses.

An alternative is to permit intervention purchases in very few locations. This would alter the price gradient within the EU cereals market. To determine the impact on fluidity, we have adjusted the linear program to reflect the assumption that intervention acts as a safety net and occurs solely in a land-locked surplus country, such as Hungary.

Cereal flows to northern export ports would be sub-optimal unless these were the lowest cost routes by which surpluses could be cleared. Hungary's land-locked status is an impediment to exports by any route, but transporting cereals from Hungary to Constanza, Romania, is typically a lower cost option than to Rouen[2].

2. RESULTS OF THE TRANSPORT ALGORITHM

2.1. Contrasting Inter-regional Price Differentials With Transport Costs

The differentials between price levels for the same commodity in different locations at the same time should reflect supply/demand balances and also the freight costs to transport cereals from surplus to deficit regions. External trade with third countries fulfils the role of accommodating overall structural surpluses or deficits within the Community. The transport algorithm model calculates price levels for each country.

- For France, Germany and the UK, the algorithm returns internal prices that are within €1 per tonne of one another. This indicates that the internal market is efficiently arbitraged for these countries.

[2] Interviews indicate that mid-2005 freight costs to Constanza were €20/tonne from W. Hungary and €25 from E. Hungary. This compares with over €35 to ports in the Northern EU (e.g., Rotterdam), making Constanza more attractive if f.o.b. export prices at these ports are the same. Working against this are competitive pressures from Black Sea exporters and logistical constraints in moving grain through the Bosphorus that may depress f.o.b. prices at Constanza. Notwithstanding these constraints, its proximity to Egypt, the world's largest importer of common wheat, supports demand from ports in this region.

Further confirmation comes from the close match of the results of the transport algorithm model with observed regional price differentials for common wheat and barley (a close feed substitute) in December 2004, the latest month for which data were provided. These results are depicted in Diagram 5.3, and are expressed in terms of their premia or discounts against prices in the largest wheat exporter, France. These results highlight the disparities in internal price levels between major deficit and surplus regions. Although these inter-regional price gradients are relatively wide, they are consistent with the optimal transport cost algorithm between these regions.

In late 2004, when local cereal markets faced initial difficulties in implementing the EU intervention buying system, the price gradient from Hungary and the Czech Republic broadly matched the results of the algorithm.

- If logistical efficiency, rather than the intervention price, determined price gradients in the interior of the Community, then prices in Hungary, for example, would settle over €20 below those in France.

The emergence of a large Hungarian discount in late 2004 was a temporary aberration. Since then, internal market price incentives to move surplus cereals from Hungary to other member states have vanished, as discounts on French prices have shrunk.

- For the Czech Republic and Hungary, as well as Austria, the results indicate that for common wheat to flow to deficit regions, internal prices would have to be significantly lower than effective intervention rates. As such, the fluidity of the market is restricted by the current price support system. Rather than accept prices eroded by high transport costs, producers choose to sell into intervention, resulting in stock accumulation.

This analysis demonstrates that the CMO intervention system may provide producers with a price safety net at the same level throughout the Community, but does so at the expense of fluidity within the internal market. To achieve fluidity, price gradients would need to widen permanently from the current regional disparities.

The likelihood of flows from the lowest priced surplus regions in Central Europe to the highest priced internal market, in Spain and Portugal warrants special comment.

- The transport algorithm analysis generates a least cost solution for allocating regional surpluses to deficit regions within the EU. This solution typically results in each deficit region being supplied by one or more surplus regions. Similarly, each surplus supplier typically divides its exports between several destinations.

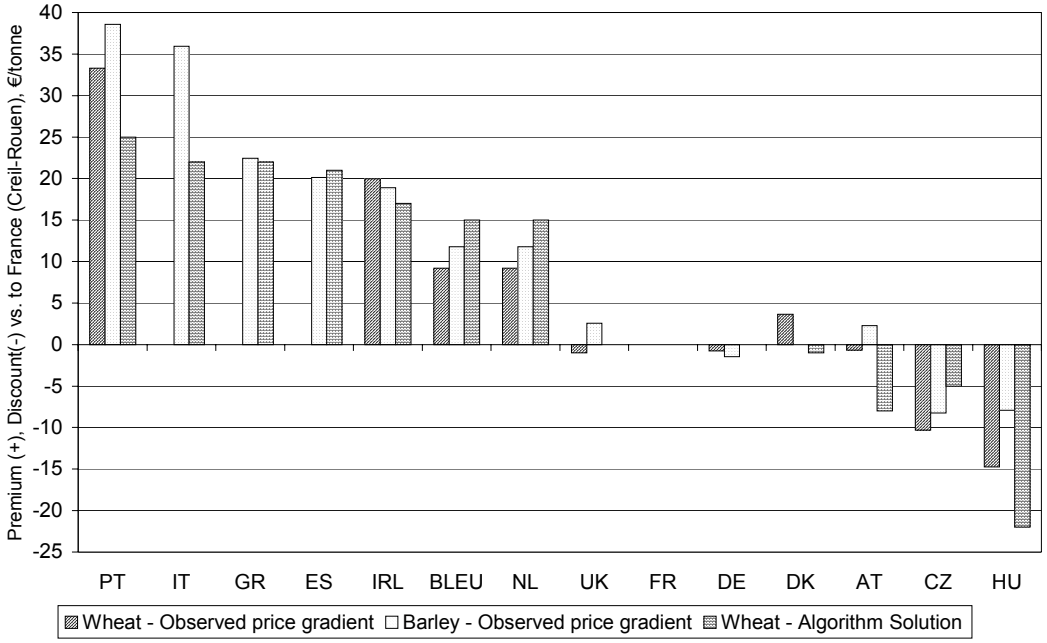
- Transfers of cereals to the Iberian Peninsula rely on road freight, or combine two or more modes of transport (for example, maritime/road), because the difference in the railway gauges in France and Spain prevents uninterrupted transfers.

- Flows from Hungary to the Peninsula involve both the longest distances and logistically the most complex flows. Hence, flows from Hungary to Spain/Portugal do not appear in the least cost solution. Rather, cereals flow northwards from Hungary, to Germany and the Netherlands.

- The transport algorithm indicates that Spain's deficit is met (from within the EU) with flows of cereals from France, which typically enter the country via Mediterranean ports at a cost of approximately €20-25 per tonne.

- It is these patterns of trade that determine price structures in Hungary and the Iberian Peninsula under optimal flows.

Diagram 5.3: Observed Price Differentials in Late 2004 vs. Transport Algorithm Results if All Exports with Open Market Refunds are from France and Germany



Source: Algorithm calculations and DG Agriculture market price data for December 2004 (which do not include common wheat prices for Italy, Greece or Spain)

2.2. Simulating A More Liberalised CMO for Common Wheat

The second stage of the analysis simulates the optimal pattern of regional flows and price levels that would emerge under a less restrictive system of intervention buying and exporting. As an example, we consider the effect of setting intervention purchases as a safety net in only one land-locked surplus country, using Hungary as the example.

Diagram 5.4 illustrates the results of this simulation and compares the resulting price gradient with that of the first transport algorithm.

- Internal prices in surplus member states in Northern Europe, with relatively easy access to ports, would remain unchanged, relative to France.

- Prices in Hungary would be at a discount to those in France, reflecting the costs of delivering cereals to Constanza. However, the diagram implies that the resulting fall would be lower than that required if all Hungary's surplus were to be moved within the EU (to the Iberian peninsula or for export from, say, Rouen, as assumed in the calculations underlying Diagram 5.3).

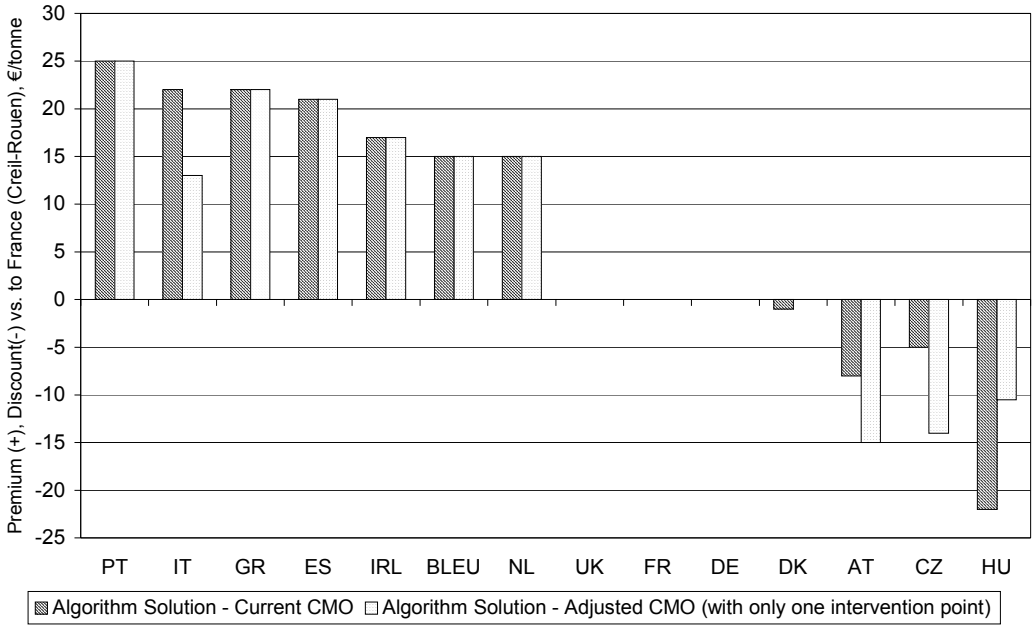
- The most land-locked cereal surplus countries, Austria and the Czech Republic, would suffer the largest declines in relative prices, both in relation to the current system (when intervention buying should hold their prices at the same level as in France, at times when intervention prices are above border prices), and in relation to the first simulation of partial liberalisation introduced above in Diagram 5.3, in which all exports are assumed to be made via northern ports.

- Price declines for land-locked surplus producers translate into lower prices in the deficit regions they supply, with Italy benefiting the most from the adjustment.

It should be emphasised that, in this simulation, in the absence of any supply and demand responses to relative price changes, it does not matter whether liberalisation is total, which would be as if the intervention price were set below the equivalent world market levels in the point of intervention, or is merely partial, so that intervention buying remains a central feature of the CMO, as a safety net, but is one that is available only in one location.

In both cases, freight cost-determined price differentials and transfers from surplus to deficit regions would occur without intervention buying in other locations. As long as the same export refund per tonne is applicable for all member states, partial liberalisation would lift the entire "cage" of relative cereal prices by the same amount in every location above its level (with zero refunds) in the event of total liberalisation.

Diagram 5.4: Contrasting Results for Common Wheat Under Current Intervention Buying with Those with Intervention in Only One Location (Hungary)



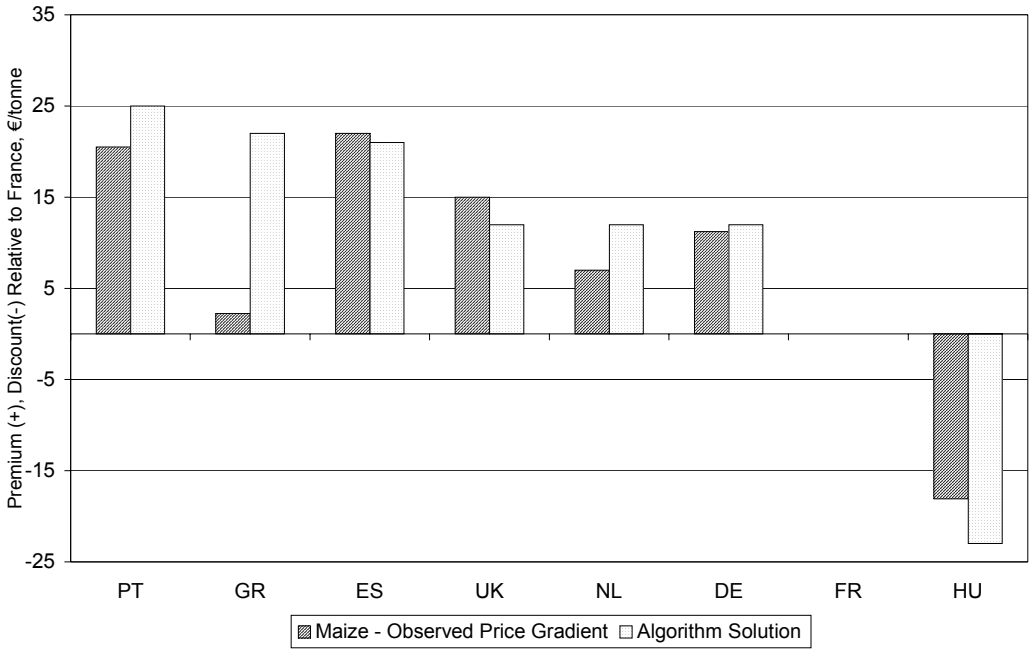
Source: Derived from transportation algorithm results, applying the assumptions explained above

3. MAIZE TRANSPORT ALGORITHM

Diagram 5.5 illustrates the results derived from modelling the algorithm developed for maize flows within the EU.

- Overall, the regional structure of actual price differentials in December 2004 fits the conclusions of the transport algorithm model of optimal distribution.
- However, the transport algorithm indicates that Greece's deficit would be filled by surpluses from France, resulting in a price gradient of over €20 per tonne.
- The observed price premium for Greece is well below €20 in practice. The likely explanation is that imports from the Balkans have held down prices.

Diagram 5.5: Maize, Actual Price Differentials vs. Transport Algorithm Results



Source: Algorithm calculations and DG Agriculture market price data.

Diagram 5.6 illustrates the transport algorithm solution for maize where a single member state (again, Hungary is taken as the example) is the intervention location. In keeping with the earlier results for common wheat, the algorithm solution in Diagram 5.6 indicates that, for maize to flow to deficit regions, Hungarian prices have to be substantially lower than those that the intervention safety net is designed to provide[3].

When intervention provides Hungarian producers with price levels in line with those in other surplus areas, there is a major disincentive to move these surpluses to deficit regions, implying poor fluidity and the accumulation of intervention stocks. The diagram reveals that:

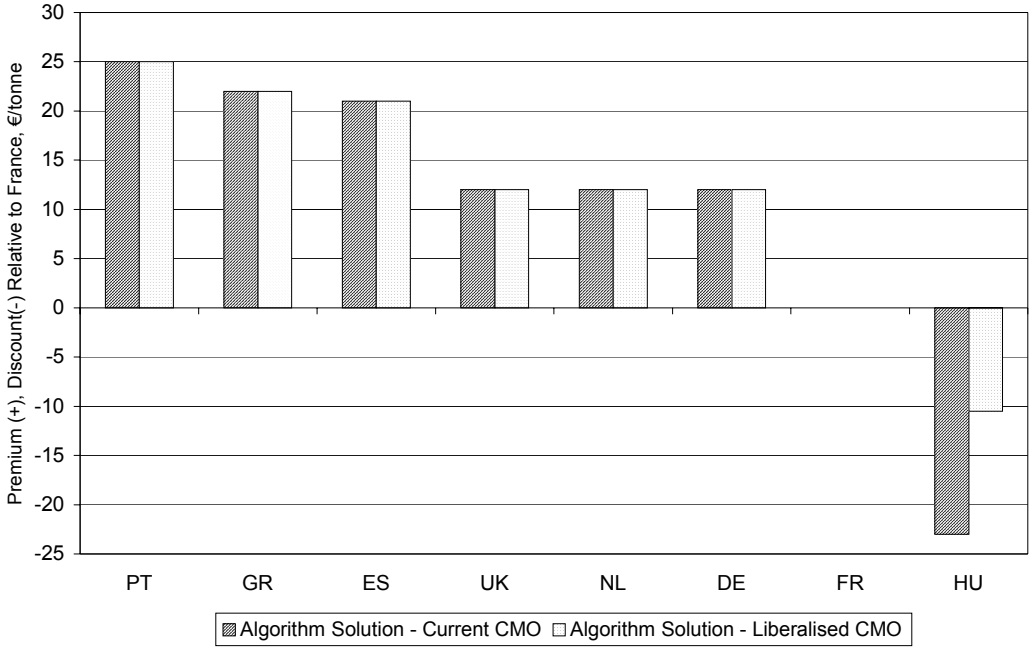
- When there is a single intervention point, as we saw in simulation for common wheat, the algorithm yields smaller differentials between Hungarian and French prices, than those that would be observed under the current CMO when internal prices are close to intervention price levels.

- With the current CMO and internal prices close to intervention levels, however, a single EU-wide export refund leads to exports being made from France, rather than Hungary. Therefore, the algorithm for the current CMO implies that, if Hungary and its immediate neighbours cannot export maize directly, their prices would have to fall more than €20 below those in France to reduce their surpluses.

- With intervention in Hungary alone or alternatively a fully liberalised outcome with no intervention buying at all, the differential between Hungarian and French maize prices would reflect ex-warehouse returns from supplying surpluses to export outlets from Hungary, rather than from France. This would yield a differential of only €11 per tonne between maize prices in the two member states.

[3] Again, as with common wheat, observed prices at the end of 2004 (when intervention failed to provide this safety net) were briefly close to those needed to achieve fluidity of flows across the EU.

Diagram 5.6: Contrasting Results for Maize with Current Intervention Buying with Those with Intervention in Only One Location



Source: Algorithm calculations and DG Agriculture market price data.

4. CONCLUSIONS

In terms of the *current structure of the market,* regional price differentials in the EU-15 member states at the end of 2004 fairly closely matched the results of transport algorithm models of optimal allocation of cereals across space.

For most EU-15 member states, we conclude that arbitrage between surplus and deficit regions has eroded sizeable deviations from the optimal price gradient.

In the enlarged EU-25, a single EU-wide intervention price for a given cereal is a barrier to the efficiency of the internal market.

The most significant divergence is that identified for Hungary, where the high costs of transporting common wheat to deficit regions of the EU are not reflected in the price gradient resulting from a single EU-wide intervention price (although in reality, in late 2004, the initial logistical inadequacies in the intervention system in Hungary immediately after accession resulted in *de facto* lower support prices, akin to those that would be observed if sales to intervention stores had to be made to other member states).

Similar results are found for maize price gradients, with the greatest divergence between the results that occur with a single intervention price and those that emerge from a logistically efficient market found in the case of Hungary.

We conclude that at times when intervention prices have been above the world market export prices that are applicable in surplus regions, price differentials between different regions within the enlarged Community have been too low to cover the freight costs to transport cereals from some surplus regions to deficit areas, leading to high levels of private and public stockpiling.

The simulation of *fully liberalised* internal wheat and maize markets generates the same inter-regional price differentials as the simulation of an *alternative partially liberalised CMO market support mechanism* in which intervention buying is restricted to a single cereal surplus land-locked state.

In these *liberalised* models, across the EU as a whole, transport algorithms reveal that a price gradient of roughly €35 per tonne is required between the lowest priced surplus regions and highest priced deficit regions to achieve fluidity within the internal market.

This is much larger than the price gradients observed when the intervention safety net is effective in all member states. It is also high by international standards.

- The price gradient currently observed in the US between its major cereal surplus regions and the primary export point, the US Gulf, is equivalent to €22 per tonne.
- In the EU-25, by contrast, price gradients greater than €35 per tonne[4] are required to encourage flows from central Europe to the Iberian Peninsula.

We conclude that the current measures, notably the application of a single intervention price throughout the Community, restrict the fluidity of the internal cereals market.

- This manifests itself in the accumulation of surplus cereals in public and private stocks.

The analysis demonstrating that a single intervention price throughout the Community for one cereal restricts the fluidity of the internal market may be extended to the analysis of the effects of a single intervention price for all cereals.

- In a liberalised market, different cereals may substitute for one another, and the mechanism that aids this process is the price competitiveness of the particular cereal that is locally over-supplied.
- However, the Cereals CMO, by establishing a single intervention price for all cereals is a major potential barrier that prevents such price signals from emerging.
- In particular, the single intervention price for all eligible cereals in all regions helps to erect barriers to the flow of surpluses of one cereal from one region to fill deficits of a cereal that may be a close substitute (for example, in feed) in another region.
- We conclude that a single intervention price for all cereals in all locations artificially restricts the fluidity of the overall cereals market.

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[4] It should be emphasised that the €35 per tonne figure is not intended to reflect actual additional export costs (in relation to Rouen, for example) from a land-locked location such as Hungary in late-2004. Lower differentials may be applicable to exports from Hungary in a liberalised environment, since, in that case, foreign trade could flow via a Black Sea port such as Constanza, Romania, rather than via more expensive and distant northern EU ports.

This transport algorithm result also occurs because the simplified model has been adapted to allow flows to occur from only one point in a country. In reality, export costs differ for different regions of the same country; export costs from Eastern Hungary are higher than those from the West of the same country.

Chapter 5, Part 5: Consumption Inside the Community

Has internal competitiveness improved so as to continually encourage the growth of internal outlets for cereals? The analysis will cover the main uses and sectors, in particular the effects on the production/consumption of meat. The crops that will be covered are common wheat for feed, feed barley, maize and rye.

1. INTRODUCTION TO ANALYSIS

1.1. Interpretation of the Question

Lower quality cereals, commonly known as feed cereals, also have important non-feed outlets. These (notably starch and biofuels) are included in the scope of this answer. Internal competitiveness is considered to have *improved* if the prices of feed cereals and low grade cereals for industrial use have fallen in relation to those of alternative feed and industrial ingredients in the internal market and become closer to world market prices (taking border prices as the reference). Border prices are viewed as the benchmark against which assessments of competitiveness are made.

The growth of internal outlets for cereals will address the animal feed, starch and biofuel sectors, considering the volumes of cereals used in each sector and developments since 1995. Taking the potential benefits of domestic cereal competitiveness a stage further, the discussion for this question also considers whether more competitive domestic raw material (i.e., cereal) prices have stimulated growth in the meat, starch and biofuel sectors themselves.

Non-price determinants of meat demand are also identified where relevant to understanding the behaviour of the livestock sector, since they have a direct effect upon cereal demand for feed.

1.2. The Relevant Cereals CMO Measures

The CMO measures introduced in the 1992 reform and extended under Agenda 2000 enacted reductions in market supports and created incentives for the cultivation of crops for industrial uses, and, most specifically, for biofuels (whose use was encouraged by national legislation) on set-aside land. In specific measures applied to the cereal starch sector, the CMO restricted the range of derived products eligible for production and export refunds.

The logic of the CMO reforms was that reductions in market support measures, including actions tightening quality standards for cereals eligible for intervention buying, would enable feed cereals to increase their use in feed and other outlets. Lower institutional prices were complemented by border measures, which included the implementation of commitments entered into with the WTO in 1994.

In particular, the measures were intended to reverse the 25% absolute decline that occurred in total cereal use in feed from 1984/85 to 1992/93, caused by a loss of markets to competing feedstuffs, and to imported cereal substitutes in particular.

The logic of the reforms was threefold:

- By increasing the price competitiveness of cereals, the CMO sought to increase their share of internal demand for feed ingredients.

- By making the overall cost of mixed feed lower than it would have been in the absence of the measures, the reforms would stimulate domestic output of animal products, as a result of the improved competitiveness of local producers.
- The reforms would promote internal consumption of these products, in response to the reduction that they induced in the supply prices of animal products.

1.3 Judgement Criteria and Indicators

Table 5.6 presents the judgement criteria, indicators and data sources used to analyse these issues.

Table 5.6: Judgement Criteria, Indicators and Data Sources Regarding Cereal Consumption

Judgement Criteria	Indicators	Data Sources
Falling internal feed cereal prices vs. world feed ingredient prices	Internal feed cereals prices World prices of feed cereals and substitutes	Eurostat DG Agriculture
Declining feed prices transmitted to compound feed and meat prices	Feed cereals incorporation rates Compound feed prices	LMC data on biofuel and starch products
Increased production and consumption of EU feed and meat	Animal product prices Production, consumption and net exports of meat, starch and energy products derived from cereals	
Improved self-sufficiency ratios in meat markets		

2. PRICE RELATIVITIES OF FEED CEREALS VS. COMPETING PRODUCTS

Appendix 45 describes the trends in internal and border cereal market prices, as well as of the prices of major cereal substitutes and protein meal. The discussion in Part 1 of this chapter has demonstrated that measures lowering intervention prices and tightening quality standards for intervention sales reduced internal market prices for feed barley, wheat and rye until the 2003/04 marketing year, when prices rose in reaction to a poor domestic cereal harvest.

From calendar year data (to reflect the form of COMEXT data), it is evident that internal market and border feed cereal prices[1] converged between 1996 and 2003. World prices were high in 1996-97, because of the US drought, which briefly brought internal EU prices close to border prices. Focusing upon the years 1998 to 2001[2], internal prices fell vis-à-vis world prices. On average in 2000-01, internal prices for feed wheat were very close to export parity border prices, they were about 3% above import parity border prices for maize and were nearly 20% below export parity prices for feed barley.

[1] Border prices are taken to be the average annual f.o.b. export prices derived in Part 6 of this chapter for wheat, barley and rye for exports to destinations which are known to import virtually entirely feed grade cereals from the EU. Maize border prices are the annual c.a.f. import prices collected by DG Agriculture.

[2] This is because late 2002 saw high world prices because of low US yields, while 2003 was marked by a poor EU crop; therefore, 1998-2001 might be considered to be the most normal recent period.

Table 5.7 describes the changes in average internal feed cereal price relativities in relation to two major cereal substitutes (corn gluten feed and cassava pellets) and soybean meal, the primary protein feed, using feed barley prices as the denominator. Feed barley was chosen for this role since it depends more heavily on feed demand, and hence is more representative of feed cereals, than feed wheat.

Soybean meal and, to a lesser extent, corn gluten feed have become less competitive since 1993-95. Since there are no tariff barriers to these products, these changes demonstrate the greater competitiveness of EU feed cereals against both products.

Table 5.7: Ratios of EU-15 Internal Feed Ingredient Market Prices to Domestic Feed Barley Market Prices, Calendar Years 1993-2004

	Maize	Soft Wheat	Soybean Meal	Corn Gluten Feed	Cassava Pellets
1993	117%	115%	111%	69%	73%
1994	110%	106%	113%	75%	86%
1995	125%	108%	110%	75%	100%
1996	119%	108%	155%	90%	89%
1997	105%	110%	195%	81%	75%
1998	113%	113%	133%	84%	75%
1999	117%	103%	117%	74%	72%
2000	115%	105%	168%	79%	67%
2001	113%	106%	172%	87%	70%
2002	120%	106%	167%	83%	77%
2003	117%	107%	158%	84%	74%
2004	122%	106%	156%	80%	75%

Source: DG Agriculture

For cassava pellets, prices relativities to feed barley changed little from 1993 to 2004. This is because pellet exports from Thailand developed almost entirely in response to the opportunity to sell it as a cereal substitute in the EU market, paying a 6% import tariff, at prices determined by EU cereals policy. Pellets have few alternative export outlets; hence their prices follow EU feed cereal prices. In this case, the relevant criterion for assessing competitiveness is the changes in feed market shares. As feed cereal prices have fallen, Thai and other cassava processors have reduced their export volumes of pellets well below the amounts permitted under their tariff rate quotas into the EU, and switched their processing to more profitable export products, such as native starch, modified starch and cassava chips, for sale mainly in Eastern Asia.

3. TRANSMISSION OF FEED CEREAL PRICES TO FEED AND MEAT PRICES

The CMO reforms have reduced internal feed cereal prices; but lower feed cereal prices do not necessarily translate into cheaper animal feed and, further down the supply chain, meat prices. In this section, we consider the extent to which animal feed prices and meat prices have declined following the decreases in feed cereal prices.

If the observed transmission is weak, this suggests that the benefits of cheaper inputs have been captured at the animal feed stage of the chain, and that cheaper inputs have not stimulated greater output downstream. In the following sections, we therefore consider output changes in the compound feed and meat production sectors in order to address the extent of any production stimuli from cheaper feed cereal prices.

Diagram 5.7 presents feed cereal, soymeal and pig feed prices. The diagram reveals the broadly flat pig feed price, in contrast to the declining feed cereal price. This supports the notion above, that the benefits of cheaper cereals have been captured at the feed stage of the meat production chain. We explore this initial observation more fully in Table 5.8. It is worth remembering, however, that feed manufacturers have observed fluctuations in the prices of other ingredients, such as soymeal, over the period, while costs such as energy have also been volatile. Feed regulations, such as the ban on bonemeal, have also contributed to the cost economics of the feed industry.

Diagram 5.7: Feed Cereal, Soybean Meal and Pig Feed Prices, 1995-2004

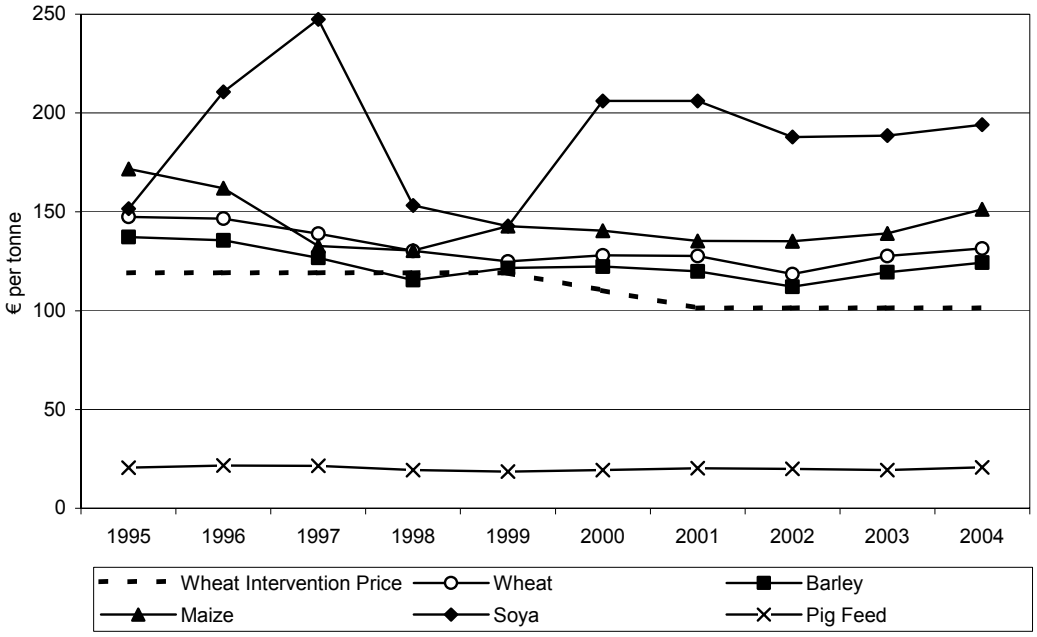

Table 5.8 contrasts average EU compound feed and final animal product prices with internal feed barley prices.

Table 5.8: Ratios of EU-15 Animal Compound Feed and Product Market Prices (per 100 kgs) to Domestic Feed Barley Market Prices (per tonne), Calendar Years 1993-2004

	Pig Feed	Pork	Poultry Feed	Poultry	Egg-Layer Feed	Eggs	Beef Feed	Beef Cattle
1993	14.2%	79.9%	16.8%	87.1%	14.0%	67.9%	11.6%	201.7%
1994	14.5%	88.7%	17.4%	93.1%	14.6%	66.1%	11.1%	217.0%
1995	15.0%	102.3%	17.8%	92.1%	15.0%	63.1%	12.3%	212.2%
1996	16.0%	119.9%	19.6%	106.8%	16.3%	79.2%	12.7%	194.7%
1997	16.9%	129.3%	20.4%	113.4%	17.3%	77.8%	12.3%	212.7%
1998	16.7%	103.5%	21.2%	121.8%	17.4%	75.3%	11.7%	238.7%
1999	15.3%	92.3%	19.7%	109.5%	16.1%	66.0%	11.7%	227.3%
2000	15.8%	115.6%	20.9%	119.0%	17.0%	83.7%	12.5%	229.3%
2001	16.9%	138.9%	22.2%	126.8%	18.2%	78.5%	12.5%	202.6%
2002	17.8%	120.8%	23.8%	123.1%	19.2%	84.5%	13.0%	232.4%
2003	16.3%	106.6%	20.6%	121.4%	17.7%	92.6%	12.5%	219.5%
2004	16.7%	111.3%	21.4%	119.1%	18.1%	70.0%	12.9%	214.3%

Source: DG Agriculture

The precise extent of the incorporation of cereals in specific mixed feeds varies with ingredient prices, but the data permit an analysis of the transmission of cereal prices to the intermediate cost of compound feed and to final animal product prices. On average, feed for non-ruminant animals (chickens and pigs) is higher in protein and lower in fibre than that for ruminants (cattle and sheep).

In the past, EU cereal prices were typically well above world market levels, as a result of the Cereals CMO, while internal protein meal prices were close to those in the external market. Consequently, overall EU protein meal incorporation rates were high by international standards. Interviews for case studies suggest that broiler poultry feed has the highest protein content among the four compared in the table, followed by egg-layers, with pigs next, and then beef cattle and finally sheep. The cereal content of commercial compound feed is usually inversely related to the protein content.

Their relative price behaviour supports this view. Between 1993 and 2004, poultry and egg-layer feed prices, relative to feed barley, rose by 27% and 29%, respectively, as against a rise of 40% for soybean meal alone. Pig feed's price relative to feed barley rose 17%, while beef cattle compound feed prices rose 11%.

- Although all mixed feed prices rose in relation to feed cereals, the ones that rose most slowly tended to be those with the highest cereal content.

- However, analysis of the annual prices of mixed feed as a linear function of feed barley and soybean meal prices from 1993 to 2004 does not confirm that this relationship is statistically significant.

Table 5.8 includes animal products, as well as compound feeds, in its statistics.

- When we examine relative price changes in the final animal products, the price transmission from feed ingredients to the final animal products is less evident.

Statistical analyses were carried out of the relationships between animal product and mixed feed prices, and between the product prices and feed cereal and soybean meal prices, to assess if and to what extent price transmission occurred between the series.

- Regression analysis results indicate that agricultural product prices are positively related to compound feed prices in all four relationships tested.

- Regression analysis also indicates that the prices of compound feed are positively related to those of animal products in three of the relationships tested.

- However, the coefficients in the analysis of the Granger causality[3] from feed ingredients to compound feed and from compound feed to animal product prices were not significant in any of the analyses undertaken.

Indeed, a puzzling feature of Table 5.8 is that, while egg prices rose a mere 3% against feed barley between 1993 and 2004, egg-layer feed recorded the highest percentage rise of any compound feed, one of 29%.

For the three other final products, beef cattle, broiler chickens and pork, those products that recorded the highest rise in compound feed prices tended to be those also recording the highest meat price increases.

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[3] Granger causality is introduced in the discussion in Chapter 4, Part 2.

DG Agriculture Report - "Price Transmission in the EU Agri-Food Sector"

The study of *Price Transmission in the EU Agri-Food Sector* undertaken for DG Agriculture in 2003 considered wheat, pig meat and beef, but the price transmission that was the focus of the study was that (in both directions) between the meat itself and the consumer product in the case of pigs and beef.

Also, the report considered bread-making, rather than feed quality output, in the case of wheat. This means that the analysis was confined to the wheat-flour-bread price transmission process.

That study found, from much larger data sets than ours (it stated that 60 data points are the minimum acceptable for the analysis, whereas our analysis has only 12), some statistically significant evidence of price transmission in both directions for individual member states, though this was not true of the full set of countries in the survey.

It may be felt that there is sufficient common structure to the agro-industrial sector to suppose that similar evidence may exist of price transmission in the two-way flow between feed cereal, mixed feed, and animal product prices.

Against this view, corporate structures in the flows from agricultural product markets to feed mixing and wholesale animal product production are very different from those downstream from animal products to retail markets. Therefore, it would not be appropriate to extend conclusions from the earlier study to the present analysis.

4. CONSUMPTION OF FEED CEREALS IN COMPOUND FEED

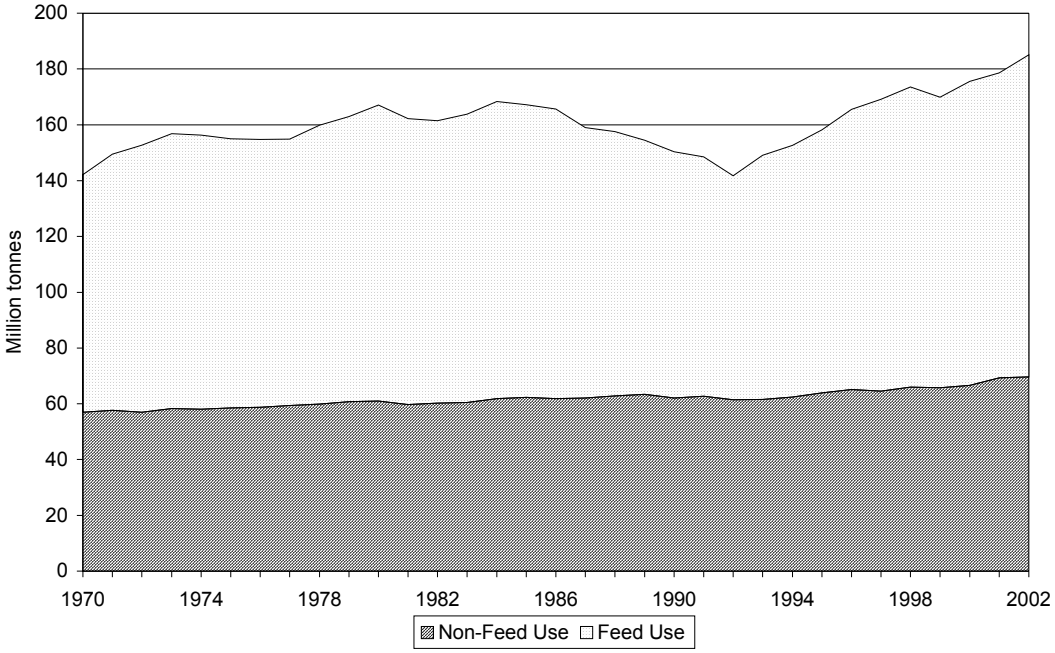
In this section, we consider whether the falls in cereal prices have stimulated the *growth of internal outlets for cereals*, in this case in the compound animal feed sector.

Diagram 5.8 illustrates the importance of competitiveness of cereals in feed outlets. This is demonstrated by the major role of animal feed as an outlet for cereals, accounting for more than half of the total domestic demand for cereals. The diagram also reveals that feed outlets for cereals had fallen steadily in sales volumes from 1984/85 to 1992/93.

Diagram 5.8 reveals clearly the stimulus to cereal consumption in feed use achieved following the reductions in institutional prices initiated by the MacSharry reforms from 1992. Prior to this period, intervention prices were different for different cereals, and are difficult to compare with later, harmonised intervention prices due to the complications arising from agri-monetary reforms and switchover coefficients. Nevertheless, the reduction in the more closely harmonised cereal intervention price from 1992 onwards, as presented in Diagram 5.8, coincides with a clear break in the trajectory of cereal use in feed, and its subsequent rise.

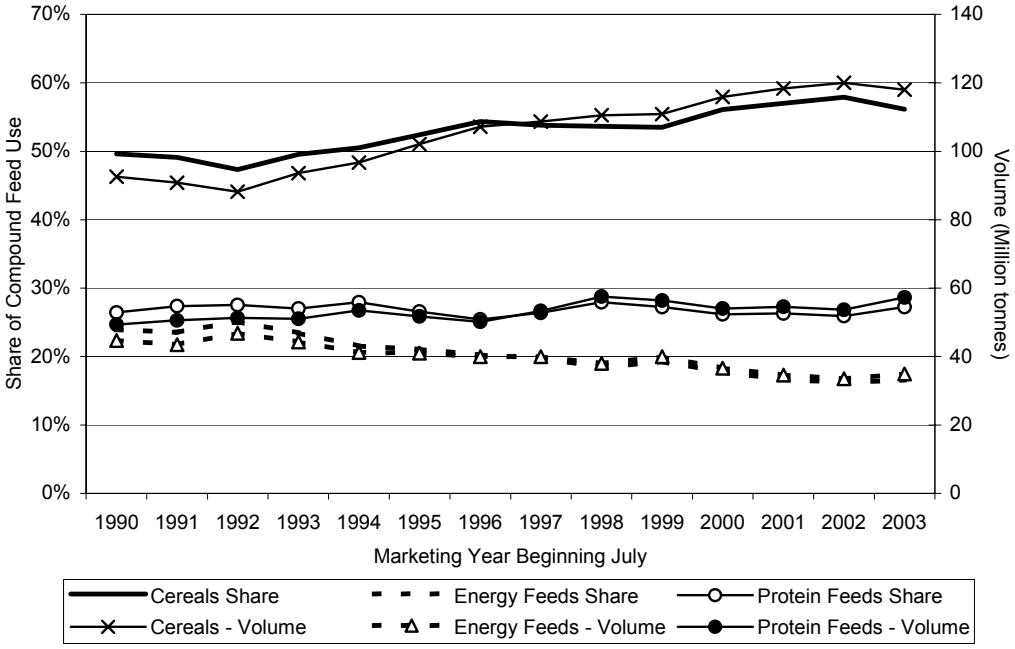
Appendix 47 presents feed ingredient data, summarised in Diagram 5.9, depicting the composition of compound feed demand for the three main types of ingredients: cereals; energy feeds (cereal substitutes, i.e., cassava pellets, corn gluten feed and citrus pulp, as well as molasses and fats); and protein feed, notably soybean meal.

Diagram 5.8: EU-15 Feed and Non-Feed Demand for All Major Cereals, 1970-2002 Marketing Years



Source: FAO

Diagram 5.9: Composition and Volume of Domestic Demand for Compound Feed by Feed Ingredients for the EU-15, 1990/91-2003/04 Marketing Years



Source: DG Agriculture

The share of energy feeds fell from 25.1% to 16.2% from 1992/93 to 2002/03, before rising slightly in 2003/04, when cereal prices rose and availability fell following the poor EU harvest. The share of protein feeds was fairly stable, while that of cereals rose from a low of 47.3% in 1992/93 to a 2002/03 high of 57.9%. At the same time, compound feed steadily increased its share of total feed at the expense of the use of forage.

Within the feed cereal segment, data in Appendix 47 reveal that, discounting 2003/04 as exceptional, the shares of soft wheat and maize rose after 1995/96, while those of feed barley and other cereals (mainly rye) declined, though their sales volumes increased. A major change in the past decade was the growth in the import share of feed cereal use, as feed wheat and barley imports from Ukraine and Russia entered in large volumes from 2001/02. Tariff rate quotas introduced in January 2003 have capped such imports. Important observations from this data, and Diagram 5.9, include:

- Gains in the cereal share of feed demand were mainly at the expense of imported energy feeds. Locally produced energy feeds defended their market position well.

- The situation regarding protein feeds contrasts with that for energy feeds.

Protein feeds are much harder to substitute than energy feeds; they provide valuable amino-acids, and prices of alternative synthetic amino-acids reflect the soymeal: cereal price trade-off. Accordingly, the demand for protein feeds tends to move in step with the growth in production of the key animal species that are major consumers of protein feeds, such as the non-ruminants, among which poultry are particularly important.

Appendix 47 examines the possible substitution of cereals for protein feed in compound feed output. It compares total cereal and protein feed use in feed with total meat output and also with solely the non-ruminant segment of meat output, since non-ruminants (poultry and pigs) are the most intensive users of protein feed. In both comparisons, the cereal share increased from 1995/96 to 2003/04; and, for both, the protein feed proportion fell between 1995/96 and 2002/03, before recovering in 2003/04, when the cereal crop was unusually low. This suggests that, with normal crop yields and a good availability of domestic feed cereals:

- Protein meal incorporation rates in feed have been falling gently since 1995/96.

Thus, once the changing structure of animal farming is taken into account, the CMO measures, by reducing internal market prices of feed cereals relative to soymeal, enabled them to substitute protein feed to a limited extent.

5. THE SUPPLY-DEMAND BALANCES WITHIN THE MEAT SECTOR

We have seen that lower cereal feed prices have translated into increased substitution of cereals for other energy feeds since the onset of CMO reforms in 1993. This section considers whether increased consumption of lower cost inputs in the compound feed sector has encouraged increased production of meat in the EU.

EU Animal Feed Sectors

From the perspective of the Cereals CMO, it is useful to disaggregate the meat sector between ruminant animals (cattle, sheep and goats), able to digest fibre and forage, and non-ruminants (poultry and pigs) whose diets are relatively higher in cereals and in protein feed. Because of the large overall scale of feed demand by cattle, their compound feed use represents roughly one third of total EU demand, even though their compound feed incorporation rates in their overall feed volumes are low.

Appendix 46 provides details of the development of the domestic meat sectors, from which Table 5.9 may be prepared.

In interpreting these tables, it should be recalled that, for ruminants, the past decade has been marked by two major shocks:

Major Shocks Affecting the EU Cattle and Sheep Sectors

- UK BSE*:* The first was the UK BSE outbreak that led to a sharp decline in EU beef consumption in 1996, from which a slow recovery occurred until 1999.
- The BSE outbreak also had some impact upon beef production, since animals that were actually or potentially infected were removed from the food chain.
- UK Foot and Mouth*:* The other disease-related shock was the 2001 UK foot and mouth outbreak that hit Community sheep meat output in particular that year, with only a slow subsequent recovery in production.
- The outbreak reduced intra-EU flows of live sheep and sheep meat, and this reduction in supply was directly reflected in a reduction in consumption.

Overall, important observations from the analysis in Table 5.9 include:

- Both the production and consumption of sheep and goat meat fell after the 1995 marketing year
- However, beef demand in 2003 was above that in 1995, although output declined in the intervening period
- Self-sufficiency ratios listed in Table 5.9 declined after 1995/96 for three of the four types of meat; pig meat was the sole exception, but even for the pig sector, self-sufficiency in 2003/04 was 3% below its peak level in 1999/2000.

Table 5.9: Rates of Growth in EU Meat Production and Consumption and End-Period Self-Sufficiency Ratios, by Meat Type, 1987/88-2003/04 (Volumes in carcass weights)

Meat Type	1987/88-1995/96 EU-12	1995/96-2003/04 EU-15
Ruminant Animals		
Beef Cattle: Production Growth	-0.2%	-1.3%
Beef Cattle: Consumption Growth	-0.9%	0.3%
Beef Cattle: Self-Sufficiency (End-Year)	110%	96%
Sheep & Goats: Production Growth	1.7%	-1.4%
Sheep & Goats: Consumption Growth	1.2%	-0.5%
Sheep & Goats: Self-Sufficiency (End-Year)	84%	78%
Non-Ruminant Animals		
Poultry: Production Growth	4.1%	1.3%
Poultry: Consumption Growth	3.7%	2.1%
Poultry: Self-Sufficiency (End-Year)	109%	102%
Pigs: Production Growth	2.1%	1.2%
Pigs: Consumption Growth	1.7%	1.1%
Pigs: Self-Sufficiency (End-Year)	106%	107%

Source: Marketing year data from AgrIS and The Agricultural Situation in the European Union, European Commission.

Comparisons of growth rates in production and consumption for all four types of meat in the nine marketing years preceding 1995/96 and the nine years after it reveal that:

- Production growth rates were lower in the latter period than the former
- Apart from beef, consumption growth was also slower in the latter period
- For beef, the reason was that the first serious concerns about BSE hit demand visibly after 1993/94, so that the total consumption fell by over 6% from 1993/94 to 1995/96; the recovery from the initial consumption shock only manifested itself after 1995/96.

In view of public anxieties regarding the quality of beef and sheep meat supplies, and the shifting consumer preferences from red to white meat on health grounds, it is not surprising that the consumption of non-ruminant sources of meat continued to expand after 1995/96.

What is surprising is that demand growth rates are below those observed previously, in spite of some substitution of non-ruminant sources of meats for meat from ruminants. It may be hypothesised that specific concerns about particular types of meat have led some consumers to reduce meat consumption in aggregate.

The development of the production of poultry and pig meats has differed from the pattern observed for consumption.

Both production and consumption of these two types of meat grew from 1995/96 until 1999/2000. Since then, the Community output of both forms of meat has declined in absolute terms, yet demand has continued to rise.

Hence, both the poultry and pig meat sectors experienced a decline after 1999 in their self-sufficiency ratios. The Community remains a net exporter of both non-ruminant meats, but the combined self-sufficiency ratio, having risen from 106.6% in 1995 to a peak of 109.5% in 1999, had fallen to 105.2% in 2003.

6. THE USE OF CEREALS IN THE PRODUCTION OF BIOFUELS AND STARCH

In this section, we consider how the CMO measures, by reducing the disparity between internal cereal prices and world market prices, influenced internal demand for cereals in biofuels and starch production. Official data for cereal demand in both these end-uses are limited; hence, we rely upon estimates derived in Appendix 48.

For biofuels, the box below details the impact of bioethanol on EU cereal markets. The important observations include:

- The EU has a deficit in diesel fuel and a surplus in petrol. The oil industry has not, so far, displayed much willingness to promote the use of ethanol as a petrol substitute, to avoid creating even larger petrol surpluses.
- National policies are particularly important in determining the pace of development of biofuels.
- The bio-ethanol market is limited because of a lack of demand for fuel ethanol.

In this respect, the CMO has had little influence upon the development of the use of cereals in the biofuel sector.

Cereal Use in Biofuels

The 1992 reforms permitted crops to be grown on set-aside land for non-food uses.

These measures led to cereal areas on set-aside land that rose from 9,000 hectares in 1993/94 to 79,300 hectares in 2003/04, of which 66,700 were for energy uses. This contrasts with over a million hectares of oilseeds grown on set-aside land for biodiesel.

Differences in the pace of development of cereals and oilseeds for non-food uses lie primarily in the nature of demand for ethanol and biodiesel.

The EU has a deficit in diesel fuel and a surplus in petrol. Major oil refiners are therefore willing to support biodiesel output to supplement existing (inadequate) diesel supplies.

With an export surplus of petrol, the oil industry has not, so far, displayed much willingness to promote the use of ethanol as a petrol substitute, to avoid creating even larger petrol surpluses.

Whether the rise in oil prices will help stimulate demand in bioethanol is yet to be seen.

National policies are particularly important in determining the pace of development of biofuels. National governments differ in the tax incentives that they provide for the use of such fuels, and they apply car engine specifications that help or hinder biofuel use.

The majority of the limited current demand for bioethanol is for the manufacture of ETBE, which is used an octane enhancer, that competes with other octane enhancers, such as MTBE.

The market for this additive is relatively limited, and governments in some important ETBE producing member states, such as France, are only willing to provide a fixed annual quota of fuel tax credits for the production of ETBE from ethanol.

The main use of fuel ethanol worldwide is in blends with petrol as a direct car fuel. This market has been difficult to develop so far in the EU because only in Sweden do the vapour pressure engine specifications permit the direct use of ethanol in blends.

By virtue of these national obstacles to the outlets that ethanol may find in the fuel market, its market is limited, not by any inherent lack of price competitiveness of cereal raw materials for ethanol production in relation to rapeseed, the primary raw material for biodiesel, but because of a lack of demand for fuel ethanol.

In this respect, the Cereals CMO has had little influence upon the development of the use of cereals in the biofuel sector.

In terms of the industrial use of cereal in the starch sector, the important findings, detailed in the accompanying box, include:

- Starch uses of cereals have grown substantially, most notably in the case of wheat starch, under the CMO framework since 1992.
- Since 2000, lower production and export refunds and tighter rules for the use of these refunds have slowed output growth.

Cereal Use in the Starch Sector

The starch sector is a major end-user of cereals, using 14 million tonnes per annum, or close to one eighth of the cereal use in feed. In Appendix 48, details are provided of the supply/demand balance of cereal use by EU starch processors and the self-sufficiency ratio, including the cereals incorporated in starch derivatives entering foreign trade.

The Cereals CMO, by reducing market supports, brought internal market cereal prices closer to world market levels and improved the competitiveness of local cereal-using industries.

In the starch sector, the effects of the CMO were muted because production and export refunds existed to provide compensation for higher internal cereal prices. Yet, wheat demand for starch manufacture rose by over 3.5 million tonnes between the 1995/96 and 2003/04 marketing years.

Local wheat starch processors benefited directly from the CMO in their competition with foreign suppliers and with maize starch producers from the competitiveness that wheat enjoyed against maize in the internal market.

The CMO also encouraged bakers to profit from greater competitiveness of local wheat by using higher proportions of medium protein wheat in their wheat flour, compensating for its lower protein content than that found in hard wheat by adding vital wheat gluten.

Imports of hard wheat have continued, since millers interviewed for this report state that some of the properties of the best hard wheat are irreplaceable, but the increased use of vital gluten, which is a major by-product from wheat starch manufacture, has enabled millers to benefit indirectly from the greater competitiveness of internal wheat.

As a consequence, sales of vital gluten have helped to sustain the expansion in wheat starch output.

This rapid expansion occurred despite reductions in support to starch producers as a result of CMO measures. One change was to tighten eligibility for production and export refunds by end-use, partly to comply with WTO commitments on export subsidies.

Another change, reflecting the CMO's success in narrowing the gap between internal and world market prices, has been a sharp decrease in the levels of starch production refunds and wheat starch export refunds. These were granted to compensate starch producers for their higher cereal costs.

However, the technical coefficients applied in computing the refunds were often historically determined and over-generous.

With the decline in cereal prices, the extent of such over-compensation fell, lowering the incentives for some forms of domestic starch processing.

EU self-sufficiency in starch products has declined in recent years.

With fewer products eligible for refunds and the sharp decline in both production and export refunds, imported starch derivatives seem to have become more competitive.

Imports of cereals in starch products doubled from 1996 to 2003, while exports grew by less than 50%.

7. CONCLUSIONS

Price Competitiveness*:* The logic of CMO reforms implemented from 1992 was to improve the competitiveness of local cereal supplies. The evidence presented above demonstrates that domestic cereal market prices have become much more competitive vis-à-vis both other major feed ingredients and world cereals prices. Cassava pellets, the main imported cereal substitute whose prices were stable vs. local cereals is such a close substitute that its competitiveness is revealed by changes in market share, and cassava pellets' feed market share has fallen markedly.

Price Transmission*:* A second criterion of increased competitiveness is the transmission of lower cereal prices to mixed feed and animal product prices. Statistical analysis of mixed feed and animal product prices vis-à-vis cereal and soybean meal prices is inconclusive; but some weight is attached to the observation that those mixed feeds and animal products that are considered the most intensive in their use of cereals were in general (but not always) those with the lowest proportional price increases in their classes of products.

Internal Cereal Outlets*:* The most compelling evidence of the attainment of the objective of the CMO measures in the feed sector is the rising share of cereals in compound feed since 1992/93. This share has increased mainly at the expense of imported energy feeds.

Substitution of protein feed has been much more modest; indeed its share of total feed actually rose in 1995/96-2003/04, but once account is taken of the increasing proportion of meat output from non-ruminants, with a higher protein diet than ruminants, and the disastrous 2003/04 cereal crop, it is concluded that there has been slight substitution of protein feeds by cereals since the 1992 reforms. The share of imported cereals in feed use rose, but the 2003 introduction of tariff rate quotas should keep these imports capped.

Effects on EU Meat Production/Consumption*:* The trends in domestic output and demand for meat products provide no evidence of the greater competitiveness of cereal prices leading to faster growth of production or consumption of any major meat products. For beef cattle and sheep, BSE and foot-and-mouth outbreaks hit both output and demand; and dietary habits have turned away from red meat. It might have been expected that poultry and pig meat consumption would have benefited from a switch away from demand for beef and lamb, but for them, too, both production and consumption growth rates have slowed since 1995/96.

Effects on Non-food Cereal Uses*:* Among other non-food uses of cereals, fuel ethanol production from cereals grown on set-aside land has made much less progress than that of biodiesel from rapeseed. For this, national legislation and the reluctance of leading oil companies to risk increasing the EU's petrol export surplus are the main causes. Starch uses of cereals are very much greater, and have grown substantially, most notably in the case of wheat starch, under the CMO framework, which has assisted it. Since 2000, lower production and export refunds and tighter rules for their use have slowed output growth.

The greatest success of the CMO measures has been to enhance the competitiveness of cereals in the internal market sufficiently to regain the sales volumes lost to competing ingredients after 1984; but this has been achieved mainly by substitution of these competing inputs. The self-sufficiency ratios of three of the four main meat sectors (pigs are the exception) and of the starch industry have all fallen since 1995.

Chapter 5, Part 6: The EU's Position on the World Market

Have all the measures taken together brought internal prices sufficiently into line with world prices to improve the share of EU cereals on the world market? In particular, have they facilitated exports without refunds? The crops that will be covered are common wheat (treating breadmaking and feed wheat separately), barley (treating malting and feed barley separately) and rye.

1. INTRODUCTION TO THE ANALYSIS

1.1. Interpretation of the Question

The CMO reforms since 1992 have reduced intervention prices, and tightened quality regulations for cereals eligible for intervention, with the intention of increasing the competitiveness of EU cereal production in the internal and export market arenas. The theory of the reforms was that reducing market supports would bring internal prices closer to world prices, thereby decreasing export refunds (and decreasing the role of refunds in enabling EU cereal exports to compete in world markets). As a net cereal exporter, EU internal cereal prices should reflect export parity. This means internal prices reflect export prices plus any export refund. Thus, internal cereal prices should also fall as intervention prices, and therefore export refunds, are reduced.

A further reform intention was to control supply via compulsory set-aside. Among the reasons for the introduction of supply controls was the commitment to the WTO to reduce subsidised agricultural exports. Unless the measures reduced internal prices sufficiently to enable cereal exports to be made without refunds, the subsidised export limits obliged the Commission to restrict export licences and accept a higher level of public and private stocks than it might have favoured otherwise and/or to adjust the set-aside rate to control supply. The latter is a blunter instrument than restrictions upon export licences and takes longer to be effective.

The share of EU cereals on the world market has two possible interpretations: as the share of extra-EU export volumes; or as the EU share of global production.

The former is the measure that relates more directly to the facilitation of exports without refunds. However, EU cereal production competes with other suppliers within the internal market; therefore, both interpretations are employed in this discussion.

Two benchmarks are used, against which the outcome of the reforms is contrasted:

- A situation in which the Agenda 2000 reductions in market support were not made;
- A situation where world market prices are assumed to prevail internally.

1.2. The Relevant Measures

The CMO measures relevant to this issue are the 1992 and Agenda 2000 reforms that:

- Reduced market supports
- Introduced the associated changes in border protection
- Applied supply control via set-aside.

In addition, management of export licences within the CMO was constrained by export commitments agreed within the WTO. The WTO agreement also imposed constraints upon the ability of the Commission to change the structure of import tariffs, which was of relevance when tariff rate quotas were introduced on selected cereals in 2003.

1.3. Judgement Criteria and Indicators

Table 5.10 presents the judgement criteria, indicators and data sources used to analyse these issues. Competition with non-EU cereals is assessed in relation to changes in the market shares in third country markets and the appropriateness, or otherwise, of the margin of preference formulae used to determine EU import tariffs.

Table 5.10: Judgement Criteria, Indicators and Data Sources Regarding Export Markets

Judgement Criteria	Indicators	Data Sources
From 1995 to 2003, rising shares of	EU share of world output and exports	Eurostat
(a) World export markets	Market share in different geographical regions	DG Agriculture
(b) World production	Internal and export market prices	COMEXT
(c) Import shares in key markets	Levels of export refunds	FAO
Export refunds approaching zero	Volumes exported with export refunds	Interviews with traders
	Imports of cereals into the Community	

2. THE EU'S SHARE OF THE WORLD CEREALS MARKET

The CMO measures affect the EU share of world cereals markets in two main ways: through their impact upon cereal output and demand, which together determine exportable surpluses, and the extent to which refunds are needed for exports to be made. Appendices 49 to 54 present the statistical data regarding the share of EU cereals on the world market vis-à-vis global export volumes and global production of the relevant cereals. Appendix 56 presents the corresponding export data for wheat flour and malt, the two main export products derived from wheat and barley.

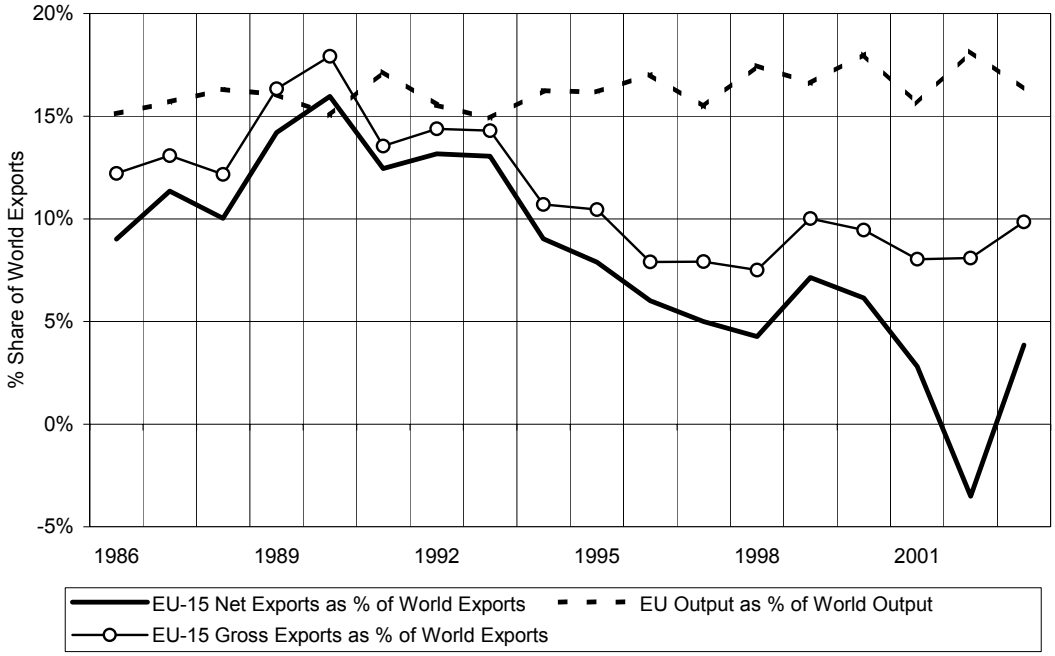
Calendar year trade and production data are summarised for common wheat, barley and rye in the following three diagrams. The diagrams reveal that, for exports:

- Wheat and Rye*:* The EU lost export market share for both common wheat and rye between 1995-96 and 2003-03.
- Barley*:* For barley, the export market share changed little.
- Cereals*:* In all three cereals, the EU increases net export shares around 2000. This was partly a decision to use the ability to carry forward unutilised WTO subsidised export limits until 2000/01; since then, there has been a binding annual limit.

In terms of production, the diagrams reveal:

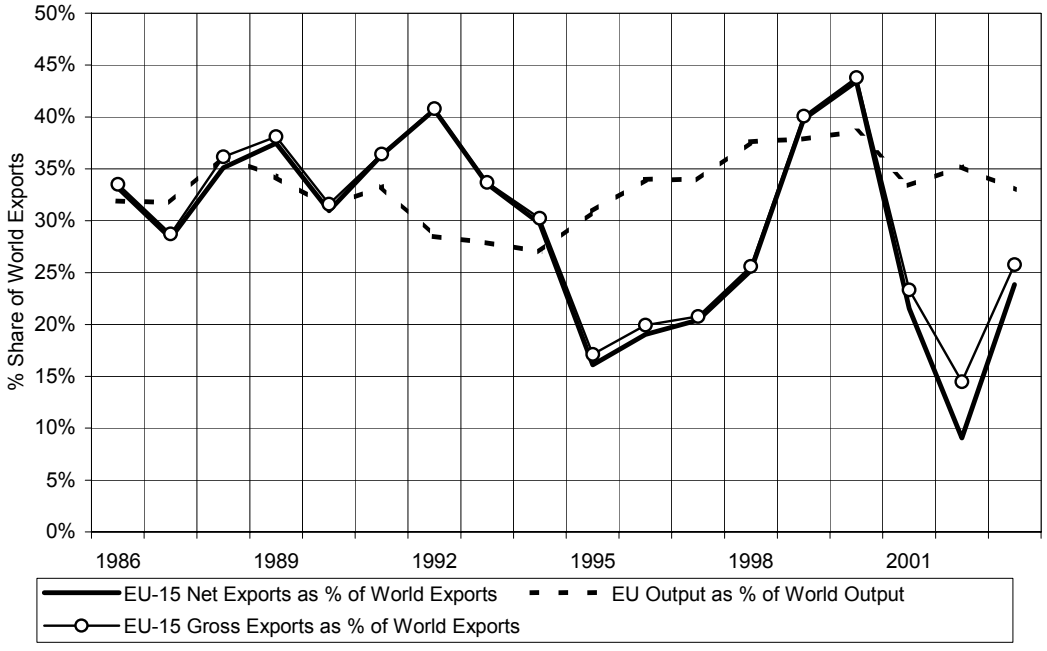
- Barley and Rye*:* The EU's world market share for both barley and rye first rose after 1995, but has declined since peaking between 1998 and 2000, to end with a similar global share to that in 1995.
- Wheat*:* The EU's share of world wheat output has shown a stronger upward trend, though with fluctuations reflecting the conditions of particular annual harvests.

Diagram 5.10: EU-15 Production, Gross Exports and Net Exports of Common Wheat as a Proportion of Total World Production and Exports



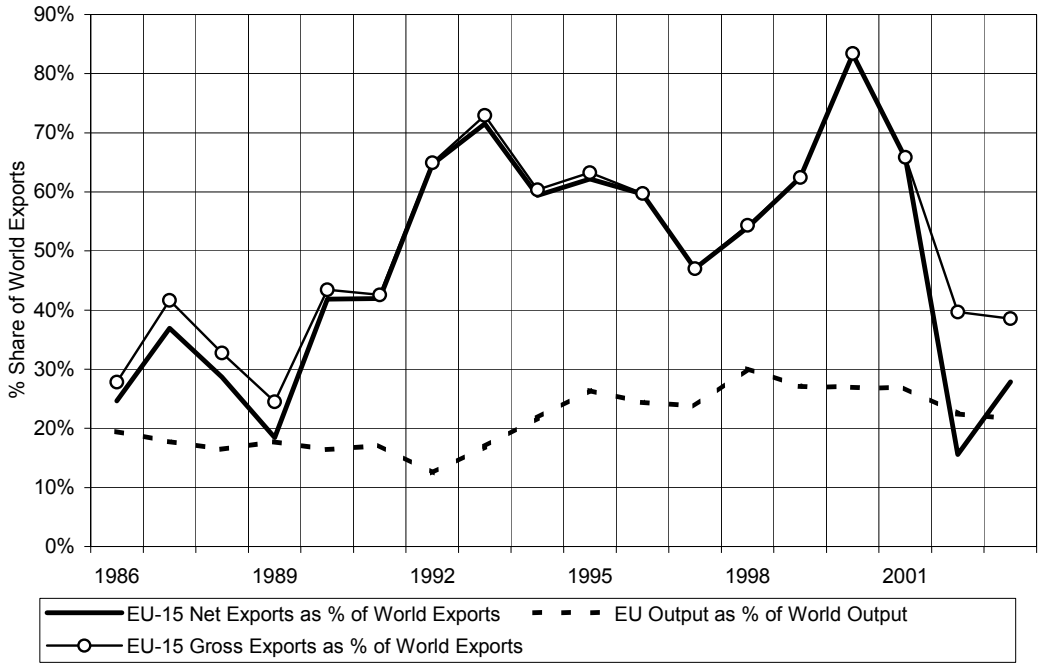
Source: FAO

Diagram 5.11: EU-15 Production, Gross Exports and Net Exports of Barley as a Proportion of Total World Production and Exports



Source: FAO

Diagram 5.12: EU-15 Production, Gross Exports and Net Exports of Rye as a Proportion of Total World Production and Exports



Source: FAO

The Quality of EU Cereal Exports and Production

- Regarding EU cereal quality, the case study monographs reveal that average common wheat quality moved in opposite directions in different member states over the past decade (rising in France and UK, falling in Germany).
- Analysis of trade data, however, reveals that high quality wheat imports have increased significantly since 1997/98 (the first year for which official data identify quality).
- For low and medium quality wheat, a sharp rise in imports after 2000 was halted with the imposition of tariff rate quotas in 2003.
- Overall, in breadmaking wheat, the EU has not raised its share of the world production nor of export markets.
- For feed wheat, the EU share of world exports has undoubtedly declined since 1995; its share of world output has, at best, changed little.
- The case studies indicate that average malting barley output quality has improved over the past decade, but EU suppliers are facing growing competition from East Europe. In this market segment, it is doubtful whether the EU has raised its share of world output or exports from 1995 to 2003.
- The same is also true of feed barley, which represents the predominant share of EU barley production and trade.

2.1. The EU's Share of Regional Import Markets for Cereals

The analyses in Appendices 49, 51 and 53 of the EU-12's share of total cereal imports into the major geographical regions from 1990 to 2003 generally reveal that the distribution of exports reflects freight advantage. The analysis reveals that:

- Total Cereals: The EU's share of import markets is highest in regions that are closest, such as non-EU Europe, North Africa and the Near East.
- Wheat*:* There is some evidence that changes in EU market shares have increased the logistical efficiency of exports, with the EU share of North African imports rising, while its share of imports into other Africa has declined.
- Barley: A sharp loss of market share since 2000 in European and Mediterranean markets, as East Europe (including the CIS) expanded its sales, and the increase in the EU share of the imports into Other Americas, primarily for malting barley.

3. THE IMPORTANCE OF EXPORT REFUNDS FOR CEREAL EXPORT SALES

Comparisons of average internal market prices and export unit values for common wheat, barley and rye reveal that:

- Wheat and Barley*:* From 1990 to 2003, and, more specifically from 1995 to 2003, the internal and external prices converged for common wheat and barley.
- Rye*:* Only for rye did the two price series remain separated, with no clear evidence of convergence since 1995.

These trends are presented in more detail in Chapter 4, Part 1, and in the box below.

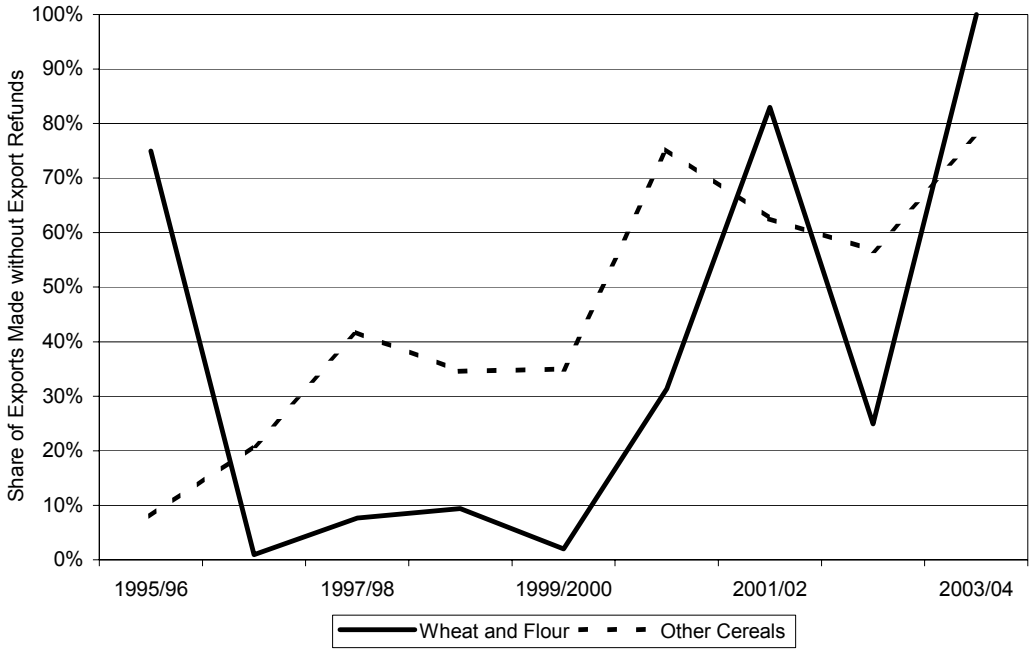
Export Refund Levels for Common Wheat, Barley and Rye

The diverging pattern of wheat/barley export refunds from rye export refunds is reflected in Chapter 4, Part 1, in Diagram 4.1, which plots average export refunds from 1996/97 (the earliest year for which data were available) to 2003/04.

- Common Wheat/Barley*:* Average common wheat and barley refunds were below €10 per tonne from 2000/01.
- As Appendix 55 explains, lower average levels of export refunds are a necessary, but not a sufficient, condition to facilitate exports, in view of WTO limits on subsidised cereal exports. In this regard, export refunds must fall to zero to lie outside the export volume commitments.
- Rye*:* For rye, internal prices remained stubbornly above export prices, and average export refunds showed no sign of being reduced below €40 per tonne from 2001/02 to 2003/04. This was because the intervention price was much higher than export prices, and thus stimulated rye output.
- In case study interviews, some rye producers acknowledged that they grew rye solely for intervention. The ending of its eligibility for intervention in 2004/05 will help to correct this particular cereal market distortion.

The percentage of EU cereal exports made without the benefit of export refunds is illustrated in Diagram 5.13.

Diagram 5.13: The Proportion of EU-15 Cereal Exports Made without Export Refunds, by Type of Cereal, 1995/96-2003/04



Source: DG Agriculture

The diagram reveals that exports made without refunds changed as follows:

- Wheat and Wheat Flour*:* For wheat and wheat flour (combined in "Group 1" for the purposes of WTO commitments), the percentage of exports that were made with no export refund rose to 100% in 2003/04, giving tangible evidence that the CMO reforms had facilitated exports without export refunds in this period.
- Barley and Rye*:* For other cereals ("Group 2"), which means principally barley and rye, the proportion of exports made without refunds also rose after 1995/96, but has not moved above 80%. For this, the exports of rye are largely to blame, since the average export refunds on barley and malt were very low by 2003/04.

Despite this positive conclusion, the picture is complicated by exogenous factors. In addition to the level of internal prices, export refunds are influenced by world price levels and by the exchange rate of the Euro against the dollar.

- Exchange Rates*:* Chapter 4, Part 1, Diagram 4.1, presents export refunds against the US dollar/Euro exchange rate, highlighting the decline in the export refund with the weakening of the Euro from 1998/99 to 2001/02. However, as the Euro strengthened from 2002/03, we would expect the export refund to have risen again. This has not occurred, and export refunds were very low, as we have seen, in 2003/04. This adds weight to the indications that internal prices have moved more in line with world market prices.
- World Prices*:* Diagram 3.8 in Chapter 3, Part 1, compares EU common wheat export prices with the same prices plus export refunds in 1995/96-2002/03. The diagram reveals that world prices were unusually weak in 1998/99. This helps to explain the peak in the export refunds of that year shown in Diagram 4.1. World prices have since recovered and moved toward EU internal price levels, aiding the recent reduction in export refunds.

4. POLICY LIMITATIONS IMPOSED BY WTO EXPORT SUBSIDY COMMITMENTS

Export refunds are subject to limitations within the EU's commitments to the WTO. The export commitments apply to both the value of export subsidies and the volumes exported with subsidies, and the commitments on wheat and wheat flour (Group 1) were distinct from those on other cereals (Group 2).

Appendix 55 analyses the implications of the EU's commitments to the WTO to reduce subsidies on cereal exports after 1995/96. The box below lists the implications of the EU's WTO export subsidy commitments.

The analysis in Appendix 55 assumes the WTO commitments had applied throughout the review period 1995/96 to 2003/04. Important conclusions of this analysis include:

- Export Subsidy Value Commitments*:* The analysis demonstrates that the value commitments would have been comfortably satisfied by the EU throughout the period under review, and would never have been a significant constraint upon the ability to continue to export cereals with refunds.
- Export Subsidy Volume Commitments*:* The export quantity commitments were much more important as a practical constraint on EU export volumes. This is because they applied regardless of the actual level of the export refund, as long as it was positive.

Despite the constraints imposed on policy by the WTO commitments, if EU internal prices were to fall to a level where export refunds were not required, i.e., *they facilitated exports without refunds*, as indicated in the question at the start of this section, then the WTO subsidised export constraints would become academic.

The EU's WTO Commitments for Export Subsidies (Refunds)

(a) Export Subsidy Value Commitments

- The analysis demonstrates that the value commitments were comfortably satisfied by the EU for Groups 1 and 2 throughout the period under review, and would never have been a significant constraint upon the ability to continue to export cereals with refunds.
- The main CMO measures enabling the EU to meet its export subsidy value limits were reductions in market supports, supported by the management of export licences and public stocks to ensure that internal market prices did not move far above intervention prices (except in periods when world prices were above the intervention price).
- Meeting export value commitments was helped by the decision taken in 2003 to apply tariff rate quotas (TRQs) on imports of low and medium quality wheat and barley to reduce the supply surplus within the internal market.

(b) Export Subsidy Volume Commitments

- The WTO export quantity commitments for Group 1 and Group 2 cereals were much more important as a practical constraint on EU export volumes. This is because they applied regardless of the actual level of the export refund, as long as it was positive.

- During the transition period for the application of the reductions in export subsidies, extending until 2000/01, the provision allowing shortfalls in the permitted levels of export subsidy values or volumes to be carried forward was needed to ensure the uninterrupted flow of export refunds. In 1999/2000, the volume of wheat exported with refunds was at its upper limit for that particular year; while in both 1998/99 and 1999/2000, the export volumes of other cereals exceeded the annual permitted limit[1].

- Since 2000/01, subsidised export limits apply rigidly every year. Analysis in Appendix 55 demonstrates that, if the Agenda 2000 measures lowering intervention price had not been made, and if each extra Euro on the intervention price had been reflected fully in internal market prices and export refunds, then, under reasonable assumptions about the increases that would have occurred in the proportion of cereal exports requiring positive export refunds, the Commission would have faced difficulties in meeting the WTO export subsidy volume limits. This would have applied to wheat in 2002/03 and would have come close to applying to other cereals, too, in the same year.

(c) Impact of External Factors on WTO Export Subsidy Commitments

- The CMO measures have to operate within a framework of unpredictable external factors that also affect the ability of the Community to meet its WTO commitments. One is the value of the Euro; the other is the impact of the climate upon the level of cereal output.

- In 2000/01-2002/03, when annual limits were binding for the first time and no provision existed to allow the over-fulfilment of limits to be carried forward, the Euro was weak, making it easier to meet export subsidy commitments. The Euro was stronger in 2003/04, but lower crop yields reduced the EU export surplus.

- The 2004/05 crop year proved more difficult because the Euro was very strong and cereal output was high, a rebound that was exacerbated by the decision taken by the Council to reduce the set-aside rate. The export subsidy return to the WTO for 2004/05 is not available, but the accumulation of intervention stocks, notably in new member states, is partial evidence of the difficulties in some circumstances of meeting the limits imposed by the WTO subsidy ceiling, without resort to measures to raise private and public cereal stocks.

[1] The limit on Group 1 (wheat and wheat flour) subsidised export volumes in 1999/2000 was 15.63 million tonnes, when subsidised exports reached 15.61 million tonnes.

The limits on Group 2 (other cereals and malt) subsidised export volumes in 1998/99 and 1999/2000 were 11.98 and 11.41 million tonnes, respectively. Subsidised exports in those years were 12.75 and 16.36 million tonnes, respectively.

5. THE GROWING COMPETITION FROM BLACK SEA CEREAL EXPORTERS

One of the more major structural changes to world cereal trade has been the emergence of Ukraine, Russia and Kazakhstan as exporters, including as suppliers to the EU. Measures taken to manage competition from these suppliers were important in determining the supply/demand balance in the EU market after 2000/01, as is discussed in detail in the accompanying box below

The emergence of Black Sea exporters undermined the existing Margin of Preference import price formulae, which determined EU import tariffs as the difference between 155% of the intervention price and the computed landed costs, including freight, of imported cereals from North America.

In 2003, the EU switched to a system of tariff rate quotas (TRQs) for barley and for low and medium quality wheat. The introduction of (TRQs) reduced EU cereal imports and hence the exportable surplus of cereals within the domestic market, but diverted Black Sea cereal exports to import regions, such as North Africa, in which the EU's proximity has traditionally favoured EU exports.

The Emergence of Black Sea Cereal Exporters

Prior to 2003, the import tariffs applied to cereal imports were determined using the Margin of Preference formulae agreed as part of the WTO agreement, which determined the tariffs as the difference between 155% of the intervention price and the computed landed costs, including freight, of imported cereals from North America.

The Margin of Preference calculation did not take account of the emergence of competitive exports, notably of low and medium quality wheat and barley, from the CIS countries via the Black Sea.

These imports not only competed with domestic cereals in the internal market but also, by adding to the surplus inside the market, increased the need for exports to remove this surplus.

To change the formulae, and switch to a new tariff rate quota system, the Commission had to compensate WTO members who would lose from such changes. Since the CIS exporters were not WTO members, they did not need to be compensated.

Therefore, compensation was provided via national TRQs for traditional suppliers, namely Canada and the US, and from January 2003, global TRQs of 2.981, 0.30 and 0.05 million tonnes, respectively, were introduced for low and medium quality wheat, feed barley and malting barley, which compared with total imports of 13.95 million tonnes of wheat and 1.23 million tonnes of barley in calendar 2002.

The introduction of tariff rate quotas reduced the exportable surplus of cereals within the domestic market, but diverted Black Sea cereal exports to import regions, such as North Africa, in which the EU's proximity has traditionally favoured EU exports. As it happened, the 2003/04 cereal crop was particularly poor for Black Sea exporters, but their emergence as exporters is not likely to be a short term phenomenon.

Indeed, in both Ukraine and Russia, sunflowerseed, the main alternative export crop, is subject to export taxes; therefore, the structure of internal crop prices in these two countries favours cereal production more strongly than world market price relativities imply.

In terms of the Cereals CMO, these newly emerged competitors in export markets have two important implications for the ability of the EU to export cereals without refunds:

- One is their threat as competitive sources of imports into the EU market
- The other is in the level of export refunds needed for EU exports to compete in external markets.

The import threat has been reduced by the imposition of the TRQs mentioned above; however, this changes the pressure point for the Commission in its management of the Cereals CMO from defence of internal market outlets for cereals to the new nature of competition in traditional export markets for EU cereals.

Black Sea exporters limited by the TRQs in their access to the EU internal market have switched exports to major EU export outlets, such as North Africa. Black Sea ports are well placed in terms of freight costs to serve these important markets[2].

In effect, the relevant world market price to use for reference in assessing the level of export refunds for wheat and barley has changed – in a downward direction – over the past decade, even in the absence of lower US Gulf export prices.

Black Sea and Argentine exports are now increasingly important in determining the landed cost of competing cereals into North African destinations[3].

Thus, at a given level of North American export prices, it is more difficult than it was previously to make cereal exports without export refunds at the current level of intervention prices.

6. CONCLUSIONS

Based on the period 1995/96 to 2003/04, the reforms of the CMO for cereals since 1992 cannot be judged to have been sufficient to have

- Improved the share of EU cereals on the world market.

The evidence for this, contained within this report, includes the following observations:

EU Share of World Market Exports**:** The share of EU cereals on the world market has tended to fall since 1995 when defined in terms of exports. Thus, it cannot be claimed that the measures have improved the share of EU cereals on the world market. The best performance was that of common wheat.

EU Share of World Production**:** If the world market is defined in terms of production, the EU share has been relatively stable. (This may seem to contradict the evidence regarding the export share, but the difference in trend is explained by the growth in domestic feed demand for cereals, discussed in Chapter 5, Part 5).

Although price reductions have not been sufficient to improve the EU's position in global markets, for some crops in some specific periods the reforms have, however, been successful in:

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[2] Including Egypt, the world's largest single wheat importer. The freight advantage to Egypt for Ukraine against Hungary was over €30 per tonne in mid-2005.

[3] Argentina, with some support from Brazil, has largely replaced the US as a maize supplier to the EU.

- Bringing internal prices into line with world market prices, and
- Facilitating exports without refunds.

The following evidence for this is presented in the report:

Export Refunds – Wheat and Barley**:** For both common wheat and barley, the CMO measures, notably the cuts in intervention prices, have brought internal prices closely into line with those in external markets in the period until 2003/04. Since exports were often made without refunds after 2000/01, it appears that the measures have facilitated exports of these two cereals without refunds during the period under review.

Export Refunds – Rye**:** For rye, the measures taken until 2003/04 did not facilitate exports without refunds. Refunds averaged over €40 per tonne each year from 2001/02 to 2003/04, with the eligibility of rye for intervention to blame, since market supports were far above export prices. Ending intervention for rye in 2004/05 should help to resolve this problem.

However, despite the success of CMO reforms in bringing some EU internal crop prices closer into line with world market prices, export refunds are still frequently applied, albeit at far lower magnitudes than was previously the case. In the near future, unless export refunds are reduced to an average of zero, several influences may restrict the EU's ability to raise its competitiveness in external markets. These include:

- WTO Export Subsidy Commitments**:** WTO commitments on subsidised cereal exports have hitherto been a major potential, rather than actual, constraint upon the facilitation of exports. However, this analysis suggests the subsidised volume ceilings are likely to become increasingly significant, especially in the light of increasing competition in nearby export markets from Black Sea origins.

- Internal and External Transport Costs**:** The imposition of tariff rate quotas on some EU cereal imports has reduced the gross export surplus within the EU market, part of which represented the pressure of the inflow of external cereals. However, competition has increased in many traditional export destinations in the Mediterranean, where the EU is at a freight disadvantage to Black Sea exporters. Moreover, as Chapter 5, Part 4 revealed, internal transport costs within the EU are relatively high. Both factors limit the EU's ability to compete without export refunds in export markets.

We conclude that, unless market support measures are implemented to reduce internal prices, or supply control, via set-aside, is increased, the new structure of world cereal exports will mean that the WTO export volume commitment will often act as a major constraint on export volumes.

In this respect, it is important to note that the crucial policy variable in the management of export policy in the cereals sector is simply whether the internal market price is above the export price, not the magnitude of the difference.

Chapter 6, Part 1: Efficiency and Cost of the Measures

And downtown, in higher circles of influence, people may have been saying, "What is with this Professor? What's he talking? His pilot light is gone out." *Saul Bellow, The Dean's December, Harper & Row, New York, 1982, p.152*

Have the measures (in particular the level of the intervention price and its impact on the trade arrangements, the direct payments scheme and set-aside) achieved income support at the lowest cost to the Community budget, without creating deadweight effects?

Has the market equilibrium been achieved at the lowest cost to the Community budget, while providing a safety net for producers?

Does this balance involve rational use of all private and public resources?

1. INTRODUCTION TO THE ANALYSIS

1.1 Interpretation of the Question

The policy logic of the CMO measures as it can be derived from Article 39.1 of the 1957 EEC Treaty has as its objectives "…the rational development of agricultural production and the optimum utilisation of the factors of production, in particular labour; thus to ensure a fair standard of living for the agricultural community …. to stabilise markets, …. assure the availability of supplies … to consumers at reasonable prices".

This highlights how, from the very beginning, the rational use of resources was viewed as the starting point from which the attainment of other objectives followed.

This chapter deals in details with an assessment of rational use of resources, cost and cost efficiency of the Cereals CMO measures. Two forms of inefficiency will be distinguished in particular:

1. Deadweight effects
2. Policy inefficiency

In assessing efficiency and cost of the CMO measures, *deadweight* is interpreted in the manner defined in DG Budget's July 2004 document (p. 103), *Evaluating EU Activities*.

"Deadweight effects are effects which would have arisen even if the intervention had not taken place. Deadweight effects can also occur when individuals and groups who are not in the target population end up as recipients of benefits produced by the intervention.

Policy inefficiency is not defined in the same document. We interpret it as all problems associated with high costs in relation to the policy impacts that are attained.

In the case of the Cereals CMO, because this CMO is one of the cornerstones of the CAP, there are few examples of true deadweight, but there are several examples of policy inefficiency.

The *safety net* provided to producers is interpreted as the combination of market price supports plus the direct payments, which provide an assured minimum price and a guaranteed income per hectare, respectively.

The *rational use of public and private resources* is assessed by reference to the different kinds of efficiencies mentioned above and to the estimates of their deadweight and policy inefficiency. A more rational use of public resources is defined as one that reduces deadweight or policy inefficiency.

1.2 The Relevant CMO Measures

On the basis of the 1957 EEC Treaty Council regulations were established on intervention prices, public stocks and the associated border measures. Direct payments and compulsory set-aside were introduced into the CMO in the 1992 and Agenda 2000 reforms

1.3 Judgement Criteria, Indicators and Data Sources Applied in this Section

Table 6.1 lists the judgement criteria employed in this section, together with the indicators that have been used and the sources of data for the analysis.

Table 6.1: Judgement Criteria, Indicators and Data Sources Regarding inefficiencies

Judgement Criteria	Indicators	Data Sources
Distribution of farm income by size of holding and by member state vs. a liberalised outcome	Farm income per family member by member state, by size of holding and by specialisation	FADN database Eurostat DG Agriculture
Changes in crop choice primarily as a result of regionalisation plans	Shifts from cereal crops with lower reference yields to higher yields	FAO DG Agriculture
Welfare effects of set-aside	Cost-benefit analysis of set-aside	FAPRI
Higher costs of managing public stocks vs. private costs or ceasing intervention	Costs of managing intervention stocks vs. private costs or ending intervention	DG Agriculture Case studies
Unexpected effects Changes in value of land Increase in cereal area	High dependence on direct payments Land rental values Larger cereal share of base area	Case study interviews and questionnaires Eurostat

Note: For details of the FAPRI model of the world cereal market see www.fapri.iastate.edu

2. METHODOLOGY

The methodology applies the following approaches to the assessment of inefficiencies:

- Consideration of the development of cereal areas within the base areas eligible for arable aid payments to determine whether base areas were set at levels that permitted farmers to expand their cereal areas and receive full area payments.
- Examination of rye production decisions, applying data about relative profitability from case studies and the levels of intervention stocks and export refunds.
- Assessment from case studies and the Set-Aside Evaluation of land in set-aside that would not have been sown to cereal crops in the absence of set-aside.
- Estimating cost of full set-aside payments on land with a low yield potential.

- Comparisons from the Evaluation report on Set-aside of the "costs of non-production" as a result of set-aside vs. the "costs of over-production" that would have been arisen if there had been no set-aside programme.

- The application of welfare cost-benefit analysis to assess the changes in producer, consumer and government surpluses associated with set-aside and other measures. This applies the methodology in Appendix 9.

- Observation drawn from case studies of the inefficiency created by regionalisation plans that encourage producers to cultivate more costly cereal crops primarily in order to profit from higher reference yields.

- Analysis of the FADN database to determine farm incomes received per family worker on cereal specialist farms in the selected six EU-15 member states.

  This analysis is undertaken by size of holding, applying alternative definitions of income. The results are compared with incomes of other types of holdings, as well as incomes outside agriculture in the same member states. This approach is discussed in Appendix 61, the main points of which are as follows.

  In Chapter 3, the fairness of cereal producers' incomes was judged in relation to the incomes of other agricultural specialists. However, the very major role of the Cereals CMO in the overall CAP means that it may not be appropriate to assess programme efficiency solely in relation to other, smaller, agricultural sectors.

  The budgetary cost of the Cereals CMO in 2003/04 was over 42% of the total product-related elements of the CAP budget (excluding only rural development expenditures) and was more than double that of the next most costly CMO (for beef and veal). Thus, measures that influence cereal producers' incomes play such a central role within the CAP as to become, in effect, a benchmark against which the fairness of other farm specialist incomes are assessed. If so, this makes it difficult to restrict the comparison of producer incomes to a partial one that is restricted solely to the agricultural sector, for fear of logical circularity.

- Comparing the costs of managing public stocks with those of private stockists

- Examining data on cereal land rentals to deduce whether returns to land were increased by the CMO measures and assessing land ownership structures to determine how much of the higher rentals flowed outside agriculture.

3. INCENTIVES FOR RYE PRODUCTION

The system of intervention prices and public stocks caused policy inefficiency by encouraging the production of particular cereals for sale to intervention stores and subsequent re-sale at a loss.

The discussion in Part 2 of this chapter identifies rye as the sole cereal whose intervention stocks remained high from 1995/96 to 2003/04, with the result that rye constituted more than 90% of all cereal intervention stocks at the end of 2003/04. German case study interviews revealed that some producers cultivated rye solely for intervention, and that, without intervention, they would switch to alternatives.

To estimate the extent of the excessive payment made to rye producers via the intervention system, we use the analysis from Part 6 of Chapter 5, which identified the

persistently high level of export refunds for rye, averaging over €40 per tonne in 2001/02-2003/04, when the average refunds on other cereals were below €10.

Comparing the actual effects of the CMO with a situation in which price differentials for rye against other cereals would have mirrored the world market price structure (which would have meant that rye's export refunds were similar to those for other cereals):

- The CMO measures resulted in rye producers being paid at least €30 per tonne more than was required to reflect world market relativities vs. other cereals.

If the rye producer price had been lowered by €30 per tonne, supply would have been reduced as rye farmers switched to more profitable crops. A drop of 25%-33% from the EU-15 average level of 5.5 million tonnes of rye in 1995-2003 is suggested if one applies the experience of Germany since rye ceased to be eligible for intervention.

- If it is assumed that a price reduction of €30 per tonne would cause output to decrease from 5.5 to 4.0 million tonnes, rye producers' incomes would have been reduced by €120-€160 million per annum, but the EU budget would have been saved many of the costs of rye intervention stocks and export refunds.

- EU rye intervention stocks averaged over 3 million tonnes since 1995/96, while exports averaged close to 1 million tonnes. Official data analysed in Part 2 of this chapter reveal that the annual costs of managing rye intervention stocks were over €40 per tonne, while average export refunds were €30 or so above those for common wheat and barley. Therefore, the budgetary costs of providing the same intervention price for rye as for other cereals were €150-€175 million per annum.

- The incentives for rye production created inefficiency by incurring budgetary costs that were €15-30 million per annum higher than the additional income received by farmers.

4. BASE AREAS AND THE EXPANSION IN THE AREAS PLANTED TO CEREALS

In Chapter 1, we noted that examination of the annual series of EU-15 cereal areas suggested that, having declined for the decade prior to the 1992 reform, the cereal area has subsequently stabilised. Unfortunately, the times series are too short and the annual data too volatile to draw significant conclusions from econometric analysis.

In the same chapter, Table 1.4 provides a summary of the trend in the base areas that were declared by member states and which acted as an upper limit to arable aid applications. The same table contrasts this trend in the base area with the actual growth in the cereal areas for which arable aid applications were made.

Cereal areas covered by arable aid applications were 37.1 million hectares in 1995/96

They rose to a peak of 40.3 million hectares in 1997/98, and then fell back slightly in response to higher set-aside levels, before reaching 40.1 million hectares in 2002/03.

They declined to 38.9 million hectares in 2003/04, partly in response to drought.

- This does not suggest that the measures, including set-aside, were a major constraint upon the overall area under cereals.

- It is significant that the combined set-aside and arable crop areas covered by arable aids and set-aside have consistently fallen short of the maximum base area declared by member states.

- This is illustrated in Diagram 6.1, plotting the shares of the base area that were planted to arable crops and put into set-aside.

We believe that this represents policy inefficiency, since the reforms were not intended to use direct payments to promote further expansion in cereal plantings.

Estimating Policy Inefficiency Associated with Over-statement of Base Areas

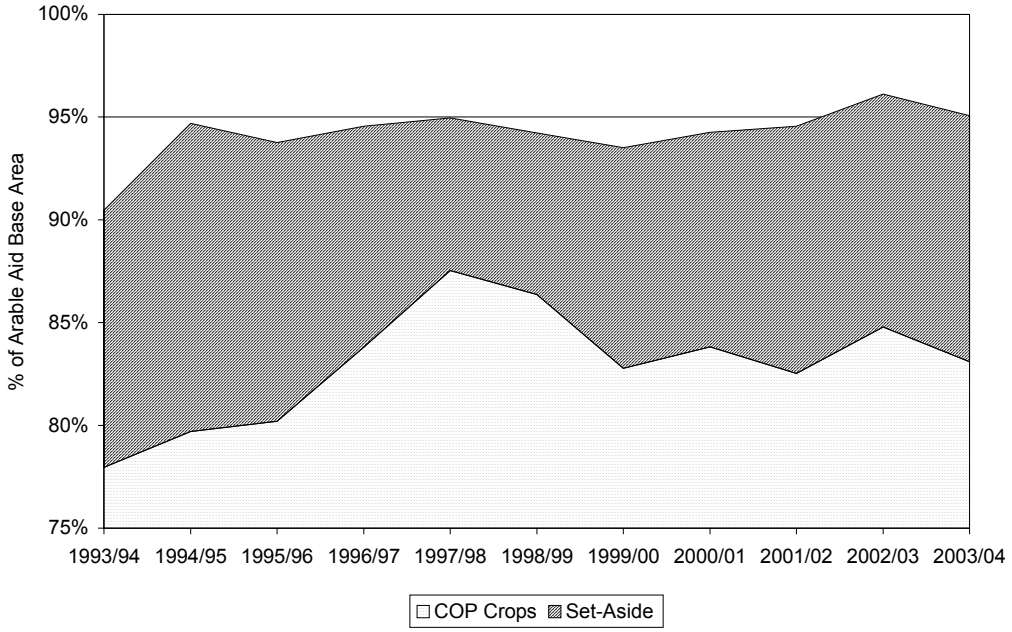
- At the start of the 1992 reform, 9.5% of the base area was not covered by arable aid applications. This percentage soon settled around an average value of 5.5%.

- We suppose that the 4.0% drop from 9.5% to 5.5% was an unintended consequence of the way in which the original base areas were determined[1].

- The resulting policy inefficiency represents 4% of the actual payments on direct payments and set-aside for all arable crops.

- Unintended expansion on this scale would represent total extra budgetary costs on area payments and set-aside of €600 million per annum in 1995/96-2003/04.

Diagram 6.1: Use of the Base Area for Arable Crops, 1993/94-2003/04



Source: Derived from Table 1.4 in Chapter 1

[1] Regional and national base areas were linked to actual 1989/90-1991/92 areas.

Since cereals averaged 87% of the total area covered by arable aid applications from 1995/96-2003/04.

- The policy inefficiency created by the over-statement of base areas and the subsequent over-expansion in cereal areas and the associated set-aside areas is estimated to be 87% of €600 million = €500 million per annum.

5. INEFFICIENCIES CAUSED BY SET-ASIDE

- We consider the inefficiencies associated with set-aside for cereals.

5.1 The Deadweight Caused by Set-aside

Applying DG Budget's definition, set-aside causes deadweight when it pays farmers to set aside land that they *would have set aside* in the absence of the measures.

It is difficult to determine how much of the potential cereal area would have been set aside in the absence of the measures. Interviews with producers revealed that there was a significant, but unquantified, proportion of their set-aside land that would have been kept fallow as part of good rotation practice, even without compulsory and voluntary set-aside.

Moreover, it was evident from the analysis of producer incomes in Chapter 3, Part 1 that there were regions in which, without set-aside payments, set-aside land would have generated negative net value added for the producer. This land may not have been planted to cereal crops in the absence of a set-aside scheme. Unfortunately, there is insufficient data from which to estimate the associated deadweight.

5.2 Policy Inefficiency Caused by Set-aside

Policy inefficiency is more readily quantified in the case of set-aside for cereal producers. Three forms of inefficiency may be identified. These are where:

- Budgetary costs of supply control via set-aside ("costs of non-production" in the Evaluation report on Set-aside prepared for DG Agriculture, January 2002) exceed the budgetary costs of ending supply control and permitting production on the same land ("costs of over-production" in the Set-aside Evaluation report).

- The set-aside payments are higher than those needed to induce producers to set land aside, because low productivity land is selected for set-aside.

- Welfare analysis reveals that loss of producer surplus caused by supply controls exceeds the budgetary savings and any increase in consumer surplus.

5.2.1 The Costs of Non-Production vs. Over-Production

The Evaluation report on Set-Aside provides estimates of the total costs per tonne of the "over-production" of cereals (that would occur in the absence of set-aside) and of the "non-production" of cereals (as a result of set-aside supply controls).

This report calculated the costs of non-production and of over-production for the three main cereals affected by set-aside, barley, rye and soft wheat, in three marketing years, 1993/94, 1998/99 and 1999/2000. In 1993/94 (which is outside the period

covered by this Evaluation), the costs of over-production were significantly higher than those of non-production, meaning that set-aside was more cost-effective than the alternative of no supply control that year. However, in 1998/99 and 1999/2000 the costs of non-production averaged €140.4 per tonne of cereals, as against an average cost of €114.6 per tonne from over-production[2].

However, these costs were calculated including the expansion in the areas planted to cereals as consequence of the base area definition (see Section 4, above).

There are no data for other years to enable one to determine whether these results are representative of the full period under review. However, the results for these three years are in line with the conclusion of the Evaluation study that:

- Producers have adapted their production plans to set-aside. At first, set-aside caused output to drop significantly; but later the drop in output associated with a given level of set-aside fell.

In the absence of comparable data for the other years in the Evaluation period, it is not possible to determine how long the balance of costs in favour of "non-production" in 1993/94 persisted; nor can we know how typical 1998/99 and 1999/2000 were of the balance of costs in recent years.

- From case study interviews for this report, it appears that producers continue to manage their operations so as to moderate their costs of supply control. Therefore, it is likely that the costs of applying set-aside have exceeded the alternative costs of removing this obligation from larger commercial producers.

- In 1998/99-1999/2000, excess costs of "non-production" were €25.8 per tonne. This sum may be applied to the forgone output on set-aside land to determine the overall programme efficiency associated with set-aside in those two years.

As the Set-aside Evaluation mentioned above concluded, it is probable that the costs of non-production would have reached the same level as those of over-production, since these costs would probably not been reduced to the same extent without a significant decrease in stocks that resulted from set-aside.

5.2.2 Making Full Set-aside Payments on Lower Yielding Areas

The Evaluation report on Set-aside calculated that, between 1996 and 1999, set-aside land had a potential yield that was 70.5% of that of the land farmed actively. They derived this by estimating the average yield potential of different classes of set-aside land, in relation to the average for non-set-aside land on the same holding.

The composition of the land that gives rise to the 70.5% of average yields is not known. However, much of this area gives rise to policy inefficiency if it is assumed that set-aside reference yields under regionalisation plans are intended to reflect local yields on rain-fed cereal areas[3].

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[2] From analysis of the data presented in the Set-aside Evaluation, we deduce that almost all the average difference of €25.8 per tonne derived from barley production.

[3] In fact, some regionalisation plans have higher reference yields for set-aside.

- If so, 100% set-aside payment on land that, on average, has a potential yield of 70.5% of non-set-aside land, may be considered to represent policy inefficiency in the application of the CMO measures.

5.3 Welfare Cost-Benefit Analysis of Set-Aside and Other CMO Measures

The modelling analysis of the consequences of set-aside and other CMO measures for producer and consumer surpluses (in the welfare sense) is presented in Appendix 60 and the results are summarised in Table 6.2.

From this analysis estimates are derived that have to be considered including the uncertainties resulting from a modelling analysis not fully adapted for the EU policy framework, for each major cereal of the ways in which the main CMO measures – market support, direct payments and set-aside – affected producer, consumer and EU public sector welfare. These calculations take account of:

- Changes in production, consumption and export volumes,
- As well as changes in prices in the internal and external markets, and
- The budgetary costs of different policy measures.

Table 6.2: The Net Welfare Effects of Measures in the Cereal Sector vis-à-vis a Liberalised Domestic Market as a Result of the CMO Reforms in 1995/96-2003/04 (€ million per annum)

Market Participant	EU	Rest of World	World
Consumer (€ million)	**-3,166**	**-1,847**	**-5,013**
Market Support	-3,166	2,453	-713
Introduction of Area Payments	0	0	0
Imposition of Set Aside	0	-4,300	-4,300
Producer (€ million)	**13,648**	**1,736**	**15,383**
Market Support	3,664	-2,277	1,387
Introduction of Area Payments	10,503	0	10,503
Imposition of Set Aside	-519	4,012	3,494
EU Budget (€ million)	**-12,659**		**-12,659**
Market Support	-792		-792
Introduction of Area Payments	-10,503		-10,503
Imposition of Set Aside	-1,363		-1,363
Net Balance (€ million)	**-2,177**	**-111**	**-2,289**
Market Support	-295	176	-119
Introduction of Area Payments	0	0	0
Imposition of Set Aside	-1,882	-288	-2,170

Source: Derived from the model described in Appendices 9 and 60.

Note: A negative value is a welfare loss; a positive value is a welfare gain.

Table 6.2 combines the estimates of the welfare consequences of the different measures for all cereals in relation to a liberalised outcome where world market prices are assumed to apply. It is evident that, from the perspective of the net balance of the effects of the different measures (summarised in the bottom section of the table):

- The major overall welfare loss to different sectors of the EU as a whole was the welfare loss associated with set-aside.

- Set-aside imposed average welfare costs of €1,882 million per annum within the Community, and most of this (€1,363 million) was borne by the EU budget.

- The beneficiaries from the imposition of set-aside were producers of cereals outside the EU, among whom the US is the most important, who gained €4,012 million from the higher producer surplus.

- The operation of US cereal policy, which relies heavily upon deficiency payments to producers, means that the US government, not individual producers, was the main beneficiary from the increase in producer surplus outside the EU.

The interpretation of the other main elements of Table 6.2 is as follows:

- The average welfare gain to producers as a result of direct payments was €10,503 million per annum between 1995/96 and 2003/04.

- The cost-benefit analysis of market support measures is computed in relation to a situation in which internal prices were at world market levels.

- The net welfare cost of the market support was €295 million per annum.

The overall-cost benefit analysis, therefore, of the welfare effects of the CMO measures may be summarised as:

- A net welfare loss, due to set-aside, of almost €1.9 billion per annum, and

- A net welfare loss of almost €0.3 billion from market support measures.

6. REGIONALISATION PLANS

The discussions of farm incomes, crop choice and the intensification of production in Chapters 3 to 5 reveal that the regionalisation plans implemented in some member states have had a significant effect upon the policy inefficiency associated with the Cereals CMO measures. The influence of the plans was magnified in two member states by the introduction of higher reference yields in the Agenda 2000 reform. The main effects are summarised in the box below.

The Consequences of Regionalisation Plans

- The encouragement of investment in irrigation works and capital equipment to take advantage of higher reference yields on irrigated than rainfed cereals;

- Changes in cropping patterns from crops with lower reference yields to those with higher yields.

Durum wheat is one of the main cereals produced in the Community. However, it was subject to its own 1997 reform, which was followed by expansions in durum wheat areas. The special supplement for durum wheat is part of a measure with a different policy logic from the regionalisation plans.

- Durum wheat was the subject of a separate evaluation in the past and is to be evaluated again soon; therefore, policy inefficiency associated with measures affecting durum wheat is not analysed in the present context.

As we observed earlier, the base area established for arable aids was set well above the actual arable crop areas at the start of the implementation of direct payments and compulsory set-aside; therefore, the budgetary envelope that might have been expected to have acted as a constraint upon the ability of cereal producers to profit from regionalisation plans has provided only a weak discipline in some member states.

Qualitative evidence of inefficiency caused by regionalisation plans is provided by case studies. Some member states applied complex regionalisation plans. Also, average reference yields in two member states were increased in the Agenda 2000 reform.

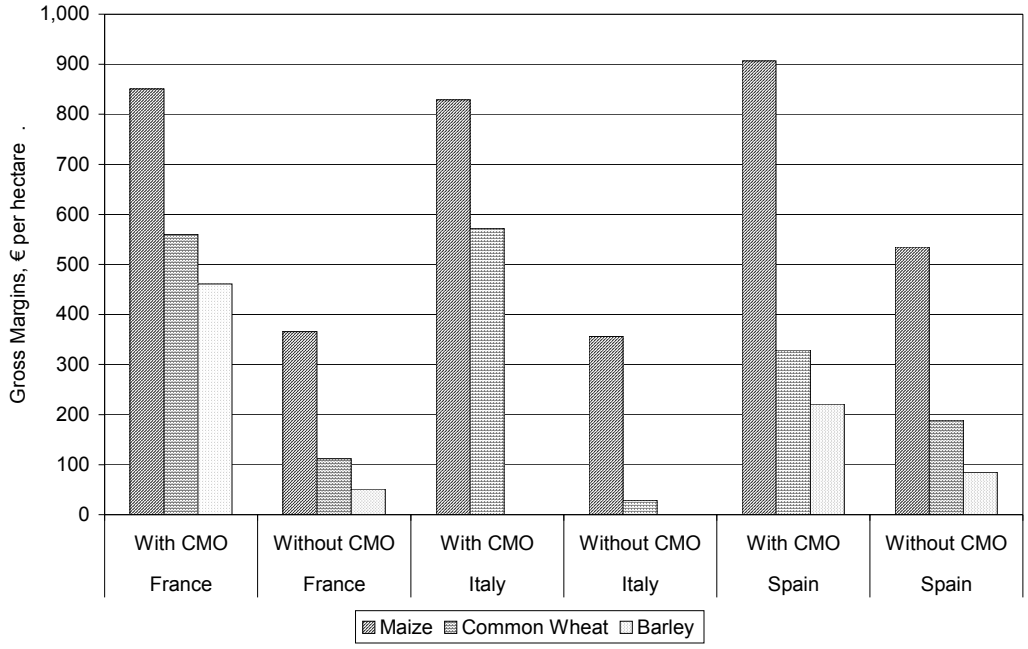
Quantitative evidence is provided in Appendices 29, 31 and 32, which compare gross margins on alternative crops, as well as the effects of the CMO measures upon these margins and trends in cereal crop areas.

Using data from those Appendices, we have prepared Diagrams 6.2 and 6.3.

The former compares gross margins in 2001/02-2003/04 for the three main cereal crops in France, Italy and Spain, both before and after the effects of CMO measures are included (These effects are calculated by combining the effects of border measures and area payments.)

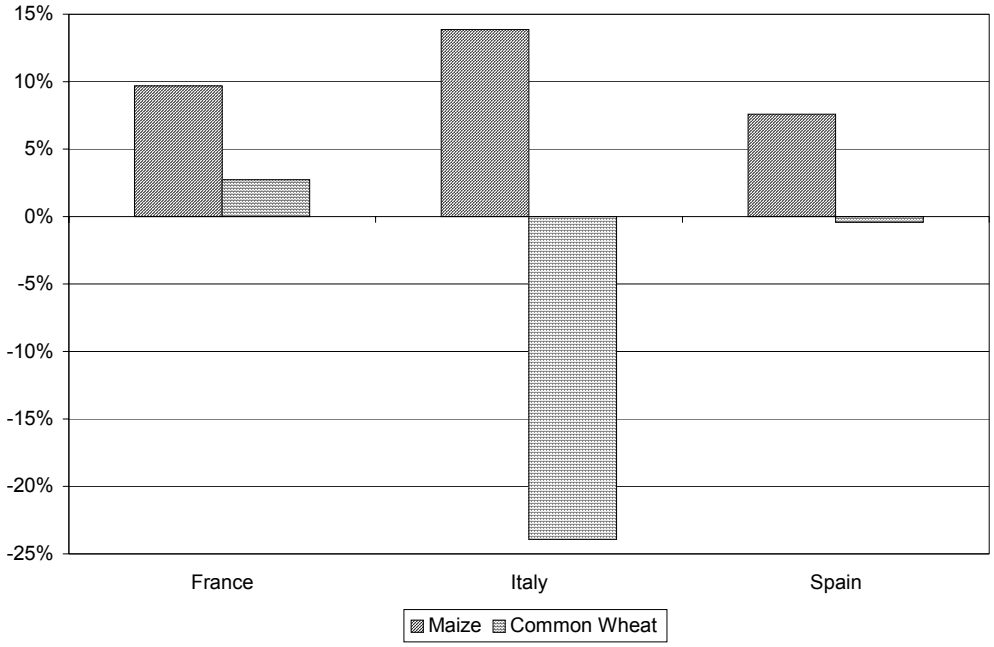
The latter diagram compares the percentage changes in total planted areas of maize and common wheat, between 1995/96 and 2001/02-2003/04.

Diagram 6.2: Comparing Gross Margins for Cereals in France, Italy and Spain, With and Without CMO Measures, 2001/02-2003/04



Source: Derived from analysis of gross margins in Chapter 4, Part 2

Diagram 6.3: Percentage Changes in Maize and Common Wheat Areas, 1995/96 to 2001/02-2003/04



Source: Derived from analysis of planted areas and gross margins in Chapter 4, Part 2

- In Diagram 6.3, maize is consistently the crop generating the highest gross margin, both with and without the CMO measures.
- Yet, the regionalisation plans tend to provide higher reference yields for maize than common wheat or barley.

The CMO measures, by affecting gross margins in the manner described, have given encouragement to producers to expand the areas planted to maize in these three countries, as illustrated in Diagram 6.3.

If one combines the total areas under the three main cereals in these three countries,

- The maize area grew by 10.8%,
- While the common wheat area fell by 1.1% and
- The barley area declined 2.7%.

The policy inefficiency associated with the CMO measures is most directly linked to differences in the benefit that the measures provide to some cereals when compared with the benefit provided to others. Details of this calculation are given in the next box:

Policy inefficiency created by regionalisation plans for maize:

- The weighted average advantage per hectare for maize over soft wheat in member states in our case studies was €25 per hectare in 2001/02-2003/04.

The latter figure seems low. This is because the data are national averages and estimated Italian national reference yields for maize that are below those for soft wheat.

- From the case studies, we believe that the average French and Spanish difference of €77 per hectare between the maize and soft wheat area payments, where these differences are the result of regionalisation plans, is more representative of the true situation in those regions where maize and common wheat compete directly with one another.

We consider that the advantages conferred by the national regionalisation plans create policy inefficiency, and that an appropriate first estimate of the extent of this inefficiency is €77 per hectare for maize.

The major maize producing countries are those that apply complex regionalisation plans. However, there are other member states that apply reference yields that do not distinguish between maize reference yields and those for other cereals.

- €77 x 3.5 million hectares of maize estimated to have complex regionalisation plans = €270 million per annum of policy inefficiency in this manner

7. INEFFICIENT DISTRIBUTION OF THE BENEFITS OF THE CEREALS CMO – ANALYSIS OF FARM INCOMES PER FAMILY WORKER BY FARM TYPE

In this section, we analyse estimates, derived from FADN data, of farm incomes per annual family working unit (FWU) for the six member states selected for case studies.

- This analysis is undertaken to assess whether policy inefficiency is created by the CMO via higher payments to cereal producers than to people with equivalent skills in other sectors.

- We also examine whether inefficiency is caused by inefficient distribution in payments to larger cereal holdings. Further detail is presented in Appendix 61.

Assessing Farmers' Income Relative to Incomes Outside Agriculture

In Chapter 3, we consider the fairness of cereal producers' incomes in relation to the incomes of other types of agricultural specialists. Appendix 61 examines an alternative approach to the assessment of fairness.

This approach is investigated because the major role of the Cereals CMO in the overall CAP means that it may not be appropriate to assess programme efficiency solely in relation to other, smaller, agricultural sectors.

In 2003/04, the Cereals CMO (including all set-aside payments) constituted more than 42% of the total CAP budget expenditure on all product CMOs.

- As such, cereal producers may be considered to play such a central role within the CAP that cereal producers' incomes become, in effect, a *de facto* benchmark against which the fairness of other types of farm incomes are assessed.

- It is suggested that an appropriate alternative basis for comparison for cereal producers' incomes is income levels outside agriculture.

- The starting point for the analysis presented in Appendix 61 is the view that a family member working on a cereal specialist farm has, on average, similar skills to entrepreneurs and managers in industry and services in the same country.

- It may therefore be argued that a fair average income for a cereal holding per family worker in relation to non-agricultural workers would be similar to the average entrepreneurial earnings in these non-agricultural sectors.

Comprehensive data on entrepreneurial incomes are not available for the Community. Therefore, we examine the implications of alternative assumptions regarding the premium that entrepreneurs earn over the average wages in industry and services.

This premium is assumed to be necessary to cover the risks inherent in entrepreneurship and to provide a return to managerial skills.

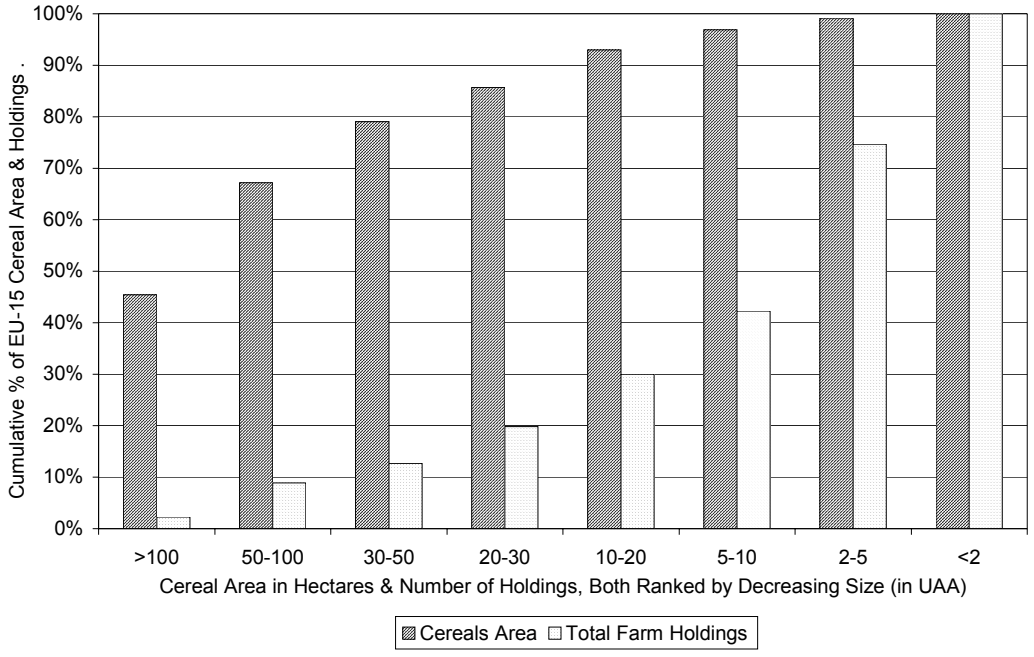
In the analysis, we compare the effects of assuming that equivalent entrepreneurial incomes outside agriculture correspond to premia of 50% over the average level of wages in industry and services in each member state.

- On this interpretation, incomes received by cereal farmers that are in excess of equivalent average entrepreneurial incomes in industry and services, are considered to represent inefficiency in applying the CMO measures.

7.1 The Distribution of Holdings by Size

Diagrams 6.4 and 6.5 present two comparisons of cumulative distributions of EU-15 cereal areas (in terms of decreasing areas planted to cereals alone) with the cumulative distribution of the total number of holdings.

Diagram 6.4: Cumulative Distribution of the Total EU-15 Cereal Areas and of the Number of Holdings, Ranked in Decreasing Size, 2000



Source: Eurostat, Farm Structure Survey (FSS), 2000

Note: The percentages of farm holdings that are between 2 and 5 ha, between 30 and 50 ha and over 100 ha in size have been estimated from other data, since FSS data aggregate some of the categories indicated in the diagram.

The first diagram contrasts the distribution of EU-15 cereal areas with the distribution of numbers of holdings, where both are measured along the X-axis in terms of decreasing overall utilised agricultural area in 2000. It cannot be assumed that the distribution of all holdings by size is the same as the distribution of cereal producers by size, but cereals are widely grown on holdings that produce other products, and therefore the diagram may provide a guide to the distribution of cereal areas by size of holdings.

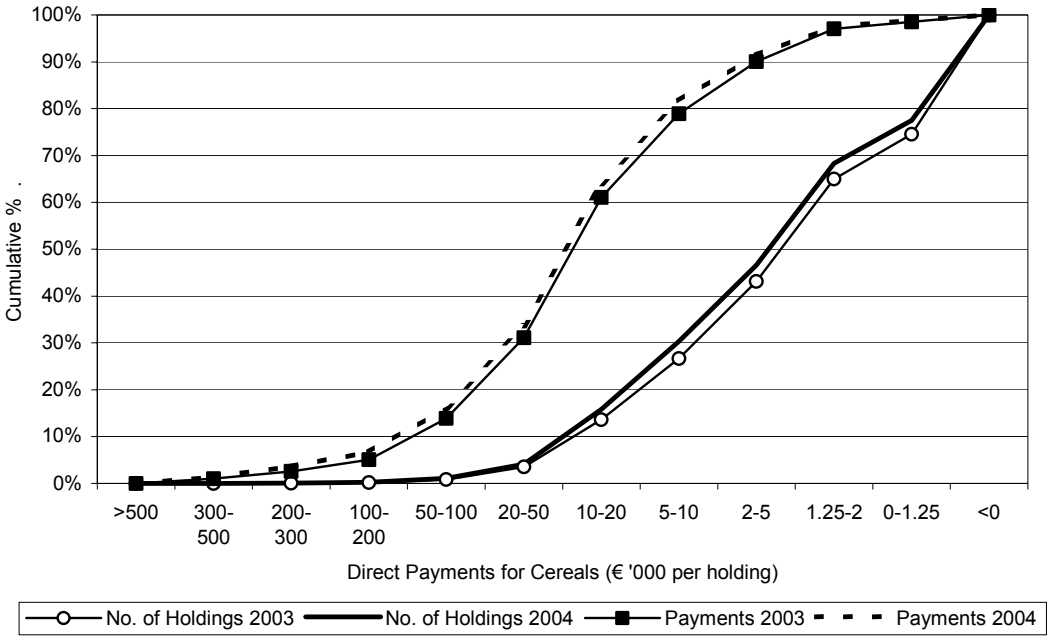
- If Diagram 6.4 may be interpreted in this manner, 13% of all holdings (those with a UAA of over 30 hectares) produce 80% of total EU cereals output.

Diagram 6.5 presents analysis of the DG Agriculture CATS database of payments to beneficiaries from the EU budget. It compares the cumulative distributions of direct payments on cereal crops per holding in 2003 and in 2004 with the distribution of the numbers of holdings in receipt of such payments.

Two points should be noted in interpreting this diagram. One is that area payments are determined by reference yields, calculated on the basis of 1986-1990 data. These may not be a fair reflection of current yields, and are no indication of variations in yields by size of holding. The other caveat is that farms are very rarely cereal monocultures, and the diagram does not take account of non-cereal farm activities (which is the previous diagram was also prepared, taking account of the overall activities on farms).

- If Diagram 6.5 accurately reflects the distribution of cereal holdings by overall size, taking account of differences in yield by size of holding and differences in types of farming, 28% of all holdings produce 80% of total EU cereals output.

Diagram 6.5: Cumulative Distribution of Total Cereal Direct Payments Areas in the Six Selected Member States, Ranked in Decreasing Size, 2003 and 2004



Source: DG Agriculture

In view of the importance of large holdings in overall cereal production, we consider below whether inefficient distribution of direct payments to large producers has led this major group of producers, in particular, to receive incomes that are high in relation to the earnings of non-farm entrepreneurs of a similar level of skill and responsibility.

7.2 Analysis of Incomes per Family Working Unit

- In this section, we compare the outcomes of the CMO measures in terms of cereal farm incomes with levels of entrepreneurial incomes outside agriculture.

- Since large holdings account for the dominant share of cereal production, we analyse their incomes in two alternative ways, when assessing the programme efficiency of the CMO measures:

    - First, where large producers are included within the overall category of cereal producers;

    - Second, where large producers are considered as a group on their own.

Table 6.3 and Diagram 6.6 summarise the effects of the CMO measures upon the average annual incomes of cereal specialist holdings per family working unit (FWU).

In the table, estimates are prepared of the excess ("surplus") of cereal producers' incomes over non-farm entrepreneurial incomes both for all cereal producers, as well as for only large holdings (ESU size classes E and F). The table also indicates the EU-15 budgetary value of payments equivalent to this surplus. The table applies four alternative definitions of income per FWU for cereal specialist producers. These are contrasted with two alternative hypotheses regarding the level of entrepreneurial incomes. The different definitions and hypothesis are summarised in the next text box.

Four Alternative Definitions of Farm Income

- Farm Income (1) = Farm Net Value Added (FNVA).
- Farm Income (2) = FNVA *minus* wages paid to farm workers.
- Farm Income (3) = FNVA *minus* wages *minus* interest payments.
- Farm Income (4) = FNVA *minus* wages *minus* interest payments *minus* land rent.

Assumption Regarding Entrepreneurial Incomes

- Our assumption for benchmarking is that entrepreneurs of medium-sized businesses earn an income 50% above the average wage in industry and services. The absolute values calculated from this assumption have to be handled with care, as the margin of error associated with this estimate is unknown. The 50% assumption is not based on any empirical research.

- Our judgement is that the appropriate estimate of income is Farm Income (3). This is because land rent may represent an element of the surplus created by the CMO. The discussion of land rentals in Section 8 of this chapter reveals that most cereal land is owned by producers, who thus benefit from higher rentals.

The difference between Farm Income (3) and non-farm entrepreneurial incomes – if positive – is interpreted as policy inefficiency ("surplus"), since it represents a transfer of income, either to corporate farms or to family-operated holdings, which raises average incomes of farm operators above comparable non-farm earnings.

This "surplus" is used to estimate the average policy inefficiency caused by inefficient distribution of direct payments.

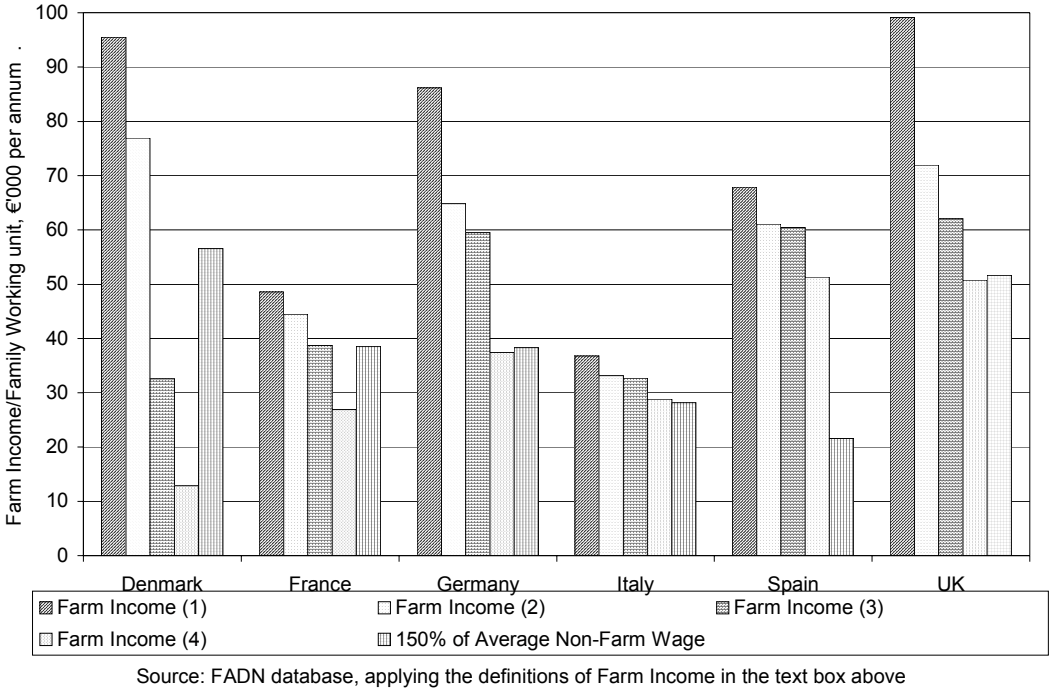
The average surplus per FWU on cereal areas in the full EU-15 is assumed to be the weighted average surplus per FWU for the six selected member states, where the weights are the numbers of FWUs in each country.

The results in Table 6.3 from applying the different assumptions are as follows:

7.2.1 Assuming the Appropriate Benchmark is 150% of Average Non-farm Wages

- Farm Income (3) for large cereal specialist farms was higher than 150% of the average wages in industry and services in five of the six member states in our case studies (Denmark was the sole exception).
- Under the assumptions made the annual budgetary cost of this surplus payment to large cereal producers would average €608 million from 1995/06 to 2002/03.
- Farm Income (3) for all cereal specialists exceeded 150% of average non-farm wages in only three (Germany, Spain and the UK) of the case study member states.
- On average, assuming member states selected for the case studies are representative of the EU-15 as a whole, the average EU-15 Farm Income (3) of all cereal specialists was below 150% of average non-farm wages.
- There was no surplus payment to average cereal producers from 1995/06 to 2002/03, and thus no associated net budgetary cost.

Diagram 6.6: Income per Family Worker on Large Cereal Specialist Holdings



Source: FADN database, applying the definitions of Farm Income in the text box above

Table 6.3: Surplus of Annual Income/Family Worker on Cereal Specialist Farms vs. Non-Farm Entrepreneurial Wages, 1995-2002 and EU Budget Cost (€/FWU/year and € million)

	Farm Income (1)	Farm Income (2)	Farm Income (3)	Farm Income (4)
Average Surplus, €/FWU for Large Farms	23,529	13,647	7,249	-5,367
Budgetary Cost (€ million/annum)	*1,972*	*1,144*	*608*	*-450*
Average Surplus, €/FWU for All Farms	6,962	394	-3,265	-10,593
Budgetary Cost (€ million/annum)	*910*	*52*	*-427*	*-1,385*

Source: Derived from analysis of FADN data.

Note: The surplus is defined as the difference between average payments per family working unit (FWU) and the benchmark level of entrepreneurial earnings in industry and services. The benchmark is expressed as a percentage of average wages in industry and services.

The average values are calculated assuming that the weighted average values for the six member states selected for case studies are representative of the full EU-15, where the weights are the FWUs on cereal holdings in these six member states.

8. LAND RENTALS

Chapter 3, Part 1, includes a discussion of increase in land rentals for cereal specialist holdings, which was considered to be an unintended effect of the CMO measures.

Farm Income (3) does not subtract rental costs from farm household incomes. Therefore, the benefits from increased profitability of cereal farming and consequent higher land rentals as a result of the CMO measures are shared between the farm household and the landowner (for most cereal holdings, they are one and the same).

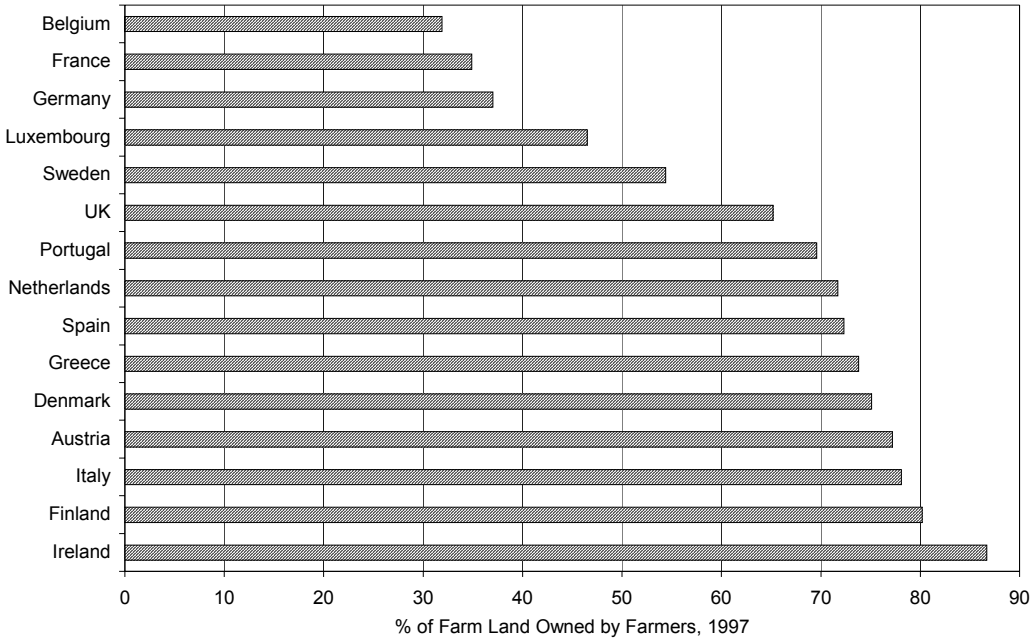
The benefits of higher land rentals are received in part by non-farmers. Increased rental incomes that they earn as a result of the effect of the CMO represent an unintended leakage to non-farmers of the support provided by the CMO.

Diagram 6.7 provides an indication of the extent of this form of policy inefficiency. This depicts farmer households' ownership of all types of farm land in 1997.

The median level of farm household ownership among member states is 72%, but, if one applies national cereal areas as weights to the percentages depicted in the diagram, we estimate that

- The weighted average proportion of cereal land owned by farm households in the EU-15 is 57%.

Diagram 6.7: Ownership by Member State of Farm Land by Farmers, 1997



Source: DG Agriculture, Farm Structure Survey

Leakage of Higher Cereal Land Rentals Outside the Cereals Sector

Analysis of land rentals from FADN data in the six selected member states reveals that average cereal specialist producers' land rentals rose by slightly over €15 per hectare per annum between 1995 and 2002. It is not known to what extent other factors that undoubtedly contributed to this outcome caused the increase in land rentals.

In Chapter 3, we argue that this, in respect of the part attributable to the CAP, is a form of unintended pure profit generated by the Cereals CMO.

Applying this increase of €15 per hectare to all cereal land yields an estimate of the annual policy inefficiency associated with higher land rentals of €550-€600 million. This is an estimate on the unlikely assumption that the increase is fully caused by the CAP measures.

The data depicted in Diagram 6.7 indicate that 57% of overall cereal land in the EU-15 is owned by farm households, with 43% owned by others.

- This means that a maximum of 43% of the overall €550-€600 million per annum of higher land rentals during the period under review benefited outside landowners, rather than owner-farmers.

- Therefore, we estimate that a maximum of €250 million of the policy inefficiency created by the CMO reforms via higher land rentals represented an unintended leakage of the effects of the Cereals CMO to outside landowners.

- It should be noted that the CMO affected land rentals before the 1992 reforms, in view of the central role of the cereals sector in EU agriculture. Unfortunately, we do not have comparable detailed analyses of land rentals on cereal specialist holdings prior to 1995 from which to assess the likely influence of the Cereals CMO upon land rentals during this earlier period.

9. THE COSTS OF THE INTERVENTION SYSTEM

Part 2 of this chapter and Appendix 59 examine the budgetary costs of management of the intervention system. The relevant conclusions are summarised below:

Budgetary Costs of the Intervention System

- A point made in interviews was that the actual charges quoted for public storage were higher than private rates because of the conditions associated with the storage of intervention stocks. However, no robust empirical information is available to estimate the difference.
- One possible explanation of the high estimated technical costs of storage is that it was reported in interviews that the rules governing the management of intervention stocks and, in particular, the uncertainties about the period in which intervention stocks will be held in store, mean that some providers of approved storage facilities may negotiate an extra payment for capacity that is not filled, but which is available when required.
- The financial costs, of 3% of the intervention price, were judged to be reasonable.
- The cost of the depreciation of stocks, which averaged 20% of the intervention price, is excessive. Private stockholders are able to restrict these costs in ways not open to public stocks, and to benefit from stock rotation within a year.
- A view expressed in interviews by traders was that private sector forms of stock management would be able to hold the annual costs of depreciation to 10%.
- "Other costs" (mainly capital gains on the sale of public stocks) yielded an average net profit of 8% of the intervention price. All but 0.2% of this figure arose from capital gains on stocks of maize and sorghum alone in 1995/96.
- For the three main cereals in public stocks, barley, breadmaking wheat and rye, there was a net loss under this heading.
- The conclusion drawn in Part 2 of this chapter is that the 1995/96 experience regarding maize and sorghum does not appear representative of the general situation regarding "other storage costs".

This implies that public stock management was not the least cost means of using the intervention system as a vital component of the safety net within the CMO measures.

The extra costs of the public management of these stocks in relation to private sector costs for performing the same role arise from excessive technical costs of storage and excessive depreciation costs. These are estimated in the next box.

The excessive technical costs of storage cannot be quantified with precision.

The depreciation cost of public stocks is raised by restrictions upon stock rotation.

Private traders indicated that they would expect to be able to hold depreciation costs to half of the observed level of costs, partly by operating without the restrictions imposed upon the management of public stocks, such as the refusal to permit stock rotation.

- This corresponds to a cost of at least €10 per annum per tonne in stocks.

- Subject to the caveat above about the true average level of intervention stocks, excessive depreciation costs were of the order of €100 million per annum.

The 'other public storage costs' category represented, on average, a source of income.

- However, this favourable budgetary outcome was almost entirely (98%) due to an exceptional gain in 1995/96 for maize and sorghum. This is not representative of normal conditions and is not included in our estimate of policy inefficiency.

- The combined policy inefficiency in the management of public stocks was €100 million of depreciation and an unknown figure on account of technical costs.

10. CONCLUSIONS

The discussion in Chapter 3 demonstrates that CMO measures are broadly successful in providing stable incomes for cereal producers, with a safety net at times of low world market prices, and in generating fair incomes, when these are assessed in relation to other types of farms. In this chapter, we analysed the extent to which the measures worked in a way counter to a rational use of public and private resources by creating deadweight, policy inefficiency, unintended effects and classical inefficiency.

In terms of the judgement criteria proposed for this discussion, our conclusions are:

- Because of the scale of the cereals sector within the CAP, we concluded that an appropriate basis for assessing policy inefficiency in the CMO measures was to contrast cereal producers' incomes per family worker with entrepreneurial incomes outside agriculture.

- We analysed the effect of assuming that non-farm entrepreneurs earn average incomes that are 50% above the average annual wages of workers in industry and services. The premium reflects risk and managerial responsibility.

- We conclude that, applying this assumption, incomes on large cereal holdings in many regions exceeded non-farm entrepreneurial incomes; but there is no policy inefficiency if we consider all cereals producers as a group.

- Depending upon how one assesses the distribution of farms by size, 80% of cereal output is produced by 20% +/- 8% of the total number of cereal producers.

- Therefore, we analyse the effect of considering large producers alone. Where a 50% premium is considered to be appropriate for entrepreneurial incomes, it results in inefficiency of €600 million created in payments to large producers alone.

- Rye production was over-stimulated by the CMO measures. This stimulus, caused by applying the same intervention price for rye as for other cereals, added €120-160 million to rye producers' incomes. However, the budgetary costs of providing this income boost were €150-€175 million per annum.

- Regionalisation plans stimulated changes in crop choice from cereals with lower reference yields to others with higher reference yields, notably maize. This caused policy inefficiency estimated to average €270 million per annum.

- Set-aside caused deadweight on land that would have been left fallow in the absence of set-aside.

- It also caused inefficiency policy inefficiency in 1998/99 and 1999/2000, by having a higher budgetary cost for "non-production" than would have been the case if there had been no set-aside and consequent "over-production". However, the budgetary cost of "over-production" was lower than that for "non-production" in 1993/94. We cannot conclude whether there was, on average, policy inefficiency in this sense during the period under review.

- Another form of policy inefficiency was full set-aside payments on low productivity land.

- In addition, welfare cost-benefit analysis revealed that set-aside imposed substantial policy inefficiency via the loss of producer surplus caused by supply control. Non-EU cereal producers (and, in particular, the US government) were the main beneficiaries from set-aside, which raised world market prices.

- Management costs of intervention stocks, when contrasted with private costs of stock management, were judged to be high. This was largely because the CMO requires public stocks to be kept physically intact, adding to stock management costs. Policy inefficiency caused by this restriction was €100 million a year.

- Two unexpected effects were, first, the over-statement of the base areas for arable aid payments, which led to a rise in cereal areas since the start of the MacSharry reform. This was estimated to have caused policy inefficiency of €500 million per annum in the application of the CMO.

- The second unexpected effect was an increase in average land rentals for cereal specialist holdings. This gave rise to a leakage of maximum €250 million per annum in the form of higher rental payments to landowners who were not the farm operator.

- It has to be noted that due to different sources and methods employed, as well as the possibility of overlapping measurement of inefficiencies, the amounts mentioned cannot be added together.

Chapter 6, Part 2: Management Efficiency

Have the arrangements for managing and administering intervention been efficient and will they be sustainable after enlargement of the European Union in May 2004?

1. INTRODUCTION TO THE ANALYSIS

1.1 Interpretation of the Question

Intervention is interpreted here in its narrower technical sense, as the management of intervention stocks. The logic behind the CMO measures regarding the system of intervention is stabilisation of the market, achieving this objective by buying surplus supplies of eligible qualities of cereals to provide price supports and a safety net to producers, and releasing these stocks in an orderly manner.

The intervention system is also intended to provide inter-temporal stability to the internal market, via monthly price increments to induce private holders of cereal stocks to sell them over several months, rather than at harvest. In this role, the system provides price signals, without necessarily requiring the accumulation of public stocks.

The intervention logic also reflected the fairness objective of the Treaty of Rome, in two respects. One was the adoption of a single intervention price for all cereals from 1993/94, and the other is the policy of a single intervention price throughout the Community. (This is unlike the situation in the sugar CMO, for example, in which deficit member states have higher intervention prices than surplus states.)

During the Agenda 2000 reform, the Management Committee used its discretionary powers to tighten the quality standards of cereals eligible for intervention, to improve the competitiveness of domestic cereals in internal and external markets. The Mid-Term Review, with evidence of a persistent lack of competitiveness of local rye output, removed it from eligibility for intervention.

In this discussion, *efficiency* is defined in terms of

- The budgetary cost of buying, managing and selling intervention stocks,
- The fluidity of the market, and
- The difference between internal market prices for cereals and intervention prices

The last indicates the extent to which intervention prices act as a safety net, with internal market prices supported at levels close to intervention prices.

Sustainability is defined in relation to the ability to prevent the budgetary costs of managing intervention and the height of the barriers to the fluidity of the internal market from increasing significantly after enlargement.

1.2 The Relevant CMO Measures

The CMO measures most relevant to this subject are those that relate to market supports, in particular, the system of publicly owned intervention stocks and the associated intervention prices and quality specifications for stocks sold for intervention.

1.3 Judgement Criteria, Indicators and Data Sources Applied in this Section

Table 6.5 lists the judgement criteria that we have applied, together with the indicators that have been used and the sources of data for the analysis.

Table 6.4: Judgement Criteria, Indicators and Data Sources Regarding Intervention

Judgement Criteria	Indicators	Data Sources
Achieving inter-temporal efficiency	Returns to private storage Producer prices in surplus regions	DG Agriculture
Avoiding artificial scarcity in the market	<5% above intervention prices when world prices are low	
Public stocks act as a safety net	Stocks don't accumulate over cycle	Case study interviews in EU-15 member states, Hungary and Poland
Management costs of stocks held down	Comparison of private sector costs	
Inter-spatial fluidity of the market	Efficiency (defined in Ch 5, Pt 4)	
Limiting total stocks after enlargement	Experience in 2004/05	

2. INTER-TEMPORAL EFFICIENCY

The inter-temporal efficiency of the monthly increments in the intervention price, as part of the CMO measures, has been discussed in Chapter 5, Part 2. The issue considered there is whether the monthly increments over-compensated private holders of stocks for their costs of storage during months for which monthly increments apply.

The analysis of monthly differentials in UK prices for feed wheat[1] revealed that

- In the period until 1995/96, the monthly increments over-compensated traders for storage costs,
- As a result, the monthly increments determined the forward price premium.

- Until 1995/96, therefore, intervention price measures artificially raised the internal price during the months when monthly increments were made.

Subsequently, reductions in the monthly increments have made it less easy to earn a profit from private sector stockholding while these increments apply, but UK evidence of the timing of sales into intervention suggests that it was still profitable for sellers to hold back these sales as long as possible.

- The Mid-Term Review of Agenda 2000 halved monthly increments, which will reduce appreciably inter-temporal inefficiency in the earlier forms of the CMO.

3. THE POSSIBLE CREATION OF ARTIFICIAL SCARCITY

Appendix 57 presents analysis of cereal producer price behaviour since 1992 in the six selected member states, as a percentage of the intervention price. These are compared with the average export prices of EU cereals, also expressed in relation to the intervention price.

[1] This was selected because monthly futures market quotations exist over the entire period under review.

This is done to determine how producer prices behaved when the intervention price was above the export price, when the management of intervention stocks would be expected to have a potentially important influence upon the internal market price.

Appendix 57 focuses upon producer price behaviour in member states that are surplus producers; they are most directly affected by sales to intervention stores. The analysis is designed to reveal whether the CMO's market support and border measures created an artificial shortage of cereals in the internal market and raised prices.

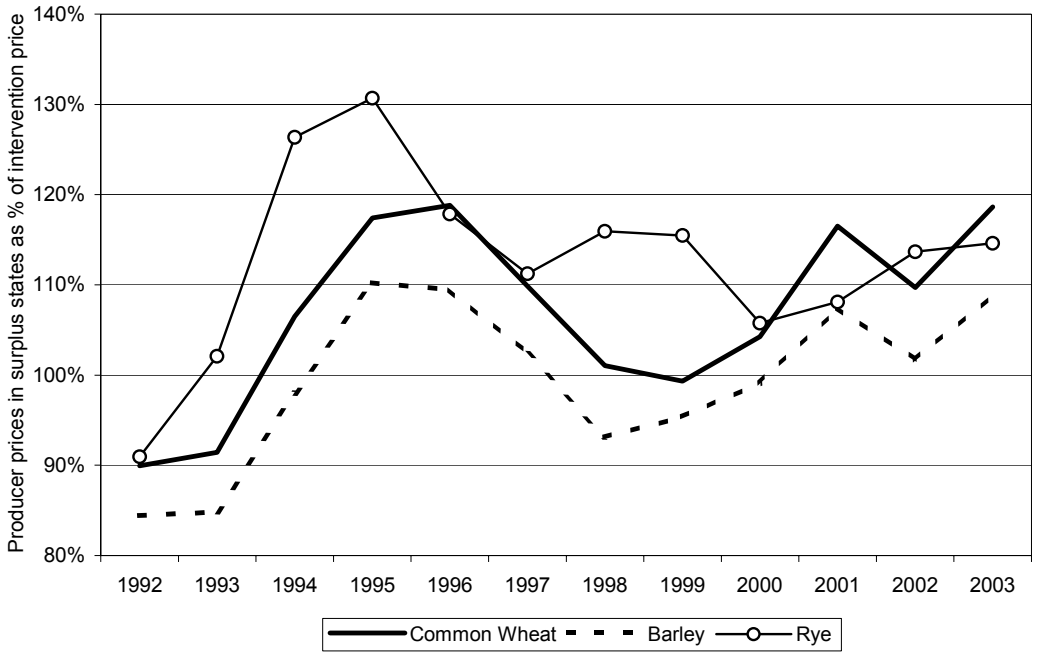
Diagram 6.6 depicts the movements in common wheat, barley and rye producer prices in these surplus regions, as a proportion of the intervention price, from 1992 to 2003.

There were only six years (1992-95 and 1998-99) when common wheat and barley export prices were below the intervention price. When the producer price movements in surplus states are compared with export prices in the Appendix, it emerges that in 1992-94 the system was efficient for both common wheat and barley, and was again efficient in 1998 and 1999, in the sense that average producer prices were below a notional ceiling set 5% above the intervention price, but in 1995, the system briefly became inefficient.

- Judged by producer price behaviour, the intervention system is considered to be efficient for common wheat and barley, since the criterion was satisfied in five of the six years when export prices were below intervention prices.

- For rye, by contrast, intervention prices were above export prices every year since 1992, and producer prices were more than 105% of the intervention price from 1993-2005; hence, the rye intervention system was not efficient after 1993.

Diagram 6.6: Average Producer Prices in Surplus Member States for the Main Export Cereals as a % of the Intervention Price in Calendar Years 1992-2003



Source: EU AgrIS database, using the producer price measure entitled "Unit value at producer price"

4. THE CYCLICAL BEHAVIOUR OF PUBLIC STOCKS

Appendix 58 reviews the behaviour of intervention stocks since 1983/84, to determine whether they acted as a temporary safety net during periods of cyclical over-supply and price weakness, and were then drawn down to low levels as the cycle ended. Such behaviour is interpreted as efficient management of these stocks. If, in contrast, stocks remain at a fairly high level even at the low point in the cycles, this is interpreted as a sign that the system has been managed inefficiently.

Comparisons of changes in cereal stocks reveal that the management of intervention was inefficient by this criterion for the most important cereals held in intervention, namely breadmaking wheat, barley, rye and durum wheat, prior to 1992/93. Only maize and feed wheat stocks were managed in an efficient manner from 1983/84 to 1992/93.

From 1992/93, both durum and feed wheat were of minimal importance in terms of their intervention stocks. Since that date, the CMO managed intervention for breadmaking wheat, barley and maize efficiently, with stocks reduced to very low levels, by historical standards, during the troughs to the stock cycle.

For rye, however, the inefficiency in intervention management persisted until 2003/04. Therefore, the Agenda 2000 Mid-Term Review's decision to remove rye from eligibility for intervention was a direct way of ending this failing of the measures.

5. MANAGEMENT COSTS OF THE INTERVENTION SYSTEM

Appendix 59 analyses the budgetary costs of the management of the cereals intervention system. (These figures are not the full costs. Costs borne by member states, such as administrative costs and some storage refunds, are not included.)

The budgetary costs include an item "other public storage costs" that varies widely from year to year and is, on average, negative, i.e., a source of revenue. This reflects the actual profits generated when intervention stocks are sold at prices above the value estimated when preparing the year's budget. The Appendix focuses upon three more stable elements of intervention costs: "technical costs of public storage", "financial costs of public storage" and "depreciation on purchase". The percentages of the intervention price that these items represent for the main cereals, as well as for all cereals combined, are depicted in Diagram 6.7.

- For technical costs, case study interviews revealed that refunds to member states to cover intervention stock storage should average less than 15% per annum of the intervention price. Hence, 20% is high, implying, over €5 per tonne to cover other technical expenses, such as quality control and inspection costs, for which interviews suggested that amount borne by the Commission should be small.

- It was also noted in interviews that, as intervention stocks are often held for long periods, extending to several years, warehouse operators do not like to store public stocks, since it restricts their freedom of manoeuvre in storing and trading cereals during intervening crop years. As a result, storage charges are higher for intervention than for private sector commercial companies that rotate their stocks.

- The financial costs, equivalent to 3% of the intervention price, appear reasonable in relation to the cost of credit to the Commission.

- Depreciation in the value of stocks held in intervention, averaging close to 20% of the intervention price, too, is excessive by the standards of commercial traders.

- There are two main reasons for this: one is that stocks held by private traders tend to be sold within a crop year. Traders restrict depreciation by selling stocks (which are often hedged in forward markets) with the benefit of monthly premia in the forward market; by contrast, public stocks are often held from one crop year to another.

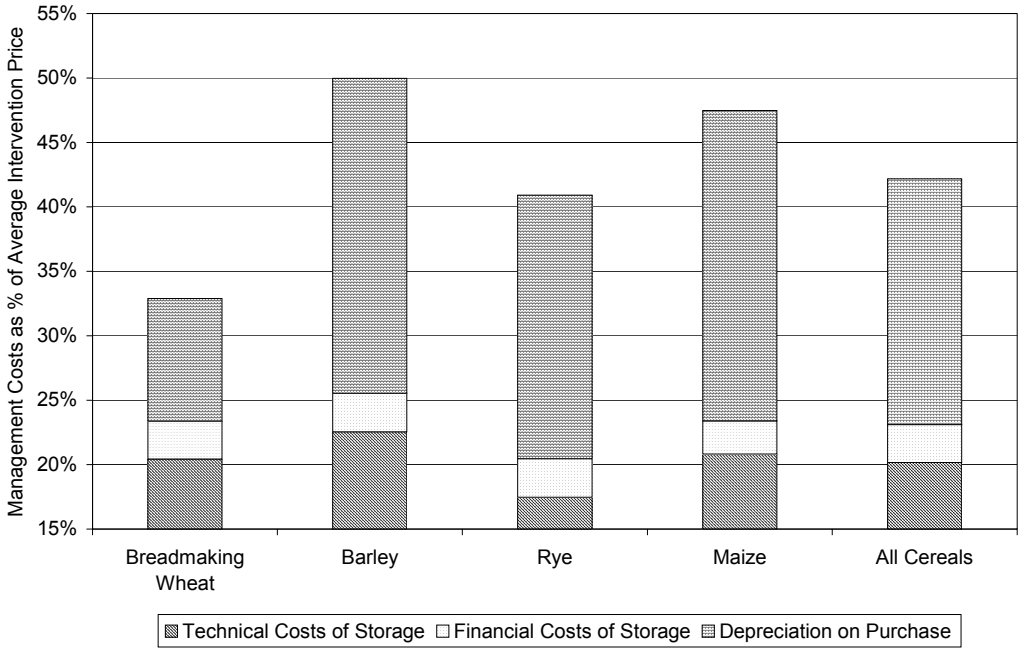
- The other reason for high depreciation costs is that the Community fails to rotate its stocks in a manner that would be employed by private traders. The procedure whereby public stocks must be kept physically intact and separated from other stocks during intervention means that, despite actions that should be taken by an approved warehouse operator, such as fumigation, the quality of cereals is likely to decline if held in intervention for lengthy periods.

- This depreciation costs are partly offset via income earned under "other public storage costs". The average gain was 8.1% of the intervention price, but this was heavily influenced by an exceptional situation in 1995/96, when a sudden rise in the world market caused large gains to be realised on the stocks of maize and sorghum in that one year.

- Maize and sorghum earned over €79 million in "other public storage costs" in the 1995/96 budget year. This represented 98% of the entire earnings under other public storage costs for all cereals from 1995/96 to 2003/04. For the three main cereals held in public stocks, namely breadmaking wheat, barley and rye, there was a net loss of €58 million when stocks were sold over the nine budget years.

- The 1995/96 experience regarding maize and sorghum does not appear representative of the general situation in relation to other public storage costs.

Diagram 6.7: Composition of Average Annual Costs of Managing Intervention Stocks by Cereal as a % of the Intervention Price, Budget Years 1995-2003



Source: Derived from DG Agriculture budget data

6. THE INTER-SPATIAL FLUIDITY OF THE MARKET

Part 4 of Chapter 5 analysed the fluidity of the internal market. It assessed how the intervention price system, with a single intervention price for all member states and all cereals, restricts the flow of cereals within the internal market.

Simulations of transport algorithms in that chapter revealed that the existence of surpluses in some regions does not necessarily lead to flows to deficit regions. The intervention system means that internal market price differentials often do not reflect transport cost gradients. Instead, intervention stocks accumulate in surplus areas.

7. THE SUSTAINABILITY OF THE SYSTEM AFTER ENLARGEMENT

Two new member states, Hungary and Poland, included as case studies in this report, provide valuable insights into the sustainability of the intervention system. Both are sizeable cereal producers with long experience of government intervention buying, and both accumulated intervention stocks during the 2004/05 marketing year.

Hungarian accession was marked by a record domestic crop, which was triggered by cereal intervention prices that were higher and less risky than the prices in the previous domestic system aligned to world market levels.

- Higher cereal prices reduced the competitiveness of the local livestock sector and weakened cereal demand
- Many of its traditional cereal export markets in the Balkans became closed to it under bilateral agreements with the EU.
- The demand for intervention caught the authorities by surprise. It took until mid-2005 before the availability of approved storage capacity caught up with the demand. In the meantime, producers unable to store their own output were forced to accept prices 20% or so below the intervention price.

In Poland, the government played a major role in cereal marketing prior to accession; therefore, the new system retained many familiar elements, though producers' reliance upon sales to public stores was reduced.

- Hungary's transitional difficulties in approving adequate intervention warehouse capacity were much less of an issue in Poland.
- Also, the access that opened up for Polish exports to other member states of cereal-using products, like meat, gave a boost to the internal demand for cereals.

Despite differences in their transitions to the EU intervention arrangements and in their proximity to the sea, Hungary and Poland shared specific problems in the management of intervention with other cereal-surplus new member states, like the Czech Republic.

The freight and port cost disadvantage that they suffer when supplying the main export markets means that they are unable to compete with member states like France or Germany in supplying cereals to meet free market export tenders.

Furthermore, the application of one intervention price throughout the EU is a major barrier to fluidity of the internal market, as Chapter 5, Part 4, revealed, by removing the price gradients needed to entice surpluses away to other member states. Therefore,

intervention stocks represent the only major alternative to sales to the local market, since private sector exports, whether to intra- or extra-EU countries, are uneconomic.

Unless the world price is far above internal prices or the Commission is prepared to subsidise exports from intervention stocks, to third countries or internally (as with the €60 per tonne freight subsidy in mid-2005 to take Hungarian cereals to Spain and Portugal), intervention stocks may be expected to accumulate in these new member states, with the supply control mechanism of compulsory set-aside not available as a policy option, since the new member states are not included in the set-aside scheme.

Sales to private stocks are possible largely because traders are able to buy directly from producers at a discount to sell later for intervention. Thus, producers accept lower prices in order to receive ready payment, as against the alternative of waiting two months to complete the paperwork for sales to intervention plus a further month before payment is made, as well as the need to offer a minimum of 80 tonnes of cereals.

Alternative procedures for the management of surpluses, such as warehouse receipts or the private stockholding adopted for the storage of pig meat, would seem to offer a cheaper form of stock management than the current system of intervention stocks.

8. CONCLUSIONS

1. Inter-temporal efficiency

- Inter-temporal efficiency of the intervention system was low during the 1992 reform. Profitable opportunities existed to store cereals privately at minimal risk.
- The profitability of such storage was reduced in the Agenda 2000 measures, but it still was profitable for traders who also owned warehouse capacity to store, knowing that intervention provided a (rising) safety net. By halving the monthly increment, the Mid-Term Review reduced this inefficiency considerably.

2. Avoiding Creating Artificial Scarcity in the Internal Market

- In five of the six years in 1992-2003 when intervention prices were above export prices, the management of intervention stocks and border measures avoided creating artificial scarcity in the internal market for common wheat and barley. Producer prices in surplus areas were less than 5% above the intervention price.
- For rye, however, the intervention system was not efficient, using the same criterion. This will be remedied with rye's removal from eligibility for intervention.

3. Stocks as a Safety Net

- During the MacSharry and Agenda 2000 reforms, intervention for breadmaking wheat, barley and maize was managed efficiently, with stocks reduced to very low levels in the troughs to the stock cycle. Rye was again the exception.

4. The Budgetary Costs of Managing Intervention

- Technical costs averaged 20% of the intervention price from 1995 to 2003. This is over €5 per tonne above the actual refunds paid to member states for storage.
- The financial costs, equivalent to 3% of the intervention price, seem reasonable.
- The depreciation of stocks averages an excessive 20% of the intervention price.

- This reflects out-dated rules about physical stock management. Warehouse receipts, widely used in the private sector, may not be used. Problems in applying the new system in Hungary were exacerbated by the inability to use warehouse receipts in conjunction with appropriate inspection procedures to manage stocks.

- The final budget item, other costs, is on average a source of income equal to 8% of the intervention price. It reflects gains made when sales from intervention achieve higher prices than those estimated when budgets are drafted.

- All but 0.2% of this 8% net income is the result of 1995/96 gains on maize and sorghum stocks. These do not appear representative of the general situation in relation to other public storage costs

5. Enlargement and the Fluidity of the Cereals Market

- The management of the system, with one intervention price for all regions and cereals, is an obstacle to the inter-spatial fluidity of the market.

- The experience after the enlargement of the Community was inevitably coloured by problems of transition as Hungary became a major holder of the Community's cereal intervention stocks, but abstracting from those transitional problems, it is evident that the system in its existing form is not sustainable.

Chapter 7: Conclusions and Recommendations

This Evaluation covers the cereals sector from 1995/96 to 2003/04, a time of major reform in the Cereals Common Market Organisation (CMO). Cereals are central to the CAP, as the major arable crop, accounting for a large part of the CAP budget.

- In 2003/04, the cereals area in the EU-15 totalled 11.4% of the total EU-15 land mass and 28.4% of the total utilisable agricultural area of the EU-15 states.
- The budgetary costs of the Cereals CMO[1] totalled €16.85 billion in 2003/04. This sum represented
    - 42.3% of the budgetary cost of all the CMOs for agricultural products,
    - 36.2% of the CAP budgetary cost of €46.51 billion that budget year, and
    - 17.4% of the total EU budget of €96.96 billion.

1. THE CEREALS COMMON MARKET ORGANISATION

The balance of the cereals sector was transformed by the CMO measures in the 1970s and 1980s, the effect of which was to turn the EU from a cereal importer into a major exporter after 1982. The changes met many EU Treaty objectives, but raised other issues. Among the more important was the fall in domestic cereals demand, notably for feed, since local cereal prices remained high in relation to competing feed ingredients. Another concern was budgetary. Sizeable supply surpluses led to budget costs in the form of export refunds and public storage of cereal stocks sold into intervention.

Two reforms, in particular, played a key role in the evolution of CMO measures since 1992: that year's MacSharry reform and the Agenda 2000 reform from 2000. Since 2004/05, the year after the end of the period covered by this Evaluation, the reforms agreed in the Mid-Term Review of Agenda 2000 have started to be implemented.

Because of the complexity of the cereals sector, with a large number of different cereals grown under widely varying conditions throughout the Community and with cereals at the heart of the arable farm economy, evolution, not revolution, was the strategy adopted towards the CMO measures. The reforms to the CMO approved in 1992 and in 1999 affected virtually all the major components of the CMO measures.

- Via reductions in the cereal intervention price, market support was lowered to improve the competitiveness of EU cereals in internal and external markets.
- Border measures, such as import tariffs and export licensing, were adapted to be consistent with lower market support and WTO export subsidy commitments.
- Direct payments were introduced, initially as compensation to producers of cereals, oilseeds and protein (COP) crops for the cuts in market support. This was done in order to provide fair and stable incomes for producers, with member states determining the regionalisation plans applied to calculate direct payments.

[1] The costs of the CMO include all budget items (budget lines B01 to B10) specifically linked to cereals, including set-aside payments. We include set-aside payments in full because they are a supply control measure, which was introduced to limit the output of cereals, rather than output of other arable crops.

- Compulsory set-aside was also introduced, solely for larger ("commercial") farmers, to control supply and manage export surpluses.

- Voluntary set-aside measures continued to be available for all producers.

- Differences in area payments per tonne for individual COP crops and set-aside were reduced, though not eliminated entirely, during the life of the two reforms.

- Within the technical aspects of the management of the Cereals CMO, the quality standards of cereals eligible for intervention were raised.

2. THE METHODOLOGY APPLIED TO THE EVALUATION OF THE CEREALS CMO

The complexity of the cereals sector and of the CMO measures, as well as the frequent changes in policy and the limited number of years covered by this Evaluation, all make it difficult to achieve significant results by means of econometric analysis. Therefore, although some econometric techniques are applied, the primary approach adopted to analyse the effects of the CMO measures is micro-economic.

The analysis in this report focuses upon different types of producers and end-users, with detailed research undertaken in selected regions in the six leading cereal producing EU-15 member states and in the two leading cereal producing new member states, namely Denmark, France, Germany, Italy, Spain and the UK, plus Hungary and Poland. These member states and regions have widely differing production structures, as well as a diverse range of cereal crops, which makes them valuable case studies.

An important element of the research was a series of structured interviews in the eight member states, covering a wide range of individuals and institutions actively involved in the cereal sector. In all, 129 such interviews were completed, and those interviewed included representatives of the farming, processing, trading, transport, warehousing, end-user, feed, academic and government sectors.

Samples of cereal farmers were selected in the six EU-15 member states, and lengthy questionnaires were submitted to them. 290 completed questionnaires were obtained.

One other important methodological technique applied to the research is:

- The use of transport algorithms to assess the effect of freight costs and the system of intervention stocks upon price differentials within the EU internal cereals market and simulate the implications of changes to intervention rules.

In the sections below, we review the main conclusions obtained from the analysis in Chapters 3 to 6, before providing recommendations drawn from these conclusions.

3. PRODUCERS' INCOMES

The CMO reforms after 1992 included a combination of price reductions and direct payments, as well as supply control measures applied via compulsory set-aside.

3.1 The Fairness of Incomes

Different lines of analysis employed in this report – including examination of FADN data on the farm net value added of cereal specialists, national data on cereal producers' incomes, and the distribution of cereal production by size of holding — imply that in

each member state the incomes of cereal specialist farmers were broadly similar to those of other types of farm specialists with similar sizes of holdings. Also, the stability over time of cereal producers' incomes was comparable to that of other producers.

- Within the agricultural sector, cereal farmers' incomes are considered to be fair, in terms of both their magnitudes and volatility, when contrasted with values for farms of a similar size but different specialisations in the same member state.

- Major differences were observed, however, between average incomes by size of farm in every member state. These differences dwarfed the differences between member states for farms of a similar size.

- With 80% of cereals output supplied by approximately 20% of cereal farms[2], income differences by size of holding have important structural consequences.

When assessing the efficiency of the Cereals CMO in providing income support to producers, we consider whether it is appropriate to compare cereal producers' incomes solely with incomes from other specialist producers. The Cereals CMO accounts for over 42% of the total CAP budget for all product CMOs. It has more than double the budgetary cost of the next largest CMO (for beef); therefore, it might be questioned whether the incomes generated by the Cereals CMO should be compared with those in other agricultural sectors, or whether the outcome of the Cereals CMO has, by virtue of its size, become the reference against which all other CMOs are compared.

If the latter is the case, the fairness of the Cereal CMO should be compared with a reference outside agriculture. In Chapter 6, Part 1, we consider the implications of taking entrepreneurial incomes outside agriculture as a benchmark. Judged against some measures of entrepreneurial incomes, cereal producers receive a high income.

3.2 Dependence of Cereal Producers' Incomes Upon Direct Payments

The dependence of cereal producers upon direct payments is high. This applies for all sizes of holdings. For average cereal producers, direct payments represent over half their Gross Margins I. In almost half the regional studies, direct payments provided the entire profit from cereal farming and also covered their full cereal production costs.

- The assured element of income from direct payments kept many farmers, notably small ones, in cereal production, when they would not have done so otherwise.

3.3 Regionalisation Plans

The effects of direct payments were often magnified by the autonomy granted to national governments to determine their own regionalisation plans, establishing the reference yields used to determine area payments. Some member states have applied very simple plans, with identical reference yields for different types of cereals. Others apply very complex plans, with higher reference yields for maize than other cereals, and higher reference yields for irrigated than unirrigated production, and with significant differences in the reference yields between neighbouring regions.

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[2] One cannot be more precise. The distribution of cereal areas vs. direct payments on cereals indicates that the largest 28% of cereal producers in terms of direct payments farm 80% of the total cereal crop area. Comparing the overall distribution of overall agricultural holdings by size with the distribution of cereal areas suggests that maybe the largest 13% of holdings farm 80% of the cereal crop area.

The plans affected the choice of cereal crop, encouraging expansions in irrigated output, where this would not have occurred without higher area payments, and giving rise on occasion to substantial imbalances in incentives between neighbouring districts.

One case study reveals how, within a single region, there are instances where some districts provide area payments that are €125 per hectare higher for set-aside than on land producing unirrigated cereals, while others pay the same amount for both. Some districts pay more than €180 per hectare more for irrigated than unirrigated cereals; yet others nearby districts within the same region pay the same amount for both.

- Such differences in regionalisation plans introduce distortions in two ways: in the choice of crop within a district, and in the choice of crop between districts.

3.4 Set-Aside

Set-aside requirements are an important element of supply control in the cereals sector, but set-aside is a fairly blunt instrument. Its effect cannot be predicted with certainty, since producers adapt their farm operating plans to put their least profitable areas into set-aside and adopt rotations to minimise the net costs of set-aside.

Its effect is even blunter following enlargement in 2004, since the new member states are not included in the set-aside scheme.

The Evaluation study of the set-aside system estimated that from 1996 to 1999, land that was put into set-aside yielded nearly 30% less than other land.

The same study's analysis of the programme efficiency of set-aside suggests that it was more effective when initially introduced, but became less effective as farmers adapted their operations to minimise its influence upon their incomes.

- Welfare analysis reveals that the main beneficiaries from supply control via set-aside are overseas producers. The US government gains a great deal from the set-aside programme, since the resulting increases in world prices reduce US official outlays on deficiency payments to its cereal producers.

4. CEREAL PRODUCTION

The overall outcome of recent Cereals CMO reforms was to slow the growth in EU-15 cereal output. From 170 million tonnes in calendar years 1980-84 and 182 million tonnes per annum in 1985-89, EU production fell to 179 million tonnes in 1990-94, before recovering to 195 million tonnes in 1995-99 and 202 million in 2000-02.

As a result of the turnaround in consumption, summarised below, net cereal exports from the EU-15 fell from 32 million tonnes in 1990-94 to 18 million in 2000-02.

This was achieved without any increase in cereal intervention stocks; on the contrary, intervention stocks were 33 million tonnes at the end of the 1992/93 marketing year, when the reforms started to take effect. The next cyclical peak was 18 million tonnes of stocks at the end of 1998/99; and the following one was 8 million at the end of 2001/02.

- The reforms achieved their broad supply control objectives, in slowing the growth in cereal output. In conjunction with their success in boosting cereal consumption, the reforms reduced exportable surpluses substantially.

4.1 The Effects on Producer Behaviour and the Choice of Production Inputs

There is evidence that the magnitude and the nature of the direct payments, by providing a guaranteed source of income per hectare of cereals regardless of the actual outcome of the harvest, affected producers' behaviour in other respects. For example, producers accepted higher risk by reducing their use of crop insurance.

In the early years of the reforms, when direct payments raised cereal producers' incomes above their previous levels, producers invested in capital equipment, including irrigation equipment and new storage capacity. However, in general, over the period since the start of the 1992 reform, the annual rates of change in factor intensities and input use in the cereal sectors of individual member states have, with few exceptions, been little different from those observed in previous periods.

- Producers' behaviour does not in general reveal an acceleration adoption of less intensive production methods, as might have been expected in the light of the fall in market prices.

- The regions where sharp reductions in input use are observed are where national policies have enforced the changes. The steady fall in Danish fertiliser and manure application rates and increase in Danish winter cereal areas at the expense of spring cereals are direct consequences of strict national measures to achieve overall environmental objectives within animal and crop farming systems.

5. CEREAL CONSUMPTION

The CMO measures succeeded in meeting the objective of raising the competitiveness of domestic cereals in the internal market. Prior to the 1992 reform, between 1980-84 and 1990-94, EU cereal consumption had fallen by almost exactly 10% in absolute terms. The decline was concentrated in animal feed uses, as cereal substitutes, mostly imported, increased their share of the feed ingredient market.

5.1 Feed Demand

- The reforms enhanced the competitiveness of domestic cereals, which greatly increased their share of the local feed market. By 2000-02, total cereal consumption was roughly 10% ahead of 1980-84. The share of cereals in feed ingredients rose from 47.3% in the 1992/93 marketing year to 57.9% in 2002/03.

The changing structure of world cereals exports, with the emergence of former Soviet Union countries as regular exporters, led to an upsurge in cereal imports (mostly of feed quality) after 2000. This was prevented from disrupting the internal market unduly by the imposition in 2003 of tariff rate quotas for lower qualities of wheat and for barley.

There is evidence that greater competitiveness of cereals as a feed input was reflected in relative declines in the prices of compound feeds that used high proportions of cereals, but there is limited evidence that this was reflected in animal product prices.

- Despite greater competitiveness of cereals in feed, reflected in increased feed cereal demand, there has been a decline in EU self-sufficiency in meat products and lower meat production and consumption growth rates since the reforms.

- The WTO Uruguay Round measures reduced subsidised exports of meat products. In addition, animal diseases (such as BSE) hit domestic meat output and demand.

5.2 Other End-Uses

Self-sufficiency ratios also declined in the major non-food cereal-using sector, starch. Yet, there has been a marked shift in starch's cereal balance away from maize (in which the EU is deficit) towards wheat (where export surpluses are the norm).

Cereals have made much less progress than oilseeds in new outlets in energy uses for agricultural products grown on set-aside land and, more recently, on areas eligible under the Mid-Term Review reform for €45 per hectare payments as energy crops.

5.3 Cereal Quality

Both consumers and producers are potentially affected by changes in the availability of different qualities of cereals as a result of the reforms. From a consumer perspective, lower feed cereal prices allow feed processors to take advantage of ample local supplies of feed grade cereals, as well as occasional surpluses of higher quality output unable to find outlets at premium prices (for example, surpluses of malting barley).

Concerns about adequate supplies of particular qualities of cereals tend to relate more to the higher end of the market. In breadmaking wheat, the evidence from the case studies is that developments often depend upon very specific variety discoveries. In the UK, the average quality of wheat has risen appreciably in recent years; in Germany, by contrast, the share of top quality output has fallen sharply, because of the introduction of a high yielding lower quality variety, rather than a response to the CMO measures.

- During the period under review, the qualities of cereals eligible for intervention were raised and as a consequence feed wheat was removed from eligibility in practice. Producer questionnaires revealed that production decisions were responsive to these tighter intervention rules.

6. INTERVENTION STOCKS

The level of intervention stocks was reduced considerably between the early 1990s and 2003/04, the last year covered in this Evaluation. However, enlargement was associated with a very substantial rise in intervention stocks in 2004/05.

Analysis reveals that the costs of the system are high in relation to storage costs faced by the private sector. This was the result of five factors:

- A single intervention price in all regions of the EU is a barrier to cereal flows from surplus to deficit areas when intervention prices are above world market levels. As a result of this barrier, the cost of making exports from intervention stocks in land-locked regions can become very high indeed.

- A single intervention price for all cereals generates inappropriate price signals for producers of different cereals. For rye, in particular, the premium of the intervention price over world market prices was much higher than for other cereals, and the premium was persistent. This led to the over-production of rye and larger export refunds per tonne for rye than for other cereals. The Mid-Term Review reform ended this distortion by making rye ineligible for intervention.

- In the earlier years of the reforms, in particular, monthly increments to the intervention price over-compensated the private sector for its storage costs.

- The insistence upon preserving the physical identity of intervention stocks until they are sold means that storage periods are unpredictable. This causes private operators to charge higher rates for the storage of intervention stocks than they would with more predictable storage periods or where stocks may be rotated.

- Intervention stocks are often held for long periods. This causes high depreciation costs, unlike with alternative systems, where stocks are rotated. Other CMOs, such as that for pig meat, demonstrate that alternatives to the methods of public storage employed in the cereals sector can function well within the Community.

7. EU SHARE OF THE WORLD CEREAL MARKET

Lower levels of market support (which boosted cereal sales to the internal market) and supply control (via set-aside) reduced EU exportable surpluses of cereals. As a result, the EU's net export share of world trade in cereals tended to decline during the 1992 and Agenda 2000 reforms. Its share of world cereal production was better maintained.

The commitments made to the WTO on the reductions to be made to the value of EU export subsidies and the volumes of subsidised cereal exports were only a minor constraint upon exports until the end of the WTO transition period in 2001/01, since a shortfall from maximum commitments in one year could be used to cover an overshoot in a subsequent year. After that date, the combination of exchange rate movements (notably a weak €), world prices and domestic supply surpluses meant that the annual WTO commitments could be met relatively simply.

- A different constellation of circumstances could cause problems in exporting surpluses. In practice, the crucial constraint is that affecting subsidised export volumes. This limit applies whether the average refund is €1 or €50 per tonne.

8. EFFICIENCY AND COST OF THE CMO MEASURES

- Programme inefficiency is created in the application of the CMO measures if they provide benefits to groups outside the intended target population.

Because of the scale of the cereals sector within the CAP, we examined the effects of assuming that an appropriate basis for assessing programme inefficiency in the application of the CMO measures to producers was to contrast cereal producers' incomes with entrepreneurial incomes outside agriculture.

We analysed in detail the assumption that non-farm entrepreneurs' average incomes are 50% above the average annual wages of workers in industry and services. The premium is added to reflect risk and managerial responsibility.

The major share of large producers in total cereal output led us to examine programme inefficiency in two ways: for all cereal farmers as a group, and for large farmers alone.

- We found that, with the estimate of non-farm entrepreneurial incomes, average large cereal farm incomes exceeded non-farm entrepreneurial incomes.

- For cereal producers as a group, no programme inefficiency in the average cereal farm incomes generated by the CMO (in the sense of over-payment to these producers in relation to equivalent non-farm incomes in the same member state) was identified if 50% is the appropriate premium to apply to determine non-farm entrepreneurs' incomes in relation to non-farm wage earners.

Another form of programme inefficiency was the over-stimulation of rye production by the CMO measures. This has ceased with the ending of rye's eligibility for intervention.

Regionalisation plans stimulated changes in crop choice from cereals with lower reference yields to others with higher reference yields, notably maize.

Set-aside gave rise to several forms of programme inefficiency.

- One was the creation of deadweight when set-aside payments were made on land that would have been left fallow in the absence of set-aside.
- Another was where full set-aside payments were made on low productivity land.
- The Evaluation report on set-aside demonstrated that, in 1998/99 and 1999/2000, programme inefficiency was created though a higher budgetary cost for "non-production" than would have been the case if there had been no set-aside and consequent "over-production". However, we cannot conclude whether there was, on average, programme inefficiency in this sense during the period under review.
- Welfare cost-benefit analysis revealed that set-aside imposed substantial programme inefficiency via the loss of producer surplus caused by supply control. Non-EU cereal producers (and, in particular, the US government) were the main beneficiaries from set-aside, which raised world market prices.

Management costs of intervention stocks, when contrasted with private costs of stock management, were judged to be high. This was largely because the CMO requires public stocks to be kept physically intact, adding to stock management costs.

Two unexpected effects of the CMO were

- The over-statement of base areas for arable aid payments. This led to a rise in cereal areas since the start of the MacSharry reform.
- An increase in average land rentals for cereal specialist holdings. This gave rise to a significant leakage in the form of higher rental payments to landowners who were not the farm operator.

9. THE MID-TERM REVIEW OF AGENDA 2000

The Mid-Term Review of Agenda 2000 resolved many of the problems identified in the previous sections.

- With the introduction of Single Farm Payments, the new CMO measures will end the link between direct payments and the cultivation of COP crops.
- Producers will, for the first time since 1993/94, make cereal production decisions without including area payments in their assessment of the revenue from cereals.
- The halving of the monthly increments in the intervention price reduces further any over-compensation for the monthly costs of storage.
- The ending of the eligibility of rye for intervention ends the distortion and deadweight when some producers specifically grew rye for sale to intervention.
- Some moderation of the benefits received by large holdings has been introduced.

- The transferability of set-aside obligations was improved (though this method of improving fairness and production efficiency across larger holdings has the effect, also, of making it more likely that set-aside land is land of low productivity, for which a full set-aside payment is not needed).

The enlargement of the Community has created other problems for the CMO, however.

- The application of a single intervention price for all member states and all cereals has given rise to large intervention stocks in land-locked locations, from which the price differentials to other member states are insufficient to generate flows within the internal market, unless the Commission provides subsidies to cover freight costs, either for internal users or for subsidised export sales.

- The problems of the accumulation of intervention stocks are made more difficult by the bilateral agreements not to make subsidised exports to states to the South East of Europe. This means that the most logical export outlets for surplus cereals in Central Europe are not available as customers.

- The new member states are exempt from compulsory set-aside. Consequently, the future use of set-aside to control supply will probably need to employ larger changes in the set-aside percentages to redress a given percentage of over-supply in the internal market, since only a proportion of member states would be affected by the measure.

10. RECOMMENDATIONS

The recommendations that flow from the analysis, taking account of the consequences of enlargement, are outlined below. At the heart of these recommendations is the experience of the 2004/05 marketing year, after enlargement added several important cereal surplus member states to the Community.

- The EU-25 now faces the prospect of persistent supply surpluses in Central Europe, with intervention stocks accumulated in regions far from export ports.

- Meanwhile the ability of the CMO to provide effective supply control through increases in compulsory set-aside has, as the previous paragraph implies, been reduced by the exclusion of the new member states from its scope.

The current CMO's system of intervention prices is poorly adapted to induce cereals to flow from land-locked surplus regions to deficit regions within the EU, without the payment of freight subsidies.

At the same time, compulsory set-aside is increasingly inefficient as a supply control measure. Not only are new member states outside its ambit, but there is also evidence that farmers have adapted by putting their least productive land into set-aside.

One of the ironies of the cost-benefit analysis of the CMO measures is that the main beneficiary from set-aside (via higher world prices) may well be the US government, which is able to pay a lower level of deficiency payments to its cereal producers than it would do if there were no set-aside system.

The recommendations focus upon market support (i.e., intervention) and supply control (set-aside). Without the proposed reforms, the sector faces regular large accumulations of intervention stocks that can only be removed through sizeable subsidies.

10.1 Market Support

- Enlargement has transformed intervention prices and stocks from their intended role, as a safety net, into a major barrier to the fluidity of the internal market.

We recommend that the role of intervention prices and stocks should be transformed so as to allow the internal market to perform its proper role of allowing surpluses to flow at the lowest cost to meet deficits internally or find outlets in the export market.

The proposals outlined below are inter-dependent. Producers and consumers should adapt their cereal production and consumption decisions to reflect location and their comparative advantage in different crops.

- They should not have these decisions distorted by a system of price supports that assumes that one tonne of different cereals should receive identical safety nets, in the form of identical intervention prices, throughout the Community.

The present system of market support often prevents the internal market from working properly, and the likelihood of such market failure has been increased by enlargement, with the prospect that future enlargement will only exacerbate the problem.

For these reasons, we recommend that:

- There should no longer be a single intervention price for all member states. Instead, we propose that intervention should be restricted to a small number of limited locations.

If this is implemented, cereals will flow from surplus to deficit regions in response to price differences in these areas. However, there will remain a safety net, in that deliveries to intervention will still be available to remove surpluses from the market if that is needed to underpin internal prices.

Also open market bids for export refunds should become more relevant for land-locked member states, since market price differentials should adapt to reflect transport costs to export ports if exports are the most profitable outlet for their cereal surpluses.

- If this recommendation is accepted, then the new intervention price should be determined so as to avoid raising market prices elsewhere in the Community[3].

A crucial issue in determining where intervention buying should be permitted, i.e. whether:

- It should be restricted to areas likely to have the biggest problem in disposing of surpluses under open market bidding (in practice, this would mean that intervention stores would be confined to Central Europe), or

- It should be restricted to areas with the greatest deficits and most vulnerable to crop failures (Spain and Portugal would be the prime candidates in this case).

Our preference is the latter option. We recommend that intervention should be confined to Spain and Portugal.

[3] The transportation algorithm in Chapter 5, Part 4, provides a starting point for such an analysis.

- Spain and Portugal have among the highest internal market prices. Intervention buying in these countries will attract cereals to these countries, if such deliveries are more profitable than private storage in other member states or export sales.

- This has the advantage that public stocks will be available if and when there is a recurrence of the crop failure that affected these countries in 2004/05.

Another recommendation is that the system (introduced in the MacSharry reform for simplicity) of a single intervention price for all cereals should cease. The example of rye illustrates the inefficiencies that can be created by this system.

- One option would be to return to the pre-1993/94 structure, with different intervention prices for different cereals. However, this would require the Council to decide each year what an appropriate differential would be.

- Our preferred option would be to select a single cereal, we recommend that it should be breadmaking wheat, and then to apply intervention solely to this cereal.

- Virtually all other cereals compete with common wheat in one of its outlets, whether as a feed or as an input for starch or as energy crops. Therefore, through competition in the market and substitution, other cereals will find their appropriate market clearing price relativity vs. wheat, with the common wheat intervention price acting as an indirect safety net for the entire cereal complex.

10.2 Public Stocks

The analysis in this report indicates that the rules applied to the management of public stocks are more costly than alternative systems operated by the private sector. To reduce the costs, while continuing to provide a safety net via public stocks, it is recommended that:

- The management of intervention stocks should permit (with appropriate inspection procedures to avoid possible fraud) the use of a wider range of private storage instruments, such as those employed in the pig meat CMO or the use of warehouse receipts. This will reduce the costs of management of the system.

10.3 Direct Payments

The implementation of regionalisation plans and the associated direct payments have created a lack of fairness in income between producers of the same cereals in different regions, and producers of different cereals in the same region.

- Single Farm Payments are inheriting many of these distortions. If the distortions are to be removed, these Single Farm Payments will need to be altered over time to remove the lack of fairness.

- Direct payments are the main cause of programme inefficiency in payments to large cereal producers, if one accepts that – because the cereal sector accounts for over 42% of the total CAP budget for product CMOs – the fairness of incomes from cereal production should be assessed in relation to incomes outside agriculture, rather that within the agricultural sector.

- If this inefficiency is to be ended, greater moderation of payments to large farmers is likely to be required than that envisaged in the Mid-Term Review reform.

10.4 Set-Aside

The effectiveness of set-aside as a supply control measure has lessened after enlargement adding ten member states that do not apply compulsory set-aside. We recommend that the continued application of set-aside should be reconsidered.

- One aspect of set-aside that meets the Treaty objective of fairness between different producers is the moderation that set-aside provides, since compulsory set-aside is applied only to larger ("commercial") holdings. As noted above, this advantage has shrunk since new member states do not apply this measure.

- An argument in favour of ending compulsory set-aside is that the decoupling of Single Farm Payments should remove some of the need for supply controls, since market prices will guide farm decisions.

- Another reason for ending set-aside is that welfare analysis of the Cereals CMO measures identified set-aside as a major source of programme inefficiency.

- More generally, the evidence of interviews with producers is that they have adapted their farming systems in such a way as to minimise the effect of set-aside on their overall production.

With these considerations in mind, it is proposed that set-aside should be phased out. It has become an inefficient measure, whose costs, both to individual producers and budgetary, now exceed the benefits to the Community.