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Evaluation of the Common Organisation of the Markets in the Sugar Sector

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Annexes

List of abbreviations

AA	=	Agricultural Area
ACP	=	African, Carribean and Pacific
AWU	=	Annual Work Unit
CAP	=	Common Agricultural Policy
CEC	=	Commission of the European Communities
CEFS	=	Comité Européenne des Fabricants de Sucre
CIF	=	Costs of Insurance and Freight
CIUS	=	Committee of Industrial Users of Sugar
CMO	=	Common Market Organisation
COP	=	Cereals, Oilseeds and Pulses
EAGGF	=	European Agricultural Guidance and Guarantee Fund
EC	=	European Community
EDF	=	European Development Fund
FADN	=	Farm Accountancy Data Network
FFI	=	Family Farm Income
FIRS	=	Fonds d'Intervention et de Remboursement de Sucre
FNVA	=	Farm Net Value Added
FOB	=	Free on Board
FWU	=	Family Work Unit
GATT	=	General Agreement on Tariffs and Trade

GDP	=	Gross Domestic Product
HFS	=	High Fructose Syrup
HHI	=	Herfindahl-Hirschman Index
HIS	=	High Intensity Sweeteners
ISO	=	International Sugar Organisation
m.e.s.	=	minimum efficient scale
MFN	=	Most Favoured Nations
MSN	=	Maximum Supply Needs
OECD	=	Organisation for Economic Cooperation and Development
PPP	=	Purchasing Power Parities
PSE	=	Producer Subsidy Equivalent
PS	=	Preferential Sugar
SCES	=	Storage Costs Equalisation Scheme
SPS	=	Special Preferential Sugar
TRQ	=	Tariff Rate Quota
UK	=	United Kingdom
URAA	=	Uruguay Round Agreement on Agriculture
WSE	=	White Sugar Equivalent
WTO	=	World Trade Organisation

Summary

The Commission of the European Community (CEC) has requested the Netherlands Economic Institute to evaluate the effectiveness, efficiency and impact of the Common Market Organisation (CMO) for sugar in the European Community. The evaluation is focused on the post 1993/94 period, but where relevant and possible a longer period has been analysed. The CEC has defined the scope of the study and structure of the report in the form of a number of specific evaluation questions. The answers on those questions are summarised in the following paragraphs, which are preceded by a short overview of the CMO Sugar.

Context
The European Community is by far the largest beet sugar producer in the world, with an annual production of 16 to 18 million tonnes of sugar. This production level is comparable to Brazil and India, the world's biggest cane sugar producers. EC sugar production amply covers domestic consumption needs of around 13 million tonnes. The EC is the biggest exporter of white sugar in the world, and the second biggest exporter - after Brazil, but before Australia, Thailand and Cuba – when both raw and white sugar are considered.

The CMO Sugar
The Community's sugar policy is set out in various rules and regulations under the CMO Sugar, which was established in 1968. Not having been subject to the two major policy reforms of the 1990s (the 1992 MacSharry reform and the 1999 Agenda 2000 decisions), the CMO Sugar is the last major market regime under the EC's Common Agricultural Policy (CAP) that has been left relatively unchanged so far. The CMO Sugar not only covers sugar and sugar beet, but also isoglucose (since 1977) and inulin syrup (since 1992. The CMO Sugar in its present form is in force until 30 June 2001.

Like any other CMO, the CMO Sugar in principle pursues the five objectives of the CAP (see Art 33, Treaty of Amsterdam), namely:
- to increase agricultural productivity;
- to ensure a fair standard of living for the agricultural community;
- to stabilise markets;
- to assure the availability of supplies;
- to ensure that supplies reach consumers at reasonable prices.

The CMO Sugar comprises a vast array of policy instruments, part being similar to traditional instruments applied in other CMO's, such as:
- an intervention price system through which minimum guaranteed prices for beet growers are maintained;
- a system of import levies and export refunds to protect the EC internal market from outside (world market) influences.

However, a number of the instruments of the CMO Sugar differ from arrangements used under the more 'traditional' CMO's. These include:

- a system of A and B production quotas allotted to each Member State, in order to limit the total quantity eligible for price support;
- production refunds for sugar being used by the chemical and pharmaceutical industry to make up for the difference between the EC sugar price and the world market sugar price;
- production levies to be paid by the sugar producers to finance both the export refunds for the exported quota sugar and the production refunds for the chemical and pharmaceutical industry;
- preferential arrangements for importing (raw) sugar (predominantly) from former colonies of EC Member States.

The CMO sugar furthermore contains a number of very specific instruments, including a storage cost equalisation scheme, minimum stock arrangements, a carry-forward of stocks mechanism, and special national aid arrangements.

Impact of the CMO Sugar on the smooth development of international trade

The contribution of the CMO Sugar to the smooth development of international trade has been analysed in terms of (i) impact on stability of the world market price of sugar, (ii) the degree of (cost) price distortions, (iii) the degree of market access and (iv) the degree of non-discrimination in trade relations.

The CMO Sugar has a negative influence on *the stability of the world market price*, because it insulates most of the EC sugar production and consumption from the world market. The same applies to sugar imported under preferential trade agreements. As a consequence the volume on the world market is lower and the number of trading partners smaller than would have been the case in the absence of the CMO Sugar. This implies that changes in supply and demand of some countries operating on the world market cause greater price fluctuations on the present market than on a market not regulated by the CMO Sugar.

EC sugar *export prices are highly distorted* in the sense that they are far below the actual production costs in the EC. The export at prevailing world market prices is made possible and profitable because of (i) the system of production levies and export refunds, and (ii) the fact that all fixed and overhead costs are covered by the profitable production of quota sugar for the EC markets. The fact that a high-cost sugar producer like the EC is capable of exporting substantial quantities of sugar has a downward effect on the world market price of sugar. If 'smooth development of international trade' is defined in terms of 'trade based on differences in comparative advantage' then the driving forces of the present sugar exports of the EC can not be considered as a contribution to the smooth development of international trade.

Access to the EC sugar market is highly limited. The level of the import duties on sugar has been prohibitive for any sugar import, other than imports under preferential trade agreements. Moreover, preferential trade agreements cause unequal market access,

diminish market transparency, redirect trade flows, increase price instability on the world market and may cause discontent among other third countries. From the point of view of (equal and sufficient) market access, the CMO Sugar has not contributed to the smooth development of international trade.

Impact of the CMO Sugar on stabilisation of the sugar markets in the EC

The CMO Sugar has a direct stabilising impact on the *supply* of sugar in the EC, through a system of fixed quota and preferential import arrangements on the one hand, and an effective disposal mechanism for exporting all surplus production to the world market on the other. Furthermore, non-preferential imports into the EC are effectively discouraged by high import duties.

The CMO Sugar has also helped to stabilise the EC sugar market in terms of price, predominantly through its system of intervention prices, which effectively creates a (price) floor in the market. Although in theory the intervention price is the same in all Member States, the effective minimum revenue for sugar producers varies across Member States and over the years. This is caused by (i) differences in regional premiums, (ii) differences in B/A sugar quota ratios that cause differences in the average levy per tonne of sugar, (iii) national support for sugar production in Italy and Spain, and (iv) agricultural exchange rates that differ from the financial exchange rates. Differences in effective minimum revenues per tonne of sugar produced across Member States have been in the order of 8-10%, apart from Italy and Spain where the minimum effective revenues were notably higher. These differences in producer revenues may have caused some instability of the sugar market prices in the EC. Nevertheless, it can be concluded that the Community sugar prices have been much more stable than the world market price, although at a much higher level. The minimum effective revenues per tonne have varied from 170% to 300% of the world market price of sugar in the period 1992/93-1998.

Security of supply at Community level

The *security of sugar supply* at Community level has not been threatened during the last 10 years. On the one hand, this can be attributed to the CMO Sugar, because the CMO has created favourable conditions for producing sugar in the EC. On the other hand, it has to be observed that also in the absence of the CMO Sugar, when most likely very little beet sugar would be produced in the EC, there would have been no problem with the security of sugar supply, because the EC sugar deficit could be met easily by purchases on the world market.

The mechanism to *carry-forward* surplus quota sugar from one season to the next is not really needed from the point of view of assuring the security of supply at the level of the entire EC. Quota production has always been sufficient to meet demand, even when disregarding the preferential imports. Also at the level of Member States, the carry-forward mechanism is not really essential for the security of supply, because a national deficit can be met easily by imports from other Member States. For some Member States the carry-forward mechanism was of some importance for making better use of their allocated production quota.

The *minimum stock requirement* is not of great importance for maintaining the security of sugar supply, either at the level of the EC or individual Member States. The overall sugar surplus in the EC is large enough and there are sufficient trade relations across markets to assure sufficient sugar supply in all Member States at any time. Only in a few cases the minimum stock requirement has helped to control sugar price increases as a consequence of a temporary insufficient supply in a particular Member State.

Reasonableness of sugar prices for industrial users

Due to the CMO Sugar, industrial user prices of sugar are high in comparison with world market prices. From that point of view industrial users may feel that sugar prices are unreasonably high. Nevertheless, the industrial users of sugar in the EC are not specifically disadvantaged by these high prices, because the CMO Sugar has been able - through an intricate system of export refunds and production refunds - to maintain a reasonable level-playing-field for all industrial sugar users in the EC as compared to extra-EC competitors. From this point of view sugar prices in the EC are not unreasonable for the industrial sugar users in the EC.

In a common sugar market, one would expect prices in the various Member States to converge rather than diverge. However, unofficial price data from the sugar using industries indicate that industrial user prices have diverged over the last decade across the EC, and that sugar prices paid by industrial users are 8% to 24% higher than the minimum guaranteed price across the Member States. These figures are, however, heavily disputed by the sugar industry asserting that the differential is substantially lower than 10%.

In view of the surplus of sugar on the EC market -about 20% of the quota sugar plus preferential imports have to be sold on the world market- one would expect the actual price-costs differential to be small, unless there is too little competition on the sugar markets. There are indications that the latter could be the case, namely: little sugar trade among Member States; most national markets controlled by one to three large sugar producers; the four largest companies in the EC accounting for almost half of the EC sugar production; low market transparency in terms of price information; and a number of anti-trust cases investigated by the EC and national authorities.

Industrial users may perceive prices as unreasonable if prices are much higher than the costs of producing sugar. The average production costs in the EC during the 1990s are estimated at about US$ 450 per tonne in low cost producing Member States (the Netherlands, Belgium and the UK) and in the range of US$ 660-750 per tonne on average for the entire EC. These figures point at a considerable profit margin per tonne, especially for low cost producers in the EC.

Reasonableness of final consumer prices

There are considerable differences in nominal sugar retail prices across Member States (up to 40% during the 1990s). Price comparisons on the basis of Purchasing Power Parities indicate price differences of even up to 70%. There are good reasons to believe

that existing price differences between Member States may be perceived as unreasonable by consumers.

Price differences are difficult to explain by differences of production costs or scarcity arguments. The relatively high level of retail prices in some Member States and especially the differences in levels between Member States are less related to the CMO Sugar than to other factors. The ex-factory price of sugar is but one cost item that matters in determining the retail price. Differences in costs, profit margins and competitive pressures in the distribution and retail sectors between Member States are most likely the main causes of the observed differences in retail prices.

Competitive position of sugar and other sweeteners

Of all sweeteners, presently only High Fructose Syrups (HFS, or isoglucose) can be considered as a real *potential* substitute for industrially used sugar. Cost competitiveness of HFS relative to sugar in the EC has improved in recent years, predominantly due to (i) a reduction of the raw material input cost (wheat and corn), and (ii) technical progress, which have made it economically feasible to use potato and wheat as raw material.

The existing quota system under the CMO Sugar has prevented HFS production increases and HFS becoming a real threat to the EC sugar industry. The current production volume of HFS in the EC is only approximately 2% of the total quantity of sugar produced in the EC.

Inulin syrup is produced in the EC only. It has been developed as a response to the high price of sugar in the EC under the CMO Sugar. Inulin syrup producers do not use their entire quotas, which is an indication that production, at *current* cost and price levels, is only marginally profitable. Inulin syrup can therefore not be considered as a serious threat to the competitive position of sugar.

The other sweeteners - polyols and high-intensity sweeteners - do not form a threat to the competitive position of sugar either. Although some of them are much cheaper than sugar in the EC, the functional properties and the use of these sweeteners are for a great deal different from sugar. However, technological developments, which improve the functional properties of the sweeteners concerned, could enlarge the range of possible applications and thereby increase their competitive position vis-à-vis sugar in the future.

Price differentiation between A, B and C-sugar and external competitiveness

When the average cost of production of refined *beet* sugar is taken as a basis of comparison, the EC is a medium-cost producer on average, while some Member States produce at notably lower cost (the Netherlands, the UK and Belgium). When compared with refined *cane* sugar the EC is not competitive. The average production costs in the EC are 1.8 to 2.3 times higher than those in the major cane sugar exporting countries.

Surplus quota sugar can be sold profitably on the world market due to the system of export refunds and production levies. The difference between the world market price and the intervention price is covered by the export refund.

Due to the relatively high prices of quota sugar in the EC, sugar producers in the EC are able to recover most or all of the fixed and overhead costs through the sale of quota sugar. As a consequence, producers are able to produce and export C-sugar profitably as long as the world market price is higher than the marginal costs of producing C-sugar.

Income derived from sugar beet production

During the 1980s and early 1990s, gross and net margins of beet production per hectare have developed favourably, despite decreasing real beet prices. Lower production costs and increased efficiency contributed to a higher net result. The upward trend came to an end in the course of the last decade, mainly due to the (further) decrease (in real terms) of the basic beet price. Looking over a period of 20 years, margins per hectare obtained from beet production have been fairly stable, despite the decrease of the real beet prices. In view of the fact that beet prices are fixed under the CMO Sugar, it can be concluded that the CMO Sugar has protected and maintained the level of the margins per hectare derived from sugar beet production. Reductions of the real beet price were not higher than the gains in terms of yield increases and cost reductions.

Gross margins of sugar beet production compared to gross margins of wheat and maize production

The gross margin per hectare of beet production has improved relative to the gross margin of wheat production in the Northern Member States (including France) and maize production in the Southern Member States during the 1980s. This was mainly caused by the fact that the price ratios of beet/wheat and beet/maize increased. During the 1990s the trend reversed. The ratio of the gross margins per hectare of beet/wheat and beet/maize declined, mainly due to the decline of the effective gross revenue per tonne of beets and the increased effective gross revenue per tonne of cereals. The latter is caused by the relative attractive world market prices of cereals in the mid-1990s and the area subsidies for cereals, which more than compensated the decline of the intervention prices of cereals. Nevertheless, beet production is still financially more attractive than growing cereals in terms of gross margins per hectare.

Impact of the CMO Sugar on farm income of sugar beet producers

Most of the farms growing beets generate higher incomes than farms not growing beets in terms of Farm Net Value Added (FNVA) and Family Farm Income (FFI), both in terms of the total amount of the farm as well as per working unit and (in most cases) per hectare. This can be explained by the relatively favourable gross margins of sugar beet production compared to that of the production of other arable crops. Obviously, the CMO Sugar has had a significant impact on the attractive profitability of beet production, particularly by protecting relatively high beet prices and providing a secured market in the EC. As such the CMO Sugar has greatly contributed to improving the income of beet growers as compared to farmers not engaged in beet production.

Time series of farm income data of a number of Member States over the period 1989-91 to 1994-96 indicate that, on average, the percentage increase of the income of beet farms was lower than the percentage increase of the income of non-beet farms. Thus, the income of beet farms deteriorated in relative terms. Although comprehensive farm income data are not available regarding the 1980s, it can be assumed that during that period, the income of beet farms improved relative to non-beet farms, because during the 1980s the ratio of 'gross margin of beet/gross margins alternative crops' increased.

Impact CMO Sugar on different categories of sugar beet producers

Farm incomes per hectare are higher when the degree of specialisation in beet production is higher (defined as beet area as percentage of total area). That positive effect is caused by the relatively high gross margin derived from beet production, which is attributable to the CMO Sugar for a great deal. This relationship could not be established for farm income per work unit.

In the UK, France, Sweden, Finland, Denmark and Germany, beet farmers have relatively large beet areas per farm. Thus in those countries the benefits of the CMO Sugar per farm are larger than in the other Member States.

The degree of specialisation in beet production per farm is highest in Finland, Italy, Portugal, Greece, Belgium and the Netherlands. Thus in relative terms the CMO Sugar is of more importance to the beet farmers in those Member States than beet farmers in other Member States.

The percentage of all farmers in a particular Member State engaged in beet production is relatively high in Belgium, the Netherlands and Denmark. Thus in those Member States a large percentage of the farmers can benefit from the CMO Sugar

Impact of C-beet production on total income derived from beet production

Most beet farmers plant a number of hectares of beets sufficient to produce their entire quota even in case of unfavourable weather conditions. Because weather is not always and everywhere unfavourable, there is generally a structural overproduction equal to 6% of the quotas on average. This 'unintended' C-beet production contributes by definition to the total income derived from beet production, because any surplus produced on the hectares planted to meet the quotas can be considered as an additional income with hardly any additional costs.

In the case of intentionally produced C-sugar, the gross margin has to be higher than the variable costs of beet production in order to contribute to total beet income of the farmer, assuming that all fixed costs are covered by the revenues from the production of quota beets. In most Member States the gross margin of C-beet production was positive during the 1990s and C-beet production contributed thus to the total income derived from beet production. However, in 1998 the gross margin of C-beet price had dropped to close to zero and was possibly negative in some regions.

The decision of a farmer whether or not to grow C-sugar (intentionally) depends on the question whether the gross margin from growing C-beets is higher than what can be earned from growing an alternative crop. When using average EC figures, it appears that during the 1990s gross margins of C-beet production were mostly smaller than the gross margins of wheat or maize production. However, when analysing the figures of a typical C-beet producing Member State like France, it appears that the gross margin of C-beet production was higher than the gross margin of wheat production in the years 1993 to 1997. However, not any more in 1998 due to the low C-beet price caused by the decline of world market prices for sugar.

Concentration of sugar beet production

The original allocation of B-quota, in the 1970s, favoured regional specialisation. Since the early 1980s quotas per Member States have not been changed any more, while there was also very little change in quotas per beet processing firm and per farm. As a consequence (further) regional specialisation was hardly possible.

The price incentive system of the CMO Sugar did not favour regional specialisation. In fact the price system favoured regions less suitable for beet production through a more favourable B/A quota ratio, regional premiums and national aid programmes. As a result gross revenues per average tonne of quota beet were higher in the regions less suitable for beet production than in those more suitable for beet growing.

The average level of specialisation of beet farms in the ECD, in terms of percentage of agricultural land used for beet cultivation, has decreased slightly from 13.1% to 12.6% (from 1990-1997). This is caused by the fact that, given the fixed quotas and the increasing yields per hectare, farmers will use a smaller percentage of their total land for beet cultivation. Thus, the CMO Sugar has had a slightly negative impact on the concentration of production in terms of degree of specialisation.

Concentration of sugar industries

A major process of concentration has taken place in the European sugar manufacturing industry. In eight Member States sugar manufacturing is now taken care off by one company only, while in three other Member States a single company controls more than 60% of the sugar production.

Technical change and a search for decreasing overall production costs were the main driving forces of the process of concentration. The CMO Sugar has stimulated and facilitated that process by assuring stable market conditions (prices and volume). On the one hand these stable conditions provided the companies with a more or less stable cash flow, which made it easy to take decisions on new investments. On the other hand the fixed prices and quotas made that profits could not be increased through increases of volumes or output prices. Thus the only option for improving financial performance was reducing production costs, particularly through concentration of processing in large plants.

However, concentration has not occurred everywhere. There are still 46 small processing plants in the EC. As far as these small plants are located in regions less suitable for sugar production, their continued existence can be explained by the fixed quotas allocated to them, and in some cases also by national support programmes (sanctioned by the CMO Sugar). In these cases, the CMO Sugar impedes further concentration of processing capacity. The relatively high number of small processing plants in France is mainly caused by ownership structures rather than the CMO Sugar.

Enlargement of the average scale of production has had a negative impact on labour intensity and employment. Decreases in direct employment in the EC sugar processing industry (12% in the last 3 years) can only be ascribed to the CMO Sugar in as far as the latter has speeded up the process of concentration and scale enlargement.

Adequate distribution of production between Member States

Whether or not the distribution of sugar production is adequate depends on the (implicit or explicit) objectives of the CMO Sugar regarding distribution. If it was the objective that each Member State should reach a self-sufficiency ratio of at least 100%, the distribution of sugar production in the EC can be judged as adequate. Only three Member States (Portugal, Spain and Greece) have a self-sufficiency ratio slightly less than 100%, while the ratios of Sweden and Finland are close to 100%. The ratios of the other Member States are substantially higher than 100%, even up to 200%.

If it was the objective to concentrate sugar production in regions with the strongest comparative advantage in sugar production, the distribution of sugar production can be judged as *modestly adequate.* About 69% of the total EC sugar production is produced from beets grown in regions that have an average sugar yield per hectare higher than the average sugar yield per hectare of the entire EC.

If it was the objective to reach a self sufficiency ratio of 100% in all Member States and that the surplus production should be distributed as much as possible on the basis of comparative advantages, the distribution of sugar production can be judged as *adequate,* because there is a positive correlation (of 62%) between the sugar yield per hectare and the self-sufficiency ratio of Member States. Thus, Member States with high yields have relatively high levels of surplus production.

The relatively high surplus of quota production in Member States with high yields per hectare is caused by the CMO Sugar because:

(i) originally the level of A-quotas was based on historical production figures, which were already the result of a certain degree of regional specialisation based on comparative advantages, and;

(ii) Member States with high yields got a relatively high B-quota on top of the A-quota.

Thus, the CMO Sugar has preserved the level of specialisation existing at the time the quotas were fixed (during the 1970s). At the same time, the CMO Sugar prevented further specialisation, as far as quota sugar was concerned, because the quotas have not been changed since 1981. Further specialisation at the level of individual Member

States was only possible through the production of more C-sugar. Such a specialisation has indeed materialised because there exists a positive correlation between the volume of C-sugar production and the average sugar yield per hectare per Member State.

Budgetary Impact of the CMO Sugar

In about 10 years time, the gross expenditures of the CMO Sugar (including storage refunds; excluding non-annex I products) have decreased from about 8% of the EAGGF budget to on average 4.3% in recent years (5.4% including non-annex I products). The net budgetary costs of the CMO Sugar, thus gross expenditures minus levy and duty receipts (excluding non-annex I products), have declined from about 2.4% of total EC expenditures about 10 years ago to on average 0.9% in recent years (1.1% including non-annex I products). About 80% of these net costs originate from the export refunds of exporting a quantity of sugar equivalent to the preferential imports of sugar.

The administration fee withheld by the Member States (10% of the levy receipts) are not included in the calculations for determining the levels of the production and storage levies. Consequently the administration fees add to the EC's budgetary deficit of the CMO Sugar. There are no logical reasons why this administration fee should not be covered by the levies because it is part and parcel of the implementation of the CMO Sugar.

Suppliers of Preferential Sugar receive the intervention price, in some cases reduced with an amount equivalent to a highly reduced duty to be paid by the purchaser. The main justification for paying a relatively high price for the import of preferential sugar is that the implicit subsidy should be seen as a sort of development aid. It is logical therefore that the costs of that system, in the form of the export refunds for exporting an equivalent quantity, should be financed from EDF resources.

The Storage Costs Equalisation Scheme

EC's net budgetary costs of the Storage Costs Equalisation Scheme (SCES) are equal to the 10% administration fee withheld by the Member States; presently about 30 million Euros per year. Furthermore the CEC and the companies experience costs in administering and implementing the scheme. The benefits of the system are said to be stable prices throughout the year. However, in the absence of the SCES, the sugar companies and traders will design their own storage costs equalisation systems in order to avoid price increases caused by storage costs throughout the year. In case there will be no equalisation system, price increases due to storage costs will be no more than about 6% throughout the year. Thus the benefits of the SCES are meagre and do not justify the costs. It is advised to elaborate a plan on how the SCES could be phased out.

When the SCES would be abolished, a new financing arrangement has to be designed for the minimum stock requirement, in case that instrument will be maintained. Commercial entities should be compensated for additional storage costs when they are required to keep minimum stocks at a higher level than the stocks they would keep on the basis of commercial considerations.

The fact that C-sugar carried forward to the next season (and then becoming quota sugar) qualifies also for storage costs refunds is not logic in view of the objectives of the CMO Sugar in general and of the SCES in particular. The main argument against this arrangement is that there is no need, in view of stabilising markets and/or securing sufficient supply, to carry C-sugar forward to the next season. Moreover, this facility might stimulate C-sugar production at the costs of a higher storage levy imposed on quota sugar production.

The CMO Sugar, regional development and social cohesion

The CMO Sugar has preserved beet production in regions less suited for it, through the system of fixed and non-tradeable quotas. As such the CMO Sugar has contributed to regional development. The other side of the coin is that preserving beet production in regions less suitable for it, works against (further) concentration of beet production in regions with a comparative advantage in beet production.

The CMO sugar has not made a specific contribution to the Economic and Social Cohesion Policy of the EC, because beet growing was not particularly concentrated in the Priority Regions at which that policy was focused. Moreover, in most of the Priority Regions where beet was grown, the profitability of beet production and the level of specialisation in beet production was less than the EC average. The Priority Regions were also over-represented in the category of regions that experienced a decrease of sugar production between 1990 and 1997.

Looking at the financial solidarity principle of the CMO Sugar, it can be noted that four Member States (Germany, the Netherlands, Austria and Sweden) are net-payers of the financing system of the CMO Sugar, while France, Belgium, Italy and the UK are the largest net-receivers. Many beet producing Priority Regions are situated in three Member States which are also net-receivers (Greece, Portugal and Italy). Those Priority Regions take thus advantage of the financial solidarity principle.

In terms of income transfers from consumers to producers across Member States, it is noted that consumers of sugar importing Member States (Spain, Greece, Portugal and Sweden) indirectly subsidise farmers in other Member States, through the relatively high sugar prices. Because almost all regions of these four Member States are Priority Regions, the direction of this income transfer is mostly in contradiction with the aim of Economic and Social Cohesion Policy of the EC.

The CMO Sugar has allowed Italy and Spain to provide special national support to the sugar industry. Because a substantial part of those national aid programmes is aimed at Priority Regions in Italy and Spain, the national aid has supported the Economic and Social Cohesion Policy of the EC.

Evaluation of the Common Organisation of the Markets in the Sugar Sector

1 Introduction

The Directorate-General for Agriculture of the Commission of the European Community (CEC) has requested the Netherlands Economic Institute (NEI) to evaluate the effectiveness, efficiency and impact of the Common Market Organisation (CMO) of sugar in the European Community (EC)[1]. The study was carried out in the period August 1999 – February 2000 by a team consisting of:

- Mr. Martin van der Linde, team leader, Director of the Division of Agriculture and Rural Development of the NEI;
- Mrs. Veerle Minne;
- Mr. André Wooning;
- Dr. Frans van der Zee.

The CMO Sugar is an important element of the Common Agricultural Policy of the EC. It was established in 1968 and the basic principles and instruments have not been changed since then. The CMO Sugar is a complex system with a vast array of instruments and regulations, which cover not only sugar, but also isoglucose and inulin. The most important instruments are:

- production quota;
- minimum guaranteed prices;
- export refunds and import levies;
- production refunds for the chemical and pharmaceutical industry;
- production levies to finance part of the export refunds and production refunds;
- preferential imports.

The CMO Sugar in its present form is in force until 30 June 2001. The Council of Ministers has to decide before 31 December 2000 on how the CMO Sugar will be prolonged after 30 June 2001. The CEC is charged with the task to prepare proposals on the continuation of the CMO Sugar. In that context the CEC has launched this evaluation of the CMO Sugar, in order to get a clear assessment of the impact of the present CMO Sugar.

The CEC has defined the scope of the study by asking 18 specific evaluation questions. Those questions are the subjects of the various chapters of this document. The evaluation is focused on the period since 1993/94, but where appropriate longer time periods have been reviewed. The study consisted of an extensive review and analysis of

[1] Nowadays European Union. Because most of the study refers to the period when the EC had not yet been superseded by the EU, the name EC is used throughout the study.

various studies, documents, EC laws and regulations and data sets of Eurostat and the Farm Accountancy Data Network (FADN). Furthermore interviews were held with a number of key persons in the sugar sector. All studies and documents consulted are mentioned in the list of references at the end of this document. A list of persons interviewed is presented in annex M.

First an overview of the content of the CMO Sugar is presented in chapter 2. The following five chapters (3-7) deal with the evaluation questions under the subject heading "stabilisation of markets and competitiveness of EC-sugar". The next five chapters (8-12) deal with the evaluation questions concerning the production of sugar beets and the income of beet producers. The questions regarding the concentration of production and (regional) specialisation are covered in the chapters 13, 14 and 15. The financing of the instruments of the CMO Sugar is analysed in the chapters 16. The link between the CMO Sugar and the Economic and Social Cohesion Policy of the EC is discussed in chapter 17.

2 The Common Market Organisation of Sugar in the European Community

2.1 The Common Agricultural Policy

2.1.1 The Treaty of Rome and the Stresa Conference

The Common Market Organisation of Sugar (CMO Sugar) in the European Community (EC) is one of the Components of Common Agricultural Policy (CAP) of the EC. The objectives of the CAP are laid down in the Treaty of Rome, on the basis of which the EC was established in 1957 by the six founding members (Belgium, Germany, France, Italy, Luxembourg and the Netherlands). The objectives of the CAP are (art. 33, Union Treaty of Amsterdam, 1993):

- 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, particularly labour;
- to ensure a fair standard of living for the agricultural community, in particular by increasing the individual earnings of persons engaged in agriculture;
- to stabilise markets;
- to assure the availability of supplies;
- to ensure that supplies reach consumers at reasonable prices.

The Ministers of Agriculture of the EC Member States fixed the operational principles of the CAP at the Stresa Conference in 1958. These principles are:

- *establishment of a single market* implying common rules for market management, common price policies for a number of agricultural products, absence of customs duties and non-trade barriers within the EC, and a single system of tariffs and non-tariff trade regulations at the external borders of the EC;
- *Community preference*, which means protecting internal markets in order to favour products produced in the EC above imported products;
- *joint financial responsibility* for the implementation of the CAP through a European Agricultural Guidance and Guarantee Fund (EAGGF). The "guidance" section is meant for financing projects for improving farm structures, rural infrastructure and facilities, etc. The "guarantee" section deals with financing the common organisation of the markets (e.g. intervention purchases and price support). Since 1991, the guarantee section has accounted for more than 90% of all spending of the EAGGF[2].

The CAP was put in place in 1962, however it did not yet cover the sugar sector. The CMO Sugar became effective in 1967 (see section 2.2).

[2] The Community Budget: the facts in figures, SEC (99) 1100 – EN, p.31.

2.1.2 CAP reform

During the second half of the seventies and the eighties production of a number of agricultural products increased rapidly and consequently prices declined. The EC had to intervene by purchasing the surpluses products (of particularly milk, meat, wine and cereals) at the guaranteed minimum prices (the intervention prices. The escalating costs of the intervention purchases forced the EC to reform the CAP. Strong international pressure in the context of the Uruguay Round of the GATT (1987-1994) to open up the EC markets for agricultural produce was another reason to reform the CAP.

During the eighties a number of attempts were already made to limit production by imposing production quotas, charging co-responsibility levies and limiting intervention up to a level of maximum guaranteed quantities. In 1992 more fundamental reforms were introduced (the MacSharry reforms). Price support of a number of products was reduced while farmers were compensated for the price decline by direct income support (linked to hectares and number of animals).

2.1.3 Agenda 2000

At the European Summit in Berlin in 1999, the Heads of States reached agreement on the so called 'Agenda 2000', including a reform of the Common Agricultural Policy. This reform was prompted by several reasons, ranging from the necessity to adapt the CAP in the light of the oncoming trade talks and the eastward enlargement of the European Community, to increasing budgetary pressure.

The Agenda 2000 reform of the CAP is a logical follow-up of the Mac Sharry reforms of 1992, which introduced a shift of price support to direct income support for a number of products. The Agenda 2000 reform takes this one step further; intervention prices for major products like cereals, beef and veal will be gradually reduced between 2000 and 2006. These price reductions will be partially compensated by compensatory payments (cereals) or premiums (beef and veal).

The first price reductions will be applied in the year 2000. Exception to this is the dairy sector, for which the quota system has been extended to the year 2006 and reductions of the intervention price for butter and skimmed milk powder will not take effect before 2005. The CMO Sugar is not affected by the Agenda 2000 reforms.

Agenda 2000 gives an extra impetus to rural development, which becomes the second pillar of the CAP. For this reason the different existing financial support programmes for agriculture and rural development have been simplified and put together in one regulation.

2.1.4 Limiting the EAGGF and spending for the agricultural sector

In 1988, the EC had already decided to limit the growth percentage of the Guarantee Section of the EAGGF to the inflation percentage plus 74% of the growth percentage of the Gross National Product of the EC Member States. The expenditures of the Guarantee Section of the EAGGF as a percentages of the total of the EC expenditures declined from 56% in 1991 to 47% in 1998, equivalent to respectively 0.62% and 0.52% of the Community GDP[3].

The Agenda 2000 aims at stabilising agricultural expenditure over the period up to 2006. The Berlin European Council estimated that reform of the CAP could be implemented within a financial framework of EUR 40.5 billion per year on average (including the accompanying measures of Mac Sharry; amounting to about EUR 2.3 billion per year). In addition EUR 2 billion per year could be used for rural development and veterinary and plant health measures.

2.1.5 Comments on the objectives of the CAP

The objectives of the CAP are a reflection of the economic conditions and general approaches to economic policy making in the fifties and sixties. At that time the overriding opinion about agricultural policy making was that the public sector had a responsibility as regards stabilisation of markets and protecting the income of the farmers. This is reflected in the objectives of the CAP. Nowadays the role of the public sector regarding stabilisation of markets is seriously questioned. Liberal policies regarding non-interference in market processes now have the upper hand.

Public sector concern about protecting the income of the farmers is still an issue. This concern is understandable in view of the fact that in developed economies agricultural incomes tends to increase more slowly than the increase of the average income in the society. This is caused by the facts that in developed economies labour productivity outside agriculture tends to increase more rapidly than in the agricultural sector, and because income elasticity of demand for food products is low.

It should also be noted that the CAP has to strike a balance between two opposing objectives and interests: protecting the income of the farmers and assuring reasonable prices for the consumers. Both objectives can not be maximised at the same time. In the final analysis, only politics can define what should be considered as an optimal result in terms of achieving both objectives to a certain degree at the same time.

2.2 History of the CMO Sugar

The CMO Sugar became effective in 1967, five years after the CAP was put in place. The delay was caused by the difficulty to design a system that guaranteed all sugar

[3] Ibid, pp.36 and 39.

producers at least the same level of support as the support they received under the (previous) national sugar policies. The following basic instruments of the CMO Sugar were put in place (and which still exist):

- minimum support prices for sugar;
- import duties and export refunds to protect the internal market (and prices);
- an intervention purchase system to guarantee the minimum support price; and
- a production quota system to limit the total quantity eligible for price support.

The first three mentioned instruments were similar to the ones used for the other CMOs. To the contrary the fourth instrument, the introduction of a production quota system, was a particularity of CMO Sugar at that time. Production quota were fixed at the level of Member States and referred only to the maximum quantity of sugar eligible for price support (intervention purchases). Members States were free to produce more, but that surplus production had to be sold outside the EC. Thus the purpose of the quota system was three-fold, namely:

- to limit the total quantity of sugar that could (potentially) be brought on the EC sugar market;
- to limit the (potential) costs of intervention purchases;
- to guarantee each Member State a certain share of the EC sugar market. This was particularly important for those Member States, which were relatively less efficient in sugar production.

The structure of the CMO Sugar was unaffected by the MacSharry reforms and the outcome of the Uruguay Round of the GATT, as reflected in the Agricultural Agreement. However limits were imposed on the total quantity of subsidised exports of sugar and the total costs of the sugar export subsidies (export refunds) for the period 1995/96 to 2000/2001 (see sections 2.3.2 and 2.3.5 and chapter 4). The sugar sector might be faced with these limits for the first time in the year 2000/2001. The EC has decided that in case the limits of the Agricultural Agreement will be reached the sugar production quota will be reduced within the existing framework. National quota reduction factors have already been agreed upon in the context of the update of the CMO Sugar in 1995 (see EC Council Reg. 2038/1999; art.26).

As said earlier, the Agenda 2000 of the EC does not affect the CMO Sugar.

2.3 The instruments of the CMO Sugar

2.3.1 Regulation of sugar prices

The EC Council of Ministers of Agriculture fixes each year before the first of August the Intervention Price for white sugar for the next marketing year, running from 1 July till 30 June. The Intervention Price is the price at which the EC is prepared (and obliged) to buy white quota sugar[4] offered to the national Intervention Agencies (see section 2.3.3). The Intervention Price thus acts as a guaranteed minimum price.

[4] For a definition of "quota sugar" see section 2.3.2.

Raw sugar and "basic" beet and cane prices are derived from the Intervention Price. The basic beet price, - in white sugar equivalents of standard quality -, is equal to 58% of the Intervention Price for white sugar beet. Beet and cane processors have to pay the farmers at least the basic beet and cane prices (minus the production levies; see further on). Thus the basic beet and cane prices are not guaranteed through intervention purchases but through this legal obligation.

The Intervention Prices since 1981 are presented in table 2.1. From 1984/85 to 1994/95 the Intervention Prices were fixed in Agricultural ECUs (second column), which deviated from the value of the financial ECUs (fourth column). Agricultural ECUs can be converted into financial ECUs with the conversion factor (third column). In economic terms only the Intervention Prices and basic beet prices in financial ECUs are relevant.

The EC charges production levies, which are meant to cover the costs of the export refunds (see section 2.3.5) and production refunds (see section 2.3.6). The following production levies can be imposed:

- a basic levy of 2% of the Intervention Price on both A-quota and B-quota sugar;
- a variable levy on B-quota sugar with a maximum of 37.5% of the Intervention Price, depending on the total costs of the export refunds;
- an additional levy, expressed as a % of the basic levy and the B-levy, in case the basic levy and the B-levy are not sufficient to cover the costs of the export refunds and production refunds[5].

The B-levies and additional levies charged since 1981/82 are shown in the sixth and seventh column of table 2.1. The additional levy was introduced in 1986/87 and it was agreed with the sugar industry that the deficits of the years 1981/82 to 1985/86 (costs of export refunds minus levy receipts) had to be recovered by additional levies during 1986/87 to 1988/89. This explains the high level of the additional levies in those years.

The levies are paid by the sugar industry, which reclaims 58% from the farmers by a discount on the basic beet price[6] [7]. Because the level of the levies is different for A quota sugar and B-quota sugar, farmers receive different prices for A quota beets and B-quota beets. The EC has allowed the Netherlands and Belgium to use a mixed price for A and B quota sugar beets. However, in practice many sugar companies in other

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5 These costs are a function of the difference between the world market price and the Intervention Price, the quantity of exported quota sugar and the quantity of sugar used by the chemical and pharmaceutical industries. See sections 2.3.5 and 2.3.8.

6 In the first instance farmers are offered a minimum beet price equal to the basic beet price minus 58% of the 2% levy of all quota sugar and 58% of the 30% or 37.5% levy on B-quota sugar (depending on the estimated costs of the export refunds). In case it appears at the end of the season that the actual B-levy is less than the maximum amount of 30% respectively 37.5%, farmers get back 60% of that part of the levy which was over-estimated (Art. 36 of Council Reg. 2038/1999). Thus the levy refund is slightly more than the original levy overcharge.

7 The total of the required levy receipts can only be determined definitely at the end of the marketing year. Therefore the final accounts with the sugar processors and final payments to the sugar beet farmers are settled as late as mid December following the marketing year concerned.

Member States use beet payment systems which are very close to the mixed pricing system.

Each Member State has a national Paying Agency and Intervention Agency that takes care of collecting the levies, paying the export refunds and buying sugar at the Intervention Price once it is offered to them. The Paying Agencies have a current account with the EC to clear the differences between collected levies and paid refunds. Since 1981/82 hardly any intervention purchase has taken place, because sugar prices in the EC were always higher than the Intervention Price. Only in the mid-eighties a small quantity of sugar was bought by the German Intervention Agency (see section 2.3.3).

Table 2.1 Intervention Prices for white sugar 1981/82-1999/2000 (ECU/tonne)

	Interv. Price white sugar in agricultural ECU/tonne	Switch-over factor	Interv. Price white sugar in financial ECU/t	Basic beet price in financial ECU/tonne	B-levy (% of IP)	Additional levy (% of basic and B-levies)
1981/82	469.5	-	469.5	35.91	30.0	0
1982/83	514.1	-	514.1	39.32	37.5	0
1983/84	534.7	-	534.7	40.89	37.5	0
1984/85	534.7	1.033651	552.7	42.27	37.5	0
1985/86	541.8	1.046429	567.0	42.79	37.5	0
1986/87	541.8	1.109251	601.0	45.36	37.5	38.9
1987/88	541.8	1.137282	616.2	46.50	37.5	17.6
1988/89	541.8	1.137282	616.2	46.50	37.5	27.0
1989/90	531.0	1.140949	605.8	45.72	22.9	0
1990/91	530.1	1.145109	607.0	45.80	37.5	2.4
1991/92	530.1	1.145109	607.0	45.80	30.4	0
1992/93	530.1	1.181597	626.4	47.30	35.1	0
1993/94	523.3	1.207509	631.9	47.67	37.5	14.2
1994/95	523.3	1.207509	631.9	47.67	37.5	5.6
1995/96	631.9	-	631.9	47.67	33.2	0
1996/97	631.9	-	631.9	47.67	36.5	0
1997/98	631.9	-	631.9	47.67	36.9	0
1998/99.	631.9	-	631.9	47.67	37.5	16.5

Source: Data from DG Agriculture.
Note: In some years the switch-over factor changed during the year (production season). For those years a time-weighted average has been calculated.

The Intervention Prices mentioned in table 2.1 are valid for white sugar of a standard quality in non-deficit areas, un-packed, ex-factory loaded on a means of transport chosen by the purchaser. In sugar deficit areas[8] the IP is higher because the CMO Sugar has fixed a regional premium on top of the IP for those areas. Since 1995/96, the following regional premiums are in force:

[8] During the period 1995/96-1997/98 Finland, Greece, Portugal, Spain and Sweden had actually a sugar deficit. If preferential imports are disregarded, the UK had also a deficit. Since 1997/98 Italy has a small sugar surplus. Ireland has a sugar surplus. See chapter 4, table 4.3.

- a premium of 2.31% of the Intervention Price in Finland[9], Ireland, Portugal and the UK, equivalent to 14.6 ECU/t of white sugar;
- a premium of 2.67% of the Intervention Price in Spain, equivalent to 16.9 ECU/t of white sugar;
- a premium of 3.7% of the IP in Italy, equivalent to 23.4 ECU/t of white sugar.

The regional premium is meant to be more or less equal to the costs of sugar transport from the nearest sugar surplus region to the sugar deficit regions concerned. The entire regional premium is added to the basic beet prices in the regions concerned. Thus the processing margin is unaffected. The objective of the regional premium is to assure that the market premium caused by the sugar deficit accrues to the farmers. The final aim is to stimulate beet production in the sugar deficit areas.

The EC fixes also a target price for white sugar, which is 5% higher than the Intervention Price. In terms of price formation on the EC markets, the target price has no practical meaning because market prices for white sugar are generally well above 105% of the Intervention Price (see chapter 5). Until the conclusion of the Agricultural Agreement of the Uruguay Round of the GATT the target price was part of the formula for fixing the import duties (see section 2.3.4). Since the Agricultural Agreement is in force target price has no function any more.

Over the last years, the basic beet price for a standard quality of beets has been calculated in the following way:

Intervention price	+631.9 ECU/t white sugar
Processing costs	-243.6 ECU/t white sugar
Value of molasses	22.5 ECU/t white sugar
Transport of beets	44.1 ECU/t white sugar
White sugar price in beets	366.7 ECU/t white sugar
Basic price of beet with 16% sugar (factor 0.013)	47.67 ECU/t of beets.

Thus farmers receive 58% of the Intervention Price (366.7/631.9), while the processors receive 42%. In reality processors get a larger share of the market price in most cases, because market prices are mostly higher than the Intervention Price, while most or all of the difference between the Intervention Price and the market price is kept by the processors (see chapter 5)[10]. In sugar deficit regions, the basic beet prices are higher due to the regional premiums mentioned earlier. Normally the sugar prices in those sugar deficit regions are also higher than in the sugar surplus regions.

The CMO Sugar prescribes that sugar processors have to pay a minimum beet price to the farmers, which is equal to the basic beet price minus the production levies. Deductions (up to a maximum; see Comm. Reg. 2497/69) are allowed when the beets are sub-standard. Minimum premiums must be paid for beets of a higher quality. The minimum of the premiums and the maximum of the deductions are determined by the Commission. Within the framework of the price rules imposed by the CMO Sugar, the

9 Finland since 1996/97, when it joined the EC.

10 Processing factories owned by cooperativestend to pay (part of) the additional margin to their members, which are the beet suppliers. Private companies tend to use the additional margin to pay higher dividends to the share holders.

beet growers and sugar industry can agree in their inter-trade agreements on premiums for early and late delivery. Sometimes premiums are paid when market prices for white sugar are higher than expected.

Processors have to sell the C-sugar on the world market without the support of export refunds (see also section 2.3.5). Although the CMO Sugar does hot prescribe how much farmers should be paid for C-sugar beets, it is generally agreed in the intra-trade agreements that growers receive about 60% of the receipts of C-sugar. (Man Sugar, 1996;24). This percentage is about equal to the share farmers get from the Intervention Price. Usually farmers get paid for the C-sugar beets after the end of the marketing season, when all C-sugar has been exported.

The CMO Sugar prescribes a framework for the contracts to be signed by beet growers and sugar processors. These contracts are known as the *inter-trade agreements.* They contain provisions regarding the purchase price, quantity, quality, delivery periods, payment schedules, etc. The prescriptions of the CMO Sugar provide a minimum of protection for the farmer. The actual inter-trade agreements are often more detailed than the CMO Sugar prescribes.

2.3.2 Production quotas

The price guarantee applies only to specific quantities (quotas) of sugar per EC Member State. There are two types of quota: A and B. The major difference between A and B quota sugar is the level of the levies (see section 2.3.1). Only quota sugar can be sold in the EC and only quota sugar is eligible for price support through the intervention mechanism and export refunds. Sugar produced in excess of the quotas is called C-sugar and can not be marketed in the EC. It has to be sold on the world market without the support of export refunds. Thus the quota system limits the supply of sugar on the EC sugar market.

The EC has allocated the quotas to Member States, while each Member State has allocated the national quota to individual sugar producing factories. In principle the allocation to individual factories could be changed once a year, but in practice there is very little change over time[11]. In most countries allocations change only in case of closure or merger of factories. Sugar factories give “beet delivery rights” to individual farms on the basis of the quota allocated to the factory. The farmers and the factories may decide to produce C-beets and C-sugar on top of respectively the delivery rights and the quota, for sale on the world market.

The allocation of national quota has not changed since the early eighties. When new countries joined the EC[12], they got a quota more or less corresponding with their sugar production at the time of accession. The present allocation of national quotas is

[11] The CMO Sugar prescribes that the quota of a particular factory may not be reduced by more than 10% from one year to another, except in Italy, Spain and the French overseas territories.

[12] Spain and Portugal in 1986; Austria, Finland and Sweden in 1995.

presented in table 2.2. France and Germany have by far the largest quotas; together about 46% of the total.

The fourth column of table 2.2 shows that there is quite a difference amongst the Member States in terms of B-quota as percentage of the A-quota. This has a historical background. In the early seventies the Member States with a comparative advantage for sugar production got a relatively high B-quota to allow them to expand sugar production for a relatively low producer price (because of the relatively high production levy on B-sugar). That explains the high B/A ration of Belgium, France, Germany and the Netherlands. Later on Denmark and Austria got also a high B/A ratio as a result of the accession negotiations. The result of this system is that Member States with a high B/A ration contribute relatively much to the total sugar levy income of the EC. Whether or not they receive relatively more than other Member States in the form of export levies depends on the level of their export of quota sugar.

Table 2.2 Allocation of national sugar quota (in tonnes of white sugar)

Region	A quota	B quota	B/A (in %)	Total quota	% of total
Austria	316,529	73,881	23.3	390,410	2.7
Belgium	680,000	146,000	21.5	826,000	5.7
Denmark	328,000	96,629	29.5	424,629	2.9
Finland	133,433	13,343	10.0	146,776	1.0
France-métropole	2,530,000	759,233	30.0	3,319,233	22.7
French overseas territories	466,000	46,600	10.0	482,600	3.3
Greece	290,000	29,000	10.0	319,000	2.2
West Germany	1,990,000	612,313	30.8	2,602,313	17.8
East Germany	647,703	199,297	30.8	847,000	5.8
Ireland	182,000	18,200	10.0	200,200	1.4
Italy	1,320,000	248,250	18.8	1,568,250	10.7
Netherlands	690,000	182,000	26.4	872,000	6.0
Portugal-continent	63,636	6,367	10.0	70,000	0.5
Portugal-Azores	9,091	909	10.0	10,000	0.1
Spain	960,000	40,000	4.2	1,000,000	6.9
Sweden	336,364	33,636	10.0	370,000	2.5
UK	1,040,000	104,000	10.0	1,144,000	7.8
EU-15	11,982,756	2,609,655	21.8	14,592,411	100.0

Source: EC Council Reg. 2038/1999.
Notes: France may allocate 30,000 tonnes of the A-quota of the French overseas territories to metropolitan France, while Portugal may allocate 10,000 tonnes of the continental quota to the Azores.

Stocks carried forward

A producer may carry forward a certain quantity of B or C-sugar to the next year not exceeding 20% of its A quota. Sugar carried forward has to be stored for a period of at least 12 months and will become part of next year's A-quota. The carry forward facility allows producers to smooth out the effects of good and bad harvests and to make optimum use of its quota. The decision to carry forward a certain quantity has to be

taken before the first of February and is irrevocable. Carried forward sugar is mostly C-sugar.

Isoglucose and inulin

Isoglucose was incorporated in the CMO Sugar in 1977 and inulin fructose syrup (made out of chicory and some other plants) in 1992, because both products are direct substitutes for sugar. Isoglucose and inulin are subject to quotas and production levies and exports of those products are eligible for export refunds. However the intervention mechanism does not apply to isoglucose and inulin and thus the EC does not determine intervention prices.

The isoglucose quotas are presented in table 2.3. Belgium and Spain have by far the largest quotas: together 51.2% of the total. The total of the isoglucose quotas is equal to 2.1 % of the total of the sugar quotas.

Table 2.3 Allocation of isoglucose quotas (in tonnes of dry matter)

Region	A quota	B quota	B/A in %	Total quota	% of total
Austria	-	-	-	-	-
Belgium	56,667	15,583	-	72,250	23.8
Denmark	-	-	-	-	-
Finland	10,845	1,085	10.0	11,930	3.9
France-m	15,887	4,135	26.0	20,022	6.6
French overseas territories	-	-	-	-	-
Greece	10,522	2,478	23.6	13,000	4.3
West Germany	28,882	6,802	23.6	35,684	11.8
East Germany	-	-	-	-	-
Ireland	-	-	-	-	-
Italy	16,569	3,902	23.6	20,471	6.8
Netherlands	7,426	1,749	23.6	9,175	3.0
Portugal-continent	8,094	1,906	23.6	10,000	3.3
Portugal-Azores	-	-	-	-	-
Spain	75,000	8,000	10.7	83,000	27.4
Sweden	-	-	-	-	-
UK	21,696	5,787	26.7	27,483	9.1
EU-15	251,588	51,427	20.4	303,015	100.0

Source: EC Council Reg. 2038/1999.
Note: The CMO Sugar considers one tonne of dry matter isoglucose as being equivalent to one tonne of white sugar.

Inulin syrup is produced by four factories only: two in Belgium, one in France and one in the Netherlands. In 1992, each factory got a quota equal to 65% of its installed technical capacity. The inulin syrup quotas are presented in table 2.4. The total of the inulin syrup quotas is 2.2% of the total of the sugar quotas.

Table 2.4 Allocation of inulin syrup quotas (in tonnes of white sugar equivalents)

	A quota	B quota	B/A in %	Total	% of total
Belgium	175,577	41,348	23.6	216,925	67.1
France	19,991	4,708	23.6	24,699	7.7
Netherlands	65,994	15,542	23.6	81,536	25.2
Total	261,562	61,598	23.6	323,160	100.0

Source: Man Sugar, 1996, 25.
Note: 1 tonne of dry matter inulin syrup is equivalent to 1.9 tonnes of white sugar.

In the context of the Agricultural Agreement of the Uruguay Round of the GATT, the EC has agreed on a reduction of the total quantity of sugar that can be exported with the support of export refunds and the total amount of export refunds involved (see chapter 4). Once the agreed limits will be reached, the EC will reduce the quotas in order to limit the surplus of quota sugar, which has to be exported. The total required quota reduction will be split proportionally among sugar, isoglucose and inulin. The contribution of each Member State to the total quota reduction of sugar, isoglucose and inulin is determined by a table of reduction coefficients included in the EC Council Regulation 2038/1999 (art.26). The contribution of each Member State to the total reduction is not exactly proportional to the share of each Member State in the total quota. Thus the reduction system will change each Member State's share in the total quota slightly.

2.3.3 Intervention purchases

As said at the start of section 2.3.1, the Commission is prepared (and obliged) to buy white quota sugar[13] offered to the national Intervention Agencies at the Intervention Price, which is fixed each year by the Commission. Since early eighties, it happened only once that quota sugar was bought by an Intervention Agency. In 1986/87, the German Intervention Agency bought 15,703 tonnes of white sugar. Apparently, the option of exporting surplus quota sugar with the support of export refunds is more attractive than selling the sugar to an Intervention Agency.

2.3.4 Import duties

The internal EC sugar market is insulated from the world sugar market through a system of import duties and export refunds (subsidies). The rules for the import of sugar are described in this section and those regarding the export in the next section.

Before the Agricultural Agreement of the Uruguay Round of the GATT was signed (see section 2.2), the EC fixed a minimum import price (threshold price), which was equal to the sum of the target price (Intervention Price plus 5%), the storage levy (see section 2.3.7) and the freight costs from the area of greatest surplus (Laon, France) to the area

[13] For a definition of "quota sugar" see section 2.3.2.

of greatest deficit (Palermo, Italy). Sugar imports were charged a variable import duty equal to the difference between the CIF[14] import price and the minimum import price. Preferential sugar imports were exempted from this import duty (see section 2.4). In practice this system of variable import duties made the importation of non-preferential sugar financially unattractive. Consequently there was hardly any importation of non-preferential sugar.

As a result of the Agricultural Agreement of the GATT, minimum import prices and variable import duties were replaced by fixed import tariffs starting the first of July 1995, and these tariffs had to be reduced by 20%, in comparison with the average import duty of the years 1986-88[15], over the years 1995/96-2000/01. Thus a tariff reduction of about 3.33% per year (see also section 3.3.5). The agreed import tariffs are presented in table 2.5. Again Preferential Sugar is exempted from these import tariffs (see section 2.9).

Table 2.5 Fixed EC import tariffs for white and raw sugar (in ECUs per tonne)

Marketing year	White sugar	Raw sugar
1995/96	507	410
1996/97	490	396
1997/98	473	382
1998/99	456	368
1999/00	439	354
2000/01	419	339

In addition there is a special safeguard clause in the Agricultural Agreement of the GATT, which allows the EC to charge additional import duties in case the import volume of the product exceeds a trigger level or if the value of the imported product falls below a trigger price. The trigger price for white sugar is 531 ECU/tonne. The additional duty on sugar, in case of low import prices, is calculated on the basis of the following schedule:

(a) No additional duty will be imposed as long as the difference between the import price and the trigger price is less than 90% of the trigger price;
(b) When the difference between the import price and the trigger price is between 10% and 40% of the trigger price, then the additional duty shall be equal to 30% of the amount by which the difference exceeds 10% of the trigger price;
(c) When the difference between the import price and the trigger price is between 40% and 60% of the trigger price, then the additional duty shall be equal to 50% of the amount by which the difference exceeds 40% of the trigger price plus the additional duty mentioned under (b);
(d) When the difference between the import price and the trigger price is between 60% and 75% of the trigger price, then the additional duty shall be equal to 70% of the

[14] CIF = Costs of Insurance and Freight.
[15] The variable import duties on sugar were high at that time, because the sugar prices on the world market were low. Thus the agreed tariff reduction started from a relatively high tariff level.

amount by which the difference exceeds 60% of the trigger price plus the additional duties mentioned under (b) and (c);

(e) When the difference is greater than 75% of the trigger price, the additional duty shall be equal to 90% of the amount by which the difference exceeds 75% of the trigger price, plus the additional duties mentioned under (b), (c) and (d).

The implication of this schedule is that the additional duty for white sugar will increase from zero to about 100 ECU/t when the import price decreases from 531 ECU/t (the trigger price) to 200 ECU/t.

Because of the relatively low world market price for sugar since 1995, the special safeguard clause for sugar has been constantly in force since 1995/96. The fixed tariffs plus the additional import duties make the import of non-preferential sugar uneconomic in comparison with the price of EC quota sugar until today. As a consequence hardly any non-preferential sugar is imported.

2.3.5 Export refunds

Since the start of the CMO Sugar in 1968, the EC has developed from being a net importer of sugar to becoming a net exporter of white sugar (see chapter 4). Sugar exported by the Member States can be categorised as follows:

- Surplus quota sugar exported with the support of export refunds.
- A quantity of sugar equivalent to the imported preferential sugar (see section 2.3.9). These exports qualify also for export refunds.
- C-sugar, which is exported without any specific support.

The amount of export refund is determined by a weekly tendering system. Each week exporters can bid for export refunds and the corresponding export licenses. The bids consist of the requested export refund in ECU per tonne of white sugar and the total quantity related to that specific bid. The Sugar Management Committee of the EC[16] evaluates the bids on the basis of the current sugar world market price, the expected evolution of that price and the estimated total quantity of sugar that will qualify for export refunds during the marketing season concerned. Approved export refunds will never exceed the maximum export refund, which is equal to the Intervention Price plus the storage levy (see section 2.3.7) plus the "free on board costs" minus the export price (world market price).

In case of export of other sugar products (raw sugar, candy products, syrups, etc.) and in case of export of small quantities of white sugar for which the exporter can not participate in the weekly tender, the exporter will get an export refund equal to the lowest bid of the relevant weekly tender minus an amount of 30 ECU per tonne of sugar (white sugar equivalents).

Sugar contained in exported food and drinks (Non-Annex I products) qualifies also for export refunds, in order to avoid that these exporters are put at a disadvantage on the

[16] Composed of representatives of the Member States and chaired by a representative of the Commission.

world market, because of the relatively high sugar prices in the EC. The export refund for that sugar is fixed monthly at a level equal to the prevailing export refund level of white sugar at the start of the month concerned, minus an amount of 30 ECU per tonne of sugar.

In the context of the Agricultural Agreement of the GATT the EC has to reduce the amount it spends on export refunds. It is expected that the EC will reach the limit imposed by the Agricultural Agreement in 2000/01 (see section 3.3.5). Then the EC will reduce the quotas, which will result in reduction of the (estimated) exportable surplus of quota sugar with support of export refunds.

The production and export of C-sugar is closely monitored in order to assure that all C-sugar is effectively exported. C-sugar does not qualify for export refund.

2.3.6 Production refunds for the chemical and pharmaceutical industry

Chemical and pharmaceutical industries use sugar, isoglucose, glucose and molasses as raw materials. The chemical and pharmaceutical industries established in the EC would be at a disadvantage when compared with producers outside the EC, because they would have to buy sugar, isoglucose, glucose and molasses at a much higher price than their external competitors. To solve this problem, the EC decided in 1986 that these industries would get a "production refund" for the use of sugar, isoglucose, glucose and molasses. The production refund level is fixed quarterly at a level equal to the average of the awarded export refunds of a certain reference period minus 84.5 ECU per tonne of white sugar.

When the system of production refunds was put in place in 1986, the chemical and pharmaceutical industries used about 60,000 tonnes of sugar per year. It was agreed that the costs of the production refunds of any further increase above 60,000 tonnes per year had to be covered by the receipts of the production levies (just as the costs of the export refunds; for more details see chapter 16). Presently the chemical and pharmaceutical industries use about 200,000 tonnes of sugar per year.

2.3.7 Storage costs equalisation

The seasonal character of sugar production implies that sugar has to be stored for some time in order to get a regular supply on the market. As a consequence sugar will become more expensive as the marketing season advances because of increasing storage costs. In order to reduce or even avoid these price increases, the Storage Costs Equalisation Scheme (SCES) has been put in place. Basically the SCES implies that sugar producers have to pay a storage levy for each tonne of white quota sugar produced (except for sugar sold to intervention agencies) and get a storage costs refund for each tonne of quota sugar stored.

The system does not apply to C-sugar, unless the C-sugar has been designated to be carried forward to the next season (see section 2.3.2). Until 1985 white sugar produced from raw cane sugar from ACP countries and India was also part of the scheme. In 1985 it was decided to discontinue this practice, because cane sugar does not require long storage periods due to the regular supply throughout the year.

The level of the storage costs refunds is fixed annually on the basis of the interest costs of the funds tied up in storing the sugar and a nominal amount per tonne for fixed costs. The refund is defined as an amount in ECU per tonne per month storage time. The quantity is calculated on the basis of the average of the stock at the start and at the end of a month. Only sugar stored in approved warehouses by sugar beet processors and specialised sugar traders is eligible for storage refunds.

In principle the SCES should be budget neutral, which means that the total of the levies should balance with the total of the refunds (see chapter 16).

2.3.8 Minimum stocks

Sugar producing companies are obliged to keep permanently a minimum stock of sugar. Council Regulation N° 1789/81 has fixed the minimum stock at 5% of the production of A quota sugar during the twelve months preceding the month concerned[17]. In case of relative shortages on national sugar markets the CEC may decide to reduce the percentage (up to 0%) for some or all Member States, in order to boost sugar supply on the market. This was for instance the case in 1995, when the CEC decided to reduce the minimum stock to 3%, followed by a further reduction to 0% on the first of July 1996. Since December 1996, the percentage is kept at 3%.

The CEC may also decide to release the minimum stock in one region only. For instance in June 1997, the CEC decided to release the minimum stock in Spain, after a period of a severe drought followed by heavy floods, which caused a deficit of 100,000 tonnes of sugar. Greece is another example. In 1998 the beet harvest in Greece was delayed due to climatic circumstances, which would cause a deficit in the months of August and September 1999. Therefore, the minimum stock was released during that period.

2.3.9 Preferential sugar imports and refining raw cane sugar

Preferential sugar

Before the UK became member of the EC in 1973, it imported already large quantities of raw cane sugar, which was refined in the UK. When the UK joined the EC, the importation of raw cane sugar by the UK from its former colonies in Africa, the Caribbean and the Pacific (ACP Countries) was included in the EC/ACP Convention signed in 1975 and became also part of the CMO Sugar. As such the interests of the refining industry in the UK and of the supplying countries were save-guarded, while at

[17] For cane sugar refiners 5% of their total production in the previous 12 months.

the same time sugar supply channels were not disrupted. According to protocol 8 of the ACP/EC Convention, the EC guarantees to buy annually, for an indefinite period, 1,294,700 tonnes of sugar (white sugar equivalents) from ACP countries (see table 2.6). These imports are exempted from import duties. Later on India was added to this list with a quantity of 10,000 tonnes. This imported sugar is called Preferential Sugar.

Table 2.6 Annual import quota of ACP countries and India (in tonnes of white sugar equivalents)

Barbados	50,312.4
Belize	40,348.8
PR Congo	10,186.1
Fiji	165,348.3
Guyana	159,410.1
Ivory Coast	10,186.1
Jamaica	118,696.0
Madagascar	10,760.0
Malawi	20,824.4
Mauritius	491,030.5
St, Christopher & Nevis	15,590.9
Surinam	0.0
Swaziland	117,844.5
Tanzania	10,186.1
Trinidad/Tobago	43,751.0
Zambia	0.0
Zimbabwe	30,224.8
Total ACP Countries	1,294,700.0
India	10,000.0
ACP/India	1,304,700.0

Source: Bartens, Sugar Economy 1997/98

The prices to be paid for Preferential Sugar are negotiated annually between the EC and the ACP States. In practice the price for bulk raw cane sugar (insurance and freight costs to European ports included), has always been equivalent to the derived Intervention Price for raw sugar in the UK. The EC guarantees that price and is prepared and obliged to buy it through the Intervention Agencies in case no other buyer is prepared to buy at the guaranteed price (which has never happened).

Maximum supply needs

In 1986 Portugal joined the EC. Portugal used to meet its domestic demand for sugar by importing and refining raw cane sugar. During the accession negotiations, Portugal got the right to continue importing raw cane sugar at world market prices free of duty until 1995.

In 1995 Finland, which also used to import substantial quantities of raw cane sugar, joined the EC. Thus a new arrangement had to be elaborated for both Portugal and

Finland. Furthermore there were two other problems regarding the import of raw cane sugar:

- the two French refineries, which were refining the raw cane sugar from the French overseas territories, were faced with insufficient supply;
- the British refining industry exerted strong pressure in the EC to get permission to import more raw cane sugar from the ACP countries than the Sugar Protocol made possible.

The EC decided to solve all these issues at once in a new comprehensive arrangement for the import of raw cane sugar. Maximum Supply Needs (MSNs) were established for the seven refineries of raw cane sugar in the EC (two in the UK, two in Portugal, two in France and one in Finland (see table 2.7):

Table 2.7 The maximum supply needs of the cane sugar refineries (in tonnes of white sugar equivalents)

Finland	60,000 t
France (metropole)	297,000 t
Portugal (Continent)	292,000 t
United Kingdom	1,130,000 t
Total	1,779,000 t

Source: Council Reg. 2038/1999.

When the refining industry imports more than the MSN, a penalty will be imposed on the excess quantity. This penalty corresponds to the full rate of the import duty in force for the marketing year concerned (including the additional import duty in force during that marketing year) and repayment of the refining aid received for the quantity of sugar concerned.

When the sugar quotas have to be reduced as a result of the commitments emanating from the Agricultural Agreement of the GATT (see section 2.3.2), the MSNs will be reduced with the same percentage as the sugar quota.

Special Preferential Sugar

The MSNs have to be met by imports from the French overseas departments, the Preferential Sugar from the ACP countries and India, and a small quantity of MFN sugar (see section 2.3.10). In case the available import quantities will not be sufficient, additional raw cane sugar can be imported from ACP countries and India, which is called Special Preferential Sugar. Because the quantities of Preferential Sugar and MFN Sugar are fixed, the volume of Special Preferential Sugar is determined by the volume of sugar produced (and consumed) in the French overseas territories.

Special Preferential Sugar (SPS) is subject to a (highly) reduced import duty of 54,1 ECU/tonne (fixed for the period 1/7/99-29/2/2000) plus a levy of 29.2 ECU/tonne (fixed for the 1999/00 campaign) for financing (part of) the adjustment aid for refining

industries (Thus a total of 83.3 ECU/tonne). Importers of SPS are obliged to pay the suppliers a minimum price equal to the minimum guaranteed price of raw sugar minus the above mentioned levy. For the period 1/7/1999 to 29/2/2000, the minimum buying price equals 496,8 ECU/tonne (Comm.Reg. 1436/99).

The SPS agreement has a duration of 6 years (1995/96-2001/02). Before the first of January 2001, the parties of the agreement shall open discussions on its possible continuation. Quantities, origin and destination of the Special Preferential Sugar of 1998/99 are listed in table 2.8.

Table 2.8 Tariff quotas for Special Preferential Sugar in 1998/99 (in tonnes of white sugar equivalents)

Country of origin	Total
ACP	324,000
India	10,000
Total	334,000
Destination	Total
Finland	60,000
France	54,500
Portugal	204,500
United Kingdom	15,000
Total	334,000

Source: Comm. Reg. N° 1375/98 and Comm. Reg. N° 440/99.

Adjustment aid

For the years 1995/96-2000/01, the EC pays "adjustment aid" for refining Preferential Sugar and "additional basic aid" for refining raw cane sugar from French overseas territories. The amounts of adjustment aid and additional basic aid are in principle the same and were initially fixed at 1 ECU per tonne of white sugar. This amount can be adjusted in the light of the storage levy fixed for the marketing year concerned (see Council Reg. 2038/1999, art. 43).

2.3.10 MFN (Most Favoured Nations) sugar

When Finland joined the EC, the EC inherited a Finnish obligation regarding the Agricultural Agreement of the GATT. The obligation consists of importing 85,463 tonnes of raw sugar (about 82,000 white sugar equivalents) from Cuba (68%), Brazil (28%) and the remainder from some other countries. The import price of this MFN sugar is freely negotiated, and subject to a reduced import duty of ECU 98 per tonne of white sugar.

2.3.11 Special national aid for the sugar sectors in Italy, Spain and the UK

Right from the start of the CMO Sugar, Italy was allowed to provide a special subsidy to its sugar sector because of poor soils, inefficient farm structures and obsolete processing equipment. The subsidy would allow the stakeholders to streamline production structures and to modernise the factories. It is said that the Italian National Sugar Plan, which was launched in 1982, has been quite successful, particularly in the North of Italy: yields have improved and the industry has become much more efficient (Man Sugar, 1996;42). As a result the subsidies in the North and Centre will be phased out in 2000/01 (see table 2.9). The maximum subsidies indicated for the period 1995/96-2000/01 are only meant for quota sugar and should benefit the sugar beet producers only, except in the South of Italy where the sugar processors are also allowed to benefit from the subsidies.

The Spanish Treaty of Accession allowed Spain to subsidise its sugar industry up to a maximum of 23.64% of the basic beet price until the end of 1995 (Man Sugar 1996;42). This subsidy has to be phased out during the period 1995/96-2000/01, except the subsidy on cane sugar (see table 2.9). The maximum subsidies mentioned in table 2.9 for Spain for the period 1995/96 to 2000/01 are meant for the producers of sugar beet and sugar cane only. On top of that, Spain was authorised to support specific restructuring plans of the Spanish sugar industry up to a maximum of ECU 45.65 million in total during the period 1993/94-1996/97. The EC would co-finance 50% of that amount (Council Reg. Art 53).

Table 2.9 Maximum authorised national aid for the sugar sectors in Italy and Spain in 1995/96-2000/01 (in ECU per tonne of white sugar)

	Italy North	Italy Centre	Italy South	Spain (cane)	Spain (beet)
88/89-90/91	154.7	154.7	154.7	N/a	154.7
91/92-94/95	108.7	108.7	108.7	N/a	154.7
1995/96	81.5	81.5	81.5	72.5	86.7
1996/97	54.3	54.3	76.1	72.5	54.3
1997/98	38.0	43.5	70.6	72.5	43.5
1998/99	21.7	32.6	65.2	72.5	32.6
1999/00	10.9	21.7	59.8	72.5	21.7
2000/01	0	0	54.3	72.5	0

Sources:Data 1995/96 to 2000/01: Council Reg. 2038/1999;art. 53. Data 1988/89-1994/95: Man Sugar 1996;42.

During the period 1995/96-2000/01, the UK is authorised to provide adjustment aid for refining preferential unrefined cane sugar. The maximum authorised support is set at 5.4 ECU per tonne of white sugar.

3 Impact of the CMO Sugar on international trade in raw and refined sugar

3.1 Introduction

The subject of this chapter is evaluation question 1.4, which reads: *"Has the common organisation of the sugar market contributed to the smooth development of international trade in raw and refined sugar, taking account of the rules in force for international trade, in particular trade flows with:*

- *Producer countries eligible for preferential import duties;*
- *Producer countries not eligible for preferential import duties;*
- *Countries purchasing Community sugar?"*

The answer to this evaluation question is sought in two parts, by: (i) investigating the contribution of EC sugar to international trade in raw and refined sugar, and (ii) determining whether the CMO Sugar has contributed to the 'smooth' development of international trade in raw and refined sugar.

The contribution of EC sugar to international trade in raw and refined sugar will be analysed in terms of volume of white and raw sugar traded. An evaluation of the contribution of the CMO Sugar to the smooth development of international trade in sugar requires clearly defined indicators. From an economic point of view, the term `smooth' both refers to (i) the degree to which supply and demand in international trade can be brought together in a quick, efficient and undistorted way, and (ii) the notion of non-discriminatory behaviour of a country (*in casu* the EC) vis-à-vis its trading partners.

The ability to balance supply and demand in a quick, efficient and undistorted way and the influence of the CMO Sugar on this ability cannot be measured directly. In general this ability will generally be affected by limitations and/or manipulations to market access, both in the domestic market and foreign markets. These are usually the result of government interference, either *directly* through import duties and/or export subsidies, or *indirectly* through other support measures (e.g., 'income' support per hectare and financial support of agricultural extension and research). Examples at the extreme are prohibitive import duties and export bans. In both cases the development of international trade is obstructed; the development of international trade in these cases should be judged as *un*smooth.

Contrary to the usual question asked in international trade literature as to what extent an individual commodity or group of commodities is supported or protected (normally measured by a coefficient of protection, or more-inclusive measures like the Aggregate Measure of Support (AMS) and the Producer Subsidy Equivalent (PSE)), question 1.4 addresses the reverse: To what extent has the CMO Sugar contributed to the development of international trade in terms of market access?

A more focused version of question 1.4 could be "what has been the contribution of the CMO sugar to the opening up of the international trade in sugar, in terms of effects of both improved EC market access and reduced EC export support?" It is obvious that answering this question is the more difficult, the greater the variety of different trade arrangements of the EC with different countries/country blocks. This leads us to the second criterion for judging the contribution of the CMO Sugar to the smooth development of international trade: non-discriminatory behaviour of a country vis-à-vis its trading partners. The hypothesis is that the less distinctions and exemptions between trading partners are made, the greater is the overall transparency in international trade, the lower are the transaction costs, and the greater is the contribution to its smooth development. The less the discriminatory behaviour therefore, the more this adds to the creation of a level playing field in international trade.

Unfortunately, measuring *quantitative* impacts of government support on external markets - and trade - is very difficult. The results of economic and econometric models could yield interesting insights by simulating the results of hypothetical with-without support scenarios and the lowering of trade barriers, and analysing the effect of these simulations on international trade as a whole. However, model results remain strongly dependent on the assumptions and necessary simplifications to generate results (which usually differ from model to model). Results are therefore usually not unambiguous. Moreover, the time and resources needed for the construction and use of encompassing international trade models are far beyond the scope of this study.

What *are* possible and usable indicators for the contribution of the CMO Sugar to the smooth development of international trade in sugar? An important aspect of the smooth development of international trade is *price stability.* The theoretical argument here is that the more stable prices are, the lesser is the (price) uncertainty for sugar beet producers and processors. Price stability is supposed to have a positive impact on production decisions and as such contributes to overall market efficiency. The world market price stability of sugar[18] can be taken as a reflection of the smoothness of international trade in a particular commodity, both over time and in comparison with other (agricultural) commodities. The extent to which the EC has influenced the world market price of sugar can be taken as a (partial) indicator of its contribution to this smooth development. Secondary data (model results) will be used as a proxy for judging this influence.

The contribution of the CMO Sugar to the opening up of the international trade in sugar, in terms of effects of both improved EC market access and reduced EC export support will be proxied by means of a comparative analysis of the Producer Subsidy Equivalent for sugar, both over time and between major OECD countries. The issue of market access is also considered from a point of equal (non-discriminatory) and sufficient access. Last, it is evaluated whether the CMO Sugar has been in line with the rules in force in international trade, as laid down by the WTO-GATT Agreement on Agriculture.

[18] Note that evaluation question 1.4 - under discussion here - is closely linked to part of evaluation question 1.5 which deals with the stability of world markets in terms of volume and price (see further chapter 4).

The contribution of the CMO Sugar to the smooth development of international trade will be analysed in terms of:

- its impact on the level and stability of the world market price of sugar;
- degree of access to the EC market;
- the degree of non-discrimination in trade relations.

For none of these indicators, absolute judgement criteria can be formulated. The judgement criteria will *be relative in* the sense that:

- a contribution to improved price stability is considered to be positive with regard to the smooth development of international trade;
- any distortion of prices is negative, while a contribution to a decreasing trend of the price distortions is positive;
- in principle market access should be entirely free, while a contribution to improving market access is positive;
- in principle trade relations should be non-discriminatory, while a contribution to phasing out discriminatory trade relations is positive.

The structure of this chapter is as follows. Section 3.2 discusses the development of international trade in *raw* sugar, and the share of the EC in *raw* sugar trade over time. Section 3.3 deals with the development of international trade in *refined* sugar, and the share of the EC in *refined* sugar over time. Section 3.4 describes the evolution of world market prices, followed by an analysis of the volatility of world market prices and the residual nature of the world sugar market in section 3.5. Section 3.6 analyses the impact of the CMO Sugar on the world market price. The effects of EC export support measures on the development of international trade, and the issues of EC market access and compliance with rules in force in international trade are discussed in sections 3.7 and 3.8 respectively. Section 3.9 provides some additional observations on the impact of the CMO Sugar on the smooth development of international trade. Section 3.10 concludes.

3.2 Raw sugar traded on the world market and the share of the EC

3.2.1 Major exporting countries

The major exporters of raw sugar and the exported quantities in 1997/98 are listed in table 3.1. Total raw sugar exports amounted to about 19 million tonnes. The volume of raw sugar actually traded on the world market is in fact lower, because the raw sugar exported by the ACP countries to the EC under preferential conditions (Preferential and Special Preferential Sugar; see section 2.3.9), and the raw sugar export falling under the

US Tariff Rate Quota (TRQ)[19] are not traded on the world market. These exports are based on long term sugar contracts, with prices well above the world market level. After deduction of these exports, the volume of the world market of raw sugar was about 16 million tonnes.

In 1997/98, the raw sugar market was dominated by Brazil and Australia, which accounted for 53% of the supply on the world market of raw sugar. This was due to both the large volume of Brazil's cane crop and to poor cane harvests in other major exporting countries, such as Thailand and Cuba. The top-4 countries represented 77% of the raw sugar supply on the world market, while the top-10 represented 96%. The EC does not export raw sugar.

Also countries such as Mauritius, Fiji, Guyana and Swaziland export significant quantities of raw sugar. Most of their exports are transported to the EC and sold under preferential conditions. Most of the sugar export of the Dominican Republic and the Philippines is imported by the USA under preferential conditions.

Table 3.1 Raw sugar export volumes, 1997-98 (in 1,000 tonnes of raw sugar)

Exporting country	Raw sugar export volume	of which:		
		Preferential Sugar + SPS	US TRQ	World market exports
Brazil	4,721.3		221.1	4,500.2
Australia	4,067.7		126.6	3,941.1
Cuba	2,509.3			2,509.3
Thailand	1,399.1		21.3	1,377.8
South Africa	850.3		35.1	815.2
Mexico	793.6		25.0	768.6
Guatemala	779.6		73.2	706.4
Colombia	380.9		36.6	344.3
Nicaragua	199.8		32.0	167.8
El Salvador	162.8		39.6	123.2
Top-10	15,864.4		610.5	15,253.9
Others	3,452.5	1,744.1	989,5	718.9
Total	19,316.9	1,744.1	1,600.0	15,972.8

Source: F.O. Licht, World sugar balances, 1999; ACP Secretariat; USDA-ERS, Sugar and Sweetener Situation and Outlook, September 1999.

[19] In the US, the Secretary of Agriculture announces annually tariff-rate quota for sugar. These TRQ determine the quantities of sugar that may enter the US at a preferential import tariff rate. Access is duty free, except for five countries (Argentina, Australia, Brazil, Gabon and Taiwan) that lack Generalised System of Preferences status. These countries pay a small nominal import duty. Any additional quantity of sugar that is imported is subject to a higher tariff rate, but in general such imports are not commercially feasible (USDA, 1999).

3.2.2 Major importing countries

The raw sugar importers and the corresponding volume of imports of 1997/98 are listed in table 3.2[20]. Russia was the largest importer of raw sugar with imports equal to about 20% of total world imports and 23% of total purchases on the world market (excluding preferential imports). The top-11 of raw sugar importers account for 72% of total raw sugar imports, 67% of all imports from the world market and 100% of the preferential imports.

Table 3.2 Raw sugar import volumes, 1997/98 (in 1,000 tonnes of raw sugar)

Importing country	Imports from world market	Imports under preferential conditions	Total raw sugar imports
Russia	4,152.8		4,152.8
USA	561.5	1,600.0	2,161.5
EC	-	1,744.1	1,744.1
Japan	1,601.6		1,601.6
South Korea	1,367.2		1,367.2
Canada	1,082.0		1,082.0
Malaysia	974.0		974.0
Egypt	962.9		962.9
Morocco	525.9		525.9
Saudi Arabia	422.9		422.9
China	330.6		330.6
Top-11	11,981.4	3,344.3	15,325.5
Others	5,902.3	-	5,902.3
Total	17,883.4	3,344.3	21,227.8

Source: Derived from F.O. Licht, World Sugar Balances,1999; ACP Secretariat; USDA-ERS, Sugar and Sweetener Situation and Outlook, September 1999.

3.2.3 The share of the EC as an importer of raw sugar

The EC is the third largest importer of raw sugar with a volume equal to 8.2% of total world imports. Most of the EC sugar imports concern raw cane sugar imported under preferential conditions: Preferential Sugar (PS), Special Preferential Sugar (SPS) and Most Favoured Nation (MFN) sugar. The quantities of PS and MFN sugar are fixed, while the quantity of SPS may vary (see section 2.3.9). Because of the high import duties, the quantity of imported sugar for which the full import duty has to be paid is very limited (see section 2.3.4). The average level of EC sugar imports during the years 1996/97 to 1998/99 is summarised in table 3.3.

[20] Totals of table 3.1 and 3.2 are different as some sugar was in transit at the end of the year and because of inadequacy of data provided by the countries.

Table 3.3 Average annual EC sugar imports by category 1996/97-1998/99 (in 1,000 tonnes of white sugar equivalent)

Category	Quantity
Preferential Sugar	1,308
Special Preferential Sugar	303
MFN sugar	82
Imports by Aegan Islands, Azores, Canary Islands and Madeira	74
Imports pure sugar at full import duty	28
Import of sugar in Non-Annex I products (duties fully paid)	462
Total imports	2,257

Source: FIRS, 1999; tableau B13, and DG Agriculture, sugar balance sheets.
Note: The Spanish and Portuguese territories Aegan Islands, Azores, Canary Islands and Madeira are allowed to import sugar free of duty up to a maximum of respectively 12,000, 5,500, 60,000 and 10,000 tonnes per year, being a total of 87,500 tonnes (Man Sugar, 1996:42).

Because of the preferential nature of EC imports, their influence on the world market of raw sugar is an indirect one. In absence of the preferential arrangements, the ACP exporters would have to sell their sugar on the world market, and supply on the world market for raw sugar would be larger. Most likely, the additional volume would be smaller than the present volume of preferential sugar. Some of the preferential sugar can only be produced profitably when it is sold at the present preferential prices to the EC, and would not have been produced when world market prices had applied.

The fact that the preferential import arrangements of the EC reduce supply on the world market of raw sugar does not mean that these arrangements do have a positive effect on the raw sugar prices on the world market. Preferential imports cause an equivalent volume of additional export of white sugar, which will have a depressing impact on the prices of white sugar on the world market.

It is difficult to predict how the abolishment of the preferential import system of raw sugar of the EC will impact on the world market prices of raw and white sugar, not only because both markets (and prices) are linked, but also because abolishment could lead to more sugar being refined in ACP countries, and could lead to a redirection of sugar trade flows.

3.3 White sugar trade on the world market and the share of the EC

The main exporters and importers of white sugar and the corresponding volumes (of 1997/98) are presented in table 3.4**.** The EC appears to be the largest exporter of white sugar with 30% of world exports. Second and third are Brazil and Thailand, which are also major exporters of raw sugar. Australia and Cuba, although large raw sugar exporters, do not rank among the top-10 white sugar exporters.

The white sugar market is less concentrated than the raw sugar market. The top-10 exporters of white sugar serve 66% of the market (volume), while the top-10 exporters

of raw sugar serve 95% of the market. On the import side, the top-10 importers of white sugar account for 37% of total white sugar imports, while the top-10 importers of raw sugar account for 67% of total raw sugar imports.

Table 3.4 White sugar trade, 1997/98 (in 1,000 tonnes of raw sugar equivalents)

	White sugar exports		White sugar imports
EU	6,411.9	Nigeria	897.6
Brazil	3,329.8	Russia	886.7
Thailand	1,224.2	India	874.7
Pakistan	639.0	Iran	856.9
India	527.5	Algeria	643.2
Colombia	473.8	Sri Lanka	529.8
Poland	403.2	Iraq	510.1
Ukraine	398.6	Israel	471.6
Guatemala	365.1	Peru	458.3
South Korea	364.9	Indonesia	446.4
Top-10	14,138.0	Top-10	6,575.3
Others	7,169.0	Others	11,312.6
Total	21,307.0	Total	17,887,9

Source: F.O. Licht, World Sugar Balances, 1999.

The trend of EC sugar exports is depicted in figure 3.1. The export of quota sugar plus the equivalent of Preferential and Special Preferential Sugar is stable because:

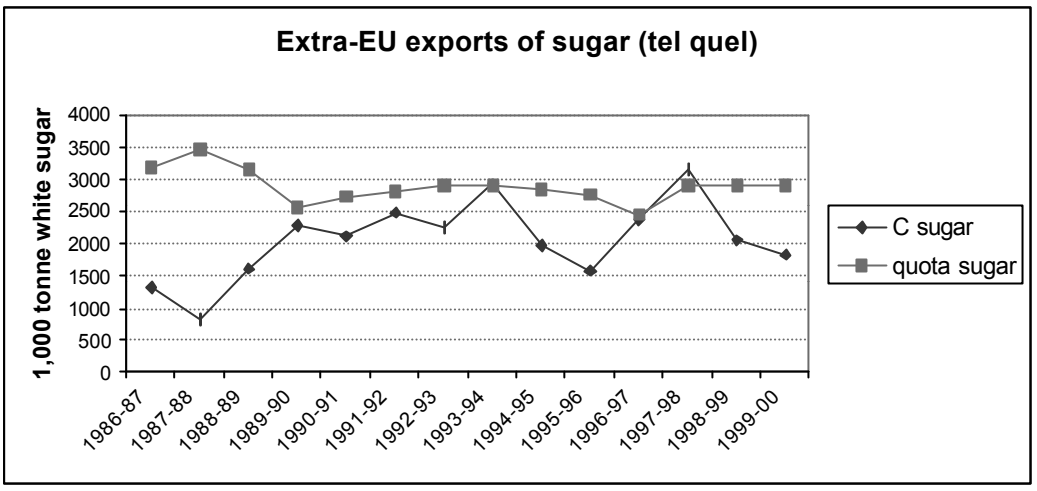
- each year the production of quota sugar is close to the total of the quotas in the EC;
- sugar consumption in the EC is fairly stable (see chapter 4);
- the quantities of Preferential Sugar are fixed, while the quantities of SPS do not vary much.

The fluctuation of C-sugar exports reflects the variation of total EC sugar production.

Over the last three campaigns (1996/97-1998/99), the EC exported on average 5.4 million tonnes of white sugar to the world market. About 2.9 million tons were exported with refunds (about 1.2 million tonnes of quota sugar and 1.7 million tonnes being the equivalent of SP, SPS and MFN sugar), while about 2.5 million tonnes consisted of C-sugar, exported without refunds (see also chapter 4).

Furthermore an average of 812,000 tonnes of white sugar equivalents was exported as sugar incorporated in food and drinks (non-annex I products; average of the years 1996/97 to 1998/99).

Figure 3.1 Extra-EC exports of sugar (tel quel)



Source: DG Agriculture, Sugar balances and final production tables, several issues.
Notes: Figures of 1998/99 are provisional and figures of 1999/2000 are estimates. Tel quel sugar is sugar and syrups not used as ingredient of other products.

The main destination regions of EC sugar exports over the years 1993-1997 are listed in table 3.5. About 40% of the EC sugar exports goes to the Middle East and about 20% to Eastern Europe and the former states of the Soviet Union. The five North African countries import about 13% of the EC sugar export.

Table 3.5 Extra-EC sugar exports per region (in 1,000 tonnes of white sugar)

	1993	1994	1995	1996	1997	% of total average 95-97
Western Europe	359	386	350	355	361	7.8
Eastern Europe	278	223	892	699	316	14.0
Former USSR	2039	192	360	267	487	8.2
North Africa	792	757	660	426	664	12.9
Rest of Africa	503	711	602	462	559	11.9
Middle East	1,206	2,068	1,914	1,493	1,980	39.6
Asia	79	243	105	84	280	3.5
Americas	57	74	44	46	41	1.0
Others	52	35	54	40	52	1.1
Total	5,365	4,689	4,981	3,872	4,740	100.0

Sources: FIRS, 1999, tableau B22.
Notes: Former Yugoslavian countries, Albania and Turkey are categorised as Eastern Europe.

Table 3.6 provides more detailed information on the destination of EC sugar exports. Major destination countries in 1997/98 were Algeria and Syria, each accounting for more than 10% of EC sugar exports. As shown, in 1997/98 about 56% of all sugar exports went to the Middle East and Northern Africa.

Table 3.6 Extra-EC exports of sugar per country, 1997/1998 (in tonnes of white sugar)

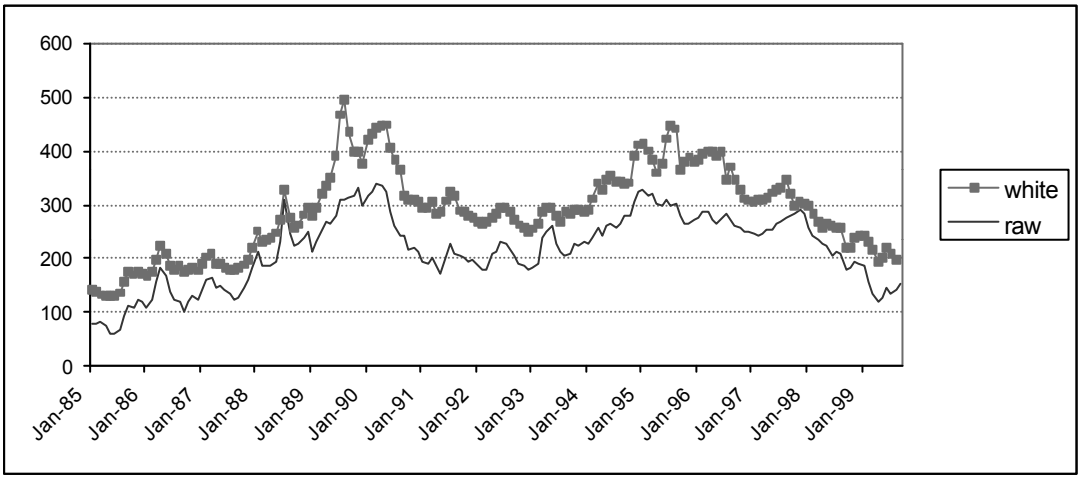
Destination	Tonnes white sugar	%	Cumulative %	Destination	Tonnes white sugar	%	Cumulative %
Algeria	670,287	11%	11%	Georgia	101,171	2%	65%
Syria	593,724	10%	22%	India	95,296	2%	67%
Israel	409,196	7%	29%	Lebanon	84,423	1%	68%
Iran	281,369	5%	33%	Romania	82,648	1%	69%
Russia	255,188	4%	38%	Jordan	82,158	1%	71%
Iraq	247,965	4%	42%	Albania	74,794	1%	72%
Libya	218,088	4%	46%	Latvia	72,618	1%	73%
Egypt	212,938	4%	49%	Yemen	71,107	1%	75%
Norway	174,562	3%	52%	Hong Kong	66,935	1%	76%
Tunisia	170,477	3%	55%	Saudi Arabia	64,932	1%	77%
United Arab Emirates	128,214	2%	57%	Guinea	64,697	1%	78%
Switzerland	116,892	2%	59%	Kuwait	64,242	1%	79%
Estonia	111,622	2%	61%	Mali	59,483	1%	80%
Mauritania	111,398	2%	63%	All others	1,165,542	20%	100%
Total exports (extra EU)	**5,851,965**						

Source: USDA-FAS, Country reports: EU, 1999.

3.4 World market prices of raw and white sugar

The evolution of the world market prices of raw and white sugar since 1985 is depicted in figure 3.2.

Figure 3.2 World market prices for raw and white sugar 1985-1999 (in US$ per tonne)



Source: F.O. Licht.

The graphs show that *nominal* prices have declined dramatically since 1995, to a level of about US$ 175 per tonne of raw sugar and US$ 200 per tonne of white sugar in 1999. These prices are lower than the production costs in most, if not all, sugar producing countries. According to industry sources, the most efficient producers, such as Brazil, are able to produce raw sugar at US$ 150-200 per tonne, while production costs in

Australia, which is considered as an efficient cane processor, are estimated at US$ 250 per tonne (see also chapter 5).

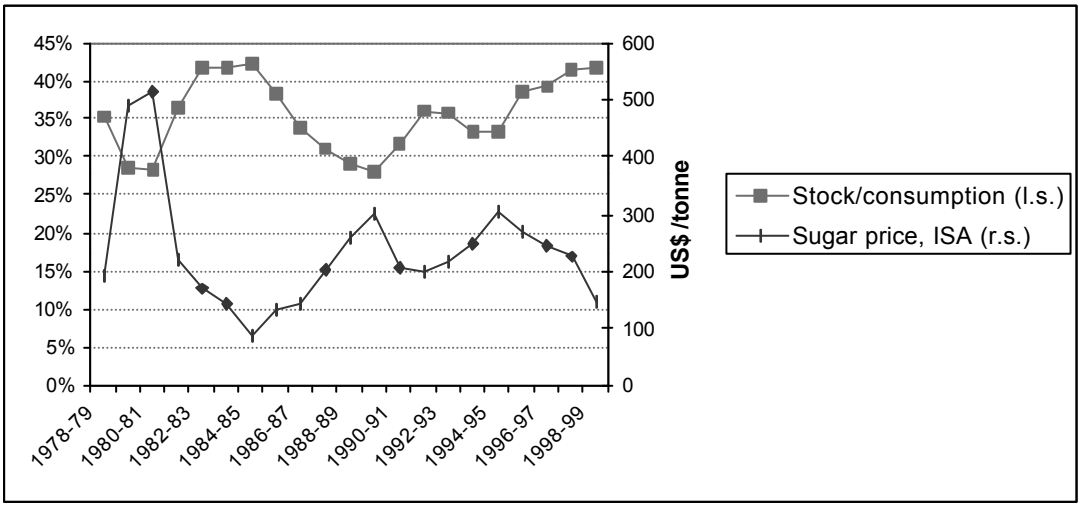
The major reasons for the present low world market prices are:

- increased exports of Brazil (partly due to the decline of the use of sugar cane for the production of ethanol), Australia, Cuba and Thailand;
- decreased imports by Asian countries and Russia due to the economic crisis in those countries since 1998.

Although the EC is the largest exporter of white sugar and the second largest exporter if exports of raw and white sugar are taken together, EC exports cannot be considered as the direct cause of the recent decline in world market prices, as EC sugar export have not increased over the last 15 years. However, the exports of other, third, countries increased markedly. From 1993 to 1997 sugar exports of Australia, Brazil and Thailand increased by more than 70% from 8.9 million tonnes to 15.4 million tonnes of raw sugar. Brazilian sugar production increased from about 8 million tonnes of raw sugar in 1990/91 to about 19 million tonnes in 1998/99 (Hannah, 1999).

There is a clear link between sugar prices and the stock ratio (world sugar stock as percentage of world sugar consumption). A fall or rise of the stock ratio coincides, to a certain extent, with an increase or decrease of prices (see figure 3.3). The correlation between these two indicators is analysed in figure 3.4.

Figure 3.3 Evolution of stock/consumption ratio (in %) and world market price for *raw* sugar (in US$ per tonne)

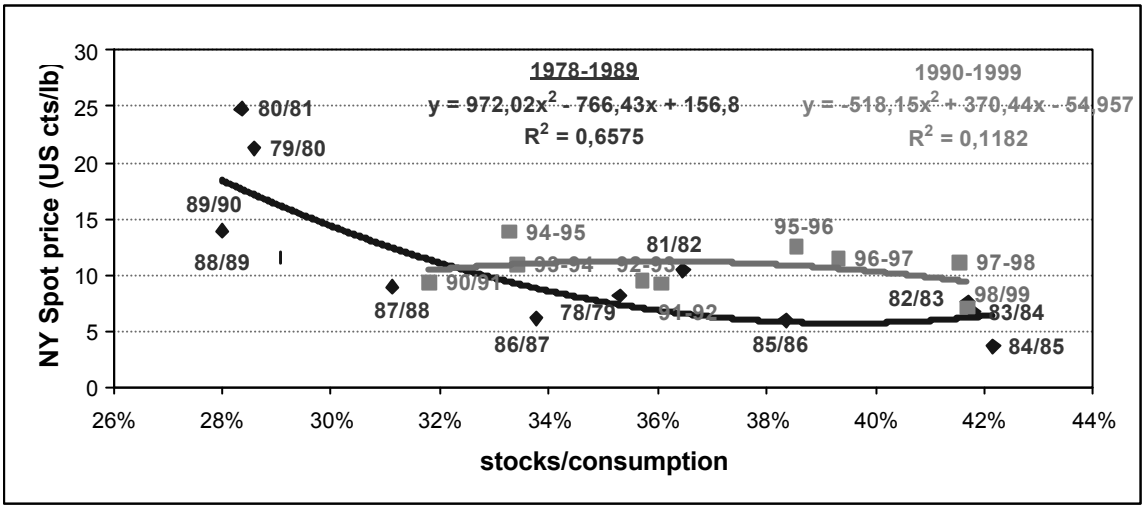


Source: F.O.Licht, World Sugar Balances, several issues, and International Sugar Association.

It appears that in the period 1979-1989, about 66% of the price changes can be explained by changes of the stock/consumption ratio. The correlation was much lower in the period 1989-1999, namely only 12%.

Prices are, of course, not only influenced by the stock/consumption ratio. Many other factors play a role, such as: the impact of changes in stocks and consumption on actual supply and demand on the market, balance of supply and demand in individual countries and trading blocks, sugar market policies of individual countries and trading blocks, etc. Some of these variables are analysed in the sections 3.5.3, 3.5.4, 3.6, 3.7 and 3.8.

Figure 3.4 Correlation between the stock/consumption ratio (in %) and the New York spot price of *raw* sugar (in US$ cts/lbs) (based on annual data, period 1978/79-1997/98)



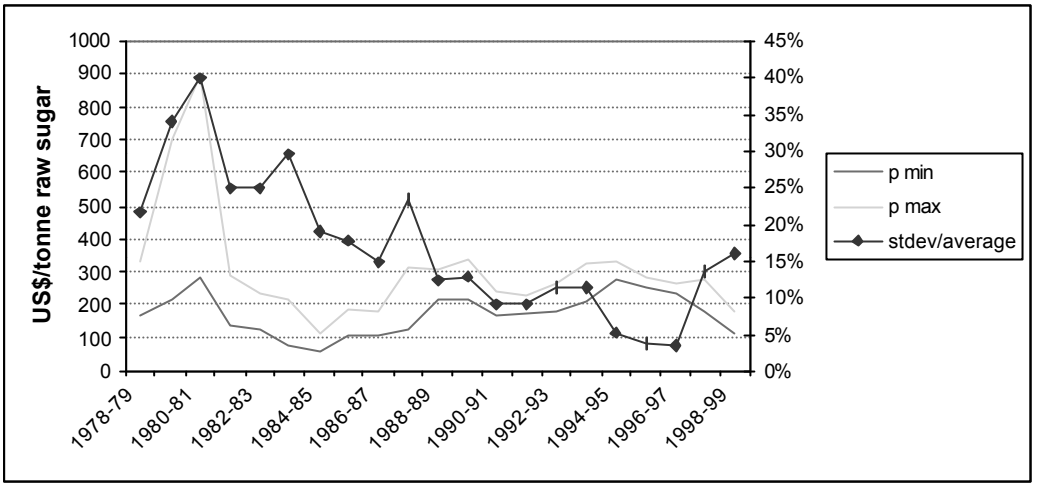
Source: Basic data from F.O.Licht World sugar balances, several issues, and International Sugar Association.
Note: Annual prices are the averages of the monthly prices from September to August.

3.5 Volatility of the world market price of sugar

3.5.1 The volatility of the world market price of sugar over time

World market sugar prices are highly volatile. A common indicator for measuring volatility is the standard deviation of the monthly prices divided by the annual average price. As is shown in figure 3.5, the price volatility of raw sugar decreased from 1980/81 to 1996/97 falling from 40% to less than 5%, with an increase to more than 15% since 1997-98.

Figure 3.5 Volatility of the world market price for raw sugar (in standard deviation divided by annual average price, expressed in %)

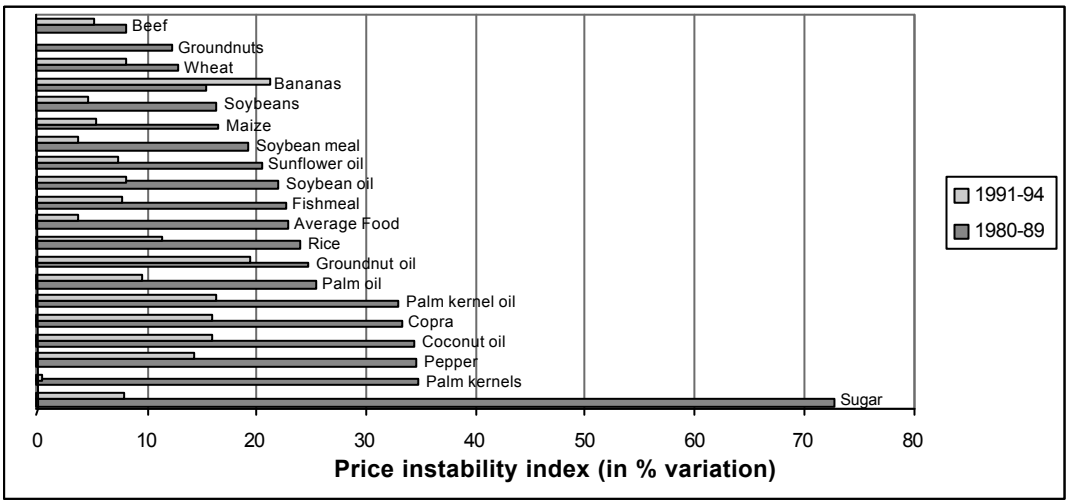


Source: F.O. Licht (I.S.A. sugar price).

3.5.2 The volatility of the price of sugar and other commodities compared

Figure 3.6, representing the price volatility of several commodities, shows that between 1980 and 1989 the price of sugar was the most volatile of all soft commodities. However, between 1991 and 1994 the sugar price volatility was close to the all-commodity average.

Figure 3.6 Price instability indices for selected agricultural commodities (in % variation)



Source: UNCTAD – Commodity Yearbook 1995.

The measure of instability used in figure 3.6 is in mathematical terms $\frac{1}{n}\sum_{t=1}^{n}\frac{\left|Y_t-\hat{Y}_t\right|}{\hat{Y}_t}*100$

where Y_t is the observed magnitude of the variable, Y_t is the magnitude estimated by fitting an exponential trend to the observed value and *n* is the number of observations. Accordingly, instability is measured as the percentage deviation of the variables concerned from their exponential trend levels for a given period.

3.5.3 Explanations for the volatility of the world market price for sugar

The main reasons for sugar price volatility are:

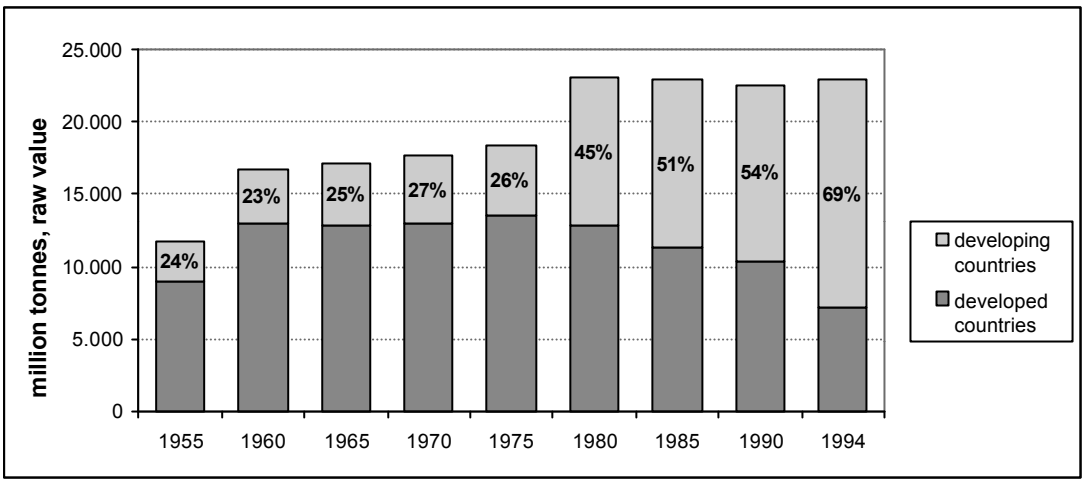
- supply variations due to weather conditions, pests and diseases;
- low price elasticity of demand (see hereafter in this section);
- the residual character of the world sugar market (see section 3.5.4).

Factors which might have caused an increase in the elasticity of demand for sugar during the decades, which could explain the decline in sugar price volatility, are:

- an increase in the availability of sugar substitutes;
- a reduction of sugar imports by public agencies and the increase of private imports. Many public agencies used to have a policy of (more or less) fixed prices which made demand non-sensitive to world market prices. The gradual change from public to private sector imports made that the average volume per transaction decreased, which contributed also to increased price stability;
- the increasing share of developing countries in total world sugar imports. In developing countries, sugar demand is more price elastic (price sensitive). The share of developing countries in total net sugar imports in the world has increased from 26% in 1975 to 69% in 1994 (see figure 3.7)[21]. At the same time, net imports of sugar in developed countries, where sugar demand is highly inelastic, decreased. Sugar production in many developed countries increased and reached the level of self-sufficiency.

[21] The world wheat and corn markets on the contrary are dominated by a handful of developed country exporters (US, EU, Australia and Canada).

Figure 3.7 The share of developing countries in sugar net imports (in Mio. tonnes raw value)



Source: Hannah and Spence (1996) (ISO).

3.5.4 The residual nature of the world sugar market

Another often-mentioned cause of the high volatility of sugar prices is the residual character of the world market for sugar. The qualification *residual market* has to be nuanced, however, when looking at the ratio of world production to total (volume) trade in sugar. In 1997/98 total world sugar production amounted to 128 million tonnes of raw sugar, while total (traded) exports were about 16 million tonnes of raw sugar equivalents (excluding preferential sugar, see table 3.1). In volume terms about 13% of total world sugar production was traded. Comparison with other agricultural product markets, such as wheat or corn, confirms the judgement that the sugar market is not more residual than other agricultural commodity markets. For example, in 1997 16% of the world wheat production was traded on the world market; for coarse grains and milled rice these percentages were 9.9% and 5.3%, respectively.

The residual character of the world sugar market has decreased since the break-up of the Soviet Union. The dissolution of the Soviet Union meant that the voluminous sugar supply from Cuba to the Soviet Union on the basis of a bilateral agreement came to an end. The sugar import demand of the Russian Federation and other former Soviet states became part of the world market. Moreover, formerly intra-Soviet sugar trade became also part of the world market (e.g., the export of Ukrainian sugar). Thus, the volume of the world sugar market has increased substantially because of the dissolution of the Soviet Union.

The qualification of the world market as a residual market can be questioned also if one analyses the export/production ratio of a number of major sugar exporters. It appears that the major exporters do not consider the world market as a residual market (see table 3.7). Countries like Brazil, Australia, Thailand, Cuba, Guatemala and South Africa produce sugar deliberately for selling on the world market.

Table 3.7 Export/production ratio of some countries in 1998/99

Country	Export/production
Brazil	47%
EU	30%
Australia	77%
Thailand	61%
Cuba	74%
Guatemala	73%
South Africa	51%

Source: USDA-ERS, Sugar and Sweetener Situation and Outlook, September 1999.

Brazil is a rather special case. Since the seventies until the early nineties, a large percentage of the sugar cane production was used to produce ethanol (fuel) and sugar for the home market. The surplus sugar cane was transformed into sugar, which was sold on the world market. Because of the subsidies on ethanol production, and because of the fact that producing sugar for the world market was not the first priority, it can be concluded that Brazilian cane processors used the world market as a residual market. This has changed during the nineties when subsidies for ethanol were phased out and ethanol demand slackened. As a consequence, Brazilian sugar exports increased dramatically. For Brazilian sugar producers the world sugar market became almost as important as the domestic sugar market. Although the world market is not a residual market for Brazil in terms of volume, it could be argued that the world market is residual in terms of price. The Brazilian sugar market is protected, just like the EC sugar market, and the domestic sugar price plus the domestic demand are high enough to cover most or all of the fixed costs of the sugar producers. Thus sugar can be sold on the world market at relatively low prices; if necessary as low as the marginal costs (just as in the case of the EC sugar). But it should be noted that the real production costs in Brazil are less than half the real production costs in the EC (see also chapter 7).

In other major sugar exporting countries, sugar producers receive some kind of implicit or explicit subsidy. The Australian government subsidises the irrigation systems of the sugar cane plantations. In Thailand, growers can benefit from a credit below market interest rates and from subsidised fertilisers. However, the level of support in these countries is much lower than the EC support. A number of other small sugar exporters have also highly protected domestic sugar markets. They export their surplus sugar (small quantities) at any price the world market offers. For them the world market is really a residual market.

In terms of its export/production ratio of 30%, the EC average is comparable to the world average, but considerably less than most major exporters (see table 3.7). However, despite the relatively large percentage the EC appears to treat the world sugar market as a residual market. EC sugar companies produce in the first place for the EC market, where (more or less) guaranteed A and B quota prices are high enough to cover all variable and fixed costs. Additional production, which varies depending climatic

circumstances, is sold on the world market. Prices on the world market are acceptable to EC sugar producers as long as they can cover their variable costs.

The conclusion should be that for most countries the world market *is not* a residual market in terms of volume. However, it *is* residual in terms of prices, because most of the major sugar exporting countries protect the domestic market (price support and subsidies), which allows the producers to cover most of the fixed costs through selling on the domestic market and to sell at relatively low prices on the world market (if necessary as low as the marginal costs).

3.6 Influence of the CMO Sugar on the world market price of sugar

A crucial question for evaluating the contribution to the smooth development of international trade is the impact of the CMO Sugar on the world market price of sugar. In absence of the CMO Sugar (*all other things equal)*, the world market price would be higher, because the EC would not export but buy most of its domestic consumption needs on the world market. Based on the data represented in figures 3.3 and 3.4, a "quick-and-dirty" *static* estimate suggests that if the EC would decrease its quotas with 10% - being the equivalent of 1.5 million tonnes of *raw* sugar -, EC sugar exports would decrease by about 1.5 million tonnes (assuming that no additional C-sugar would be produced). The short-term effect would be a decrease of world stocks with 1.5 million tonnes, which translates into a decrease of the stock/consumption ratio from 0.415 to 0.403[22]. This decrease of the ratio would cause an increase of the New York spot price of about 15 US$/tonne per tonne[23] (which is about 8% of the present raw sugar price of US$ 180 per tonne). A price increase would benefit other producing countries and harm net sugar importers.

Long-term dynamic effects - which include the price effect on domestic production structures and the supply response of other, third, countries - can only be analysed on the basis of a detailed model of world sugar production and consumption. A study by the World Bank concluded that the long-term impact of the CMO Sugar on the sugar world market price could be about minus 17% (Borrell and Duncan; 1990). It estimated that the annual income foregone because of lower prices would amount to US$ 160 million for Australia and Brazil, US$ 72 million for Thailand, US$ 50m for the Philippines and South Africa, US$ 20m for the Dominican Republic and US$ 13 million for Colombia and Guatemala (in 1984 US$ values). Table 3.8 summarises the findings of different scenarios of world trade liberalisation generated by different models, both in terms of their absolute and their relative price effect. While the studies are far from unanimous[24] as to level of the price increasing effect of trade liberalisation (i.e. the price depressing effects of the current export subsidies), the tendency - represented by the sign in table 3.8 – is clear. More recent studies appear to predict a lesser impact of liberalisation on world market prices than earlier studies.

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22 Stock to use ratio of 1997/98 was 51.076 million tonnes divided by 122.928 million tonnes.
23 Calculation based on the function $Y = - 518.15X^2 + 370.44X – 54.957$, shown in figure 3.4.
24 See also the general observation on the use and results of models in section 3.1.

Table 3.8 Impact of trade liberalisation on world market prices

Authors	Study base period	Price effect (%)	Price effect US$/tonne Prices 1990	Scenario
Tyers and Anderson (1986)	1987	+10%	+17.2	Liberalisation by East Asia and Western Europe
OECD (1987)	1979-81	+1%	+6.8	10% reduction in assistance to OECD sugar producers
Webb, Ronigen and Dixit (1987)	1984	+53%	+98.1	Complete trade liberalisation, 12 commodities
Huff and Moreddu (1990)	1982-85	+25%	+99.2	Multilateral trade liberalisation
Martin et al. (1990)	1980-83	+60%	+200.6	Multilateral trade liberalisation
Lord and Barry (1990)	1990	+10 to 30%	+22 to 88	Multilateral trade liberalisation
ABARE (1993)	2000 baseline	+5.30%		Implementation of Uruguay agreement
USDA (1994)	2000 baseline	+2 to 5%		Implementation of Uruguay agreement
Unctad (1995)	2000 baseline	+5%		Implementation of Uruguay agreement
Wong, Sturgiss and Borrell (1989)	1985-2004 simulation	+8%		OECD price liberalisation
Wong, Sturgiss and Borrell	1985-2004 simulation	+33%		Liberalisation of Japan, EU and US markets

Source: Borrell and Pearce (1999: 18).

The extent to which the EC has influenced the world market price of sugar as a (partial) indicator of its contribution to the smooth development of international trade in sugar cannot be determined in absolute and unequivocal terms. However, it is clear that the CMO Sugar has had and still has a depressing effect on the world market price of sugar.

In the absence of a simulation model, the question whether the CMO Sugar has contributed to price instability could not be determined in exact quantitative terms in the context of this study. However, there exists a positive correlation between the volume of EC sugar exports and the world market price level (Paris spot market prices), with a correlation coefficient as high as 0.61 over the period 1981-1997. The causal relationship is mainly a one-way flow, with EC exports increasing when world market prices rise. As such, the increased EC export will decelerate the increase of the world market price. For the period 1990-97 the correlation between the volume of EC sugar exports and world market prices was considerably weaker however (0.18 only).

3.7 The CMO Sugar, export support and international trade in sugar

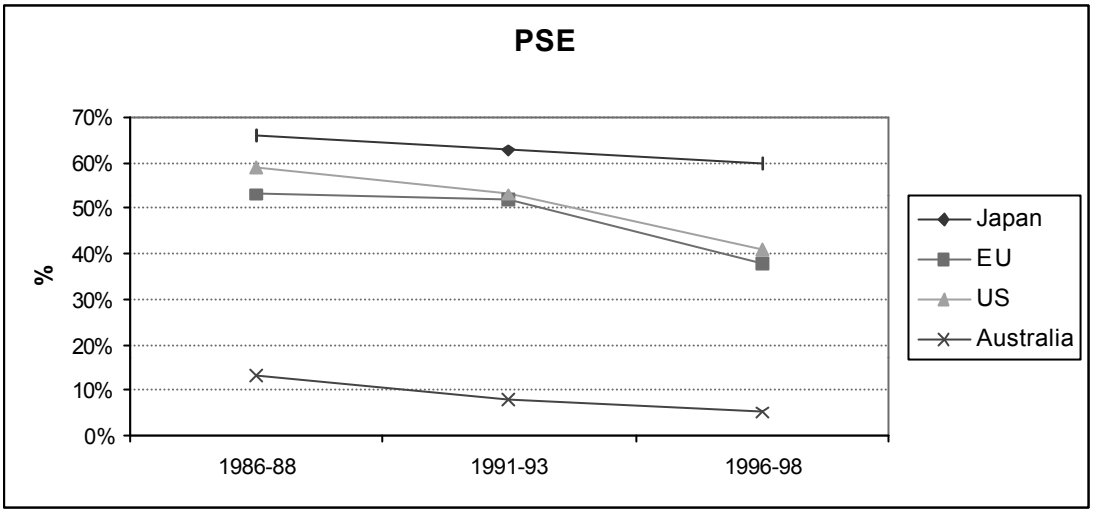
The contribution of the CMO Sugar to the development of international trade in sugar, in terms of effects of both improved market access into the EC and reduced EC export support - contributing to a level playing field in international trade in sugar - is difficult to measure. A reasonably acceptable proxy for the reduction in EC export support is the Producer Subsidy Equivalent (PSE). The PSE is an indicator of the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm gate level, arising from policy measures which support agriculture, regardless of their nature, objectives or impacts on farm production or income. Although the PSE covers more than export support in the strict sense it is the only reliable and undisputed measure available. The PSE does not provide us, however, with a reliable measure of (improved) EC market access.

The Producer Support Equivalent can be expressed in three ways:

- in monetary terms;
- as a ratio to the value of gross farm receipts valued at farm gate prices, including budgetary support (percentage PSE); or
- as a ratio to the value of gross farm receipts valued at world market prices, without budgetary support.

Since the mid-1980s, the average percentage PSE for sugar in the EC has fallen from 53% in 1986-88, to 52% in 1991-93 and 38% in 1996-98. For 1998 the PSE was estimated to rise to 43%. Measured in ECUs, the PSE has dropped notably as well: in 1998, the Producer Subsidy Equivalent for sugar in the EC equalled ECU 1,855 millions. This was higher than in 1997 (ECU 1,828 millions), but 33% lower than the figure for 1991-93. For a full overview of figures of the EC and three other countries, see annex A1.

Figure 3.8 The evolution of PSEs of sugar beet production for selected OECD countries for the period 1986-1998 (as a % of gross farm receipts, valued at farm gate prices)



Source: OECD.

Figure 3.8 shows the development of PSE percentage levels over the years for the EC, the USA, Japan and Australia. The comparison has been restricted to major OECD countries for which data were available and are important from a sugar production and/or trade point of view. Of these countries Japan and the USA are importers, while the EC and Australia are major exporters. As figure 3.9 shows, in all countries percentage PSE levels have declined over time. Patterns for the EC and the USA are almost similar, with USA support being somewhat higher in all periods. Support levels in Japan are much higher and have not decreased as much as in the other countries. The percentage PSE of Australia, which was already low in the mid-1980s, has gone down even further. On the basis of this (limited) PSE comparison, the level of EC support for sugar producers appears to be in line with the levels in the USA and Japan. When the PSE is taken as a proxy for export support, these results would imply that international trade relations have not been put under relatively more strain and pressure by the EC than by the USA and Japan. A full judgement regarding EC export support policies for sugar and its effect on the development of international trade is not possible on the basis of a PSE comparison alone. Such a judgement should also be based on a (comparative) analysis of market access possibilities (see next section).

3.8 The CMO Sugar, market access and rules in force for international trade

3.8.1 Equal and sufficient EC market access?

Third countries do not enjoy *equal* market access into the EC. This is primarily due to the existence of preferential trade agreements (Preferential Sugar; Special Preferential Sugar; Maximum Supply Needs, see section 3.2.3 and chapter 2). Preferential trade

agreements have a discriminatory effect in the sense that part of the sugar is traded on the basis of special arrangements different from the ones prevailing on the world market. Preferential trade agreements for sugar diminish market transparency, redirect trade flows, increase price instability on the world market (see section 3.6) and may cause discontent among other third countries (especially potential trade partners). The preferential trade agreements introduced by the EC do not contribute to the creation of a level playing field in sugar trade. For these reasons, the preferential trade agreements for sugar have not contributed to the smooth development of international trade in raw and refined sugar.

Whether third countries enjoy *sufficient market access* into the EC is a difficult question. When this question is evaluated against the rules in force in international trade as laid down in the WTO-GATT Agreement on Agriculture, the answer is an unequivocal yes (see below). The EC keeps up with the rules and stays within the limits specified in the Agreement. However, when the criterion would be whether the major exporting countries feel they have sufficient access into the EC, the answer would probably be no. Until the Agreement on Agriculture took effect, the EC sugar market was effectively sealed off from the world market by a system of variable import duties (see also section 2.3.4). This system made sugar imports unattractive and exporting to the EC was in practice impossible for countries other than the EC's preferential trade partners.

The preferential sugar trade arrangements with ACP countries, India, Brazil and Cuba are attractive for the countries concerned (see Annex A3), both because of guaranteed entry to the EC market and because of a price which was two to three times higher than the average world market price during the last ten years. On the one hand, these preferential arrangements have a negative impact on the stability of the world market of raw sugar as they insulate about 4.6% of the volume of internationally traded raw sugar from the world market. As such, the world market of raw sugar is made thinner, with a greater risk of price instability.

On the other hand, raw sugar imports from ACP countries into the EC cause an equivalent volume of (additional) EC white sugar exports, traded on the refined sugar market. In case the preferential trade arrangements would not exist (and given the sugar surplus in the EC), the EC exports of white sugar would be smaller, while the ACP countries, India, Brazil and Cuba would bring more raw sugar on the world market. This would create more stability on the raw sugar market and less stability on the white sugar market. Most likely, however, part of the present raw sugar production in some ACP countries would be stopped, because it can not be produced profitably at long-term average world market prices. Other ACP countries might decide to set up refineries in order to be able to export white sugar and create a higher value added.

To the extent that the preferential sugar trade agreements insulate part of the raw sugar trade from the world market and that those agreements are a disincentive for some ACP countries to set up refining capacity for the export of white sugar, the preferential agreements do not contribute to the smooth development of international. The current

preferential trade arrangements under the CMO Sugar hamper the quick and efficient allocation of resources, i.e. the structural development of the sugar (and other) industries, in the ACP countries.

3.8.2 The CMO Sugar and its compliance with the WTO-GATT rules

Since the mid-1990s market access into the EC is subject to rules in force in international trade, as laid down in the WTO-GATT Agreement on Agriculture and concluded at the GATT Uruguay Round. The Agreement on Agriculture covers the period 1995/96 to 2000/01 and comprises a vast range of commitments in the areas of market access, export subsidisation and domestic support of agricultural products, including sugar. A full-inclusive analysis of the implications of the Agreement on Agriculture for EC trade relations with third countries can be found in Annex A2. Here only the major findings are reported.

The Agricultural Agreement requires a minimum market access at reduced or nil import duties for each agricultural product of 3% of domestic consumption in 1995/96 and 5% in 2000/01. The EC has no problem to fulfil this commitment, because it imports 1,304,700 tonnes of sugar (white sugar equivalents) duty free from the ACP countries and India every year, which is more than 10% of the sugar consumption[25]. Moreover, as a result of the accession of Finland to the EC, the EC is also obliged to import 85,463 tonnes of raw sugar (equivalent to 78,626 tonnes of white sugar) at a reduced import duty. Furthermore, the EC imports 200,000 to 300,000 Special Preferential Sugar at a reduced import duty rate from the ACP states each year. The exact quantity depends on the supply needs of the cane sugar refineries in the EC and the production of sugar cane in the French overseas territories. However, these SPS imports are not acknowledged by the WTO as being part of the minimum access requirement.

The Agricultural Agreement also obliges the EC to improve market access by replacing the ad valorem import duties by fixed import duties (done in 1995) and a gradual reduction of the fixed duty by in total 20% between 1995/96 and 2000/01, compared to the average of the years 1986/87 to 1988/89 (the base year of the Agricultural Agreement; see Annex A2 and section 2.3.4). The EC is allowed to impose an additional import duty when the cif (costs of insurance and freight) sugar import price is lower than 90% of the trigger price of EUR 531 per tonne (the ”Special Safeguard Clause”). The additional import duty is a function of the difference between the trigger price and the world market price. The safeguard clause has been effective since 1995, because of the low world market prices, and has prevented non-preferential sugar imports entering into the EC.

The Agricultural Agreement imposes also constraints on subsidised sugar exports (exports with refunds). In the year 2000/01 the subsidised quantity has to be 21% lower than in the base period (1986/87-1988/89), while the total subsidy amount has to be

[25] The EU must import a minimum 630.000 tonnes o f sugar (white sugar value) every year, or 5% of consumption of 12.6 million tonnes (CIBE-CEFS; 1998).

36% lower than in the base period. The financial outlay for subsidies on agricultural ingredients, including sugar, in food and drinks (Non-Annex I products) has to be reduced by 36% as well. There is no quantitative limit for Non-Annex I products.

The general conclusion is that the CMO Sugar has until now incorporated the GATT rules imposed in its system of production control and export refunds quite easily. Until 1999/00 the limits of the Agricultural Agreement have not yet had an impact on the EC sugar sector and on its import and export performance, because the limits were not yet reached. Particularly the safeguard clause regarding import duties has prevented competition from imported sugar. The limit on the total amount for export subsidies (refunds) will become effective most likely in 2000/01, which will result in either reducing the intervention price or the production of quota sugar or both.

3.9 Further remarks on the impact of the CMO Sugar on the smooth development of international trade in sugar

The CMO Sugar has by means of its price support system - intervention price, import duties and export refunds - and its quota system made it possible to insulate its production of quota sugar from the world market. EC sugar producer prices were two to three times higher than the world market price since 1985. This allows (i) EC beet growers to earn a reasonable living according to EC standards, and (ii) the EC sugar processing industry to realise an attractive rate of return. Consumers of sugar and sugar-containing products pay most of the bill of these high sugar prices. The consequences of the CMO Sugar for the development of international trade in sugar can be summarised as follows:

- The production of quota sugar is structurally at least 10% higher than sugar consumption in the EC. The price producers receive for this surplus quota production is generally at least twice as high as the average world market price. This is made possible by the system of production levies and export refunds. Without this system most of the surplus quota would not have been produced and EC supply to the world market would have been lower.
- EC sugar exports are about 13% of total supply on the world market (white and raw taking together). Taking into account preferential sugar imports, the net EC exports are 9% of the world market. If these exports would not exist, most likely world market prices would be higher and/or more sugar would be exported by countries with relatively low production costs.
- The relatively high EC support prices allow the sugar beet farmers and processors to recover fixed costs and to attain a reasonable income on the basis of the production of quota sugar. As a consequence, they can produce C-sugar for export on the basis of a marginal cost approach, as long as marginal costs are below the average world market price. Through this mechanism, the CMO Sugar stimulates C-sugar production. If support prices were lower, most likely less C-sugar would have been produced and sold on the world market.
- The volume of EC sugar export has been quite stable over the years. As such the EC exports have not caused instability on the world market. Also the dramatic decline

of world market prices since 1995 was not caused by EC exports. The price decline was primarily caused by a substantial increase of exports from Brazil, Thailand and Australia. At the same time, import demand from Russia and a number of Asian countries declined.

- The average cost per tonne EC sugar is two or three times higher than the average cost per tonne of its main competitors (e.g., Brazil, Thailand, Australia, see also chapter 7). In the absence of the CMO Sugar there would have been no EC sugar export. Most of the European sugar demand would have been met by imports of white sugar and raw cane sugar to be refined in the EC. Maybe there would have been some sugar production in North Western Europe still. In such a situation, the volume of the international sugar trade would be about 46% higher than the present trade volume (57 million tonnes in stead of the present 39 million tonnes of raw sugar equivalents). Because of the higher demand and trade volume, world market prices could have been at a higher level and more stable than presently.
- The CMO Sugar, and in particular the export refund system, does not stimulate EC exporters to undercut prices on the world market. Export refunds can be obtained through a tendering system, and cannot be higher than the difference between the intervention price and the world market price. This forces exporters to try to get the maximum price on the world market.

3.10 Conclusions

The indicators and judgement criteria for answering the evaluation question have been outlined in section 3.1, particularly in the second last paragraph. The conclusions regarding these indicators and judgement criteria are summarised in this section.

Stability of the world market price of sugar

By insulating most of the EC sugar production and consumption from the world market as well as the sugar imported under preferential trade agreements, the CMO Sugar has a negative influence on the stability of the world market price. The world market is thinner and there are less trading partners than there would have been in the absence of the CMO Sugar. As a consequence, changes in supply and demand of some countries operating on the world market cause greater price changes in the present market structure with the CMO Sugar than without the CMO Sugar. Only the export of C-sugar bears a more direct relationship with the world market price: higher or lower world market prices cause an increase, respectively decrease of the EC sugar export. This will have a cushioning effect on world price levels, and hence contributes to stability of the world market price.

Price distortions

EC sugar export prices are highly distorted in the sense that those prices are far below the actual production costs in the EC. The export (at prevailing world market prices) is made possible and profitable because of:

- the system of production levies and export refunds, in the case of surplus B-sugar; and
- the fact that all fixed and overhead costs are covered by the profitable production of quota sugar for the EC markets, which implies that C-sugar can be exported at marginal costs.

The fact that a high-cost sugar producer like the EC is still capable of exporting substantial quantities of sugar has a downward effect on the world market price of sugar, which is a cost for other sugar exporting countries and a benefit for sugar importing countries. From the point of view that international trade should be the result of differences in comparative advantages and cost prices, the driving forces of the present sugar exports of the EC can not be considered as a contribution to the smooth development of international trade.

Since the early nineties the level of export subsidisation, as witnessed by the Producer Subsidy Equivalent, has decreased from about 50% in 1991-93 to about 40% in 1996-98. Thus the CMO Sugar has allowed a reduction of export subsidisation and has reduced its negative impact on the smooth development of international sugar trade.

Access to the EC markets

The level of the import duties on sugar has been prohibitive for any sugar import, other than imports under preferential trade agreements. From this point of view, the CMO Sugar has not contributed to the smooth development of international trade.

The WTO-GATT Agreement on Agriculture includes a gradual reduction of the EC import duties on sugar. Although the level of the duties on sugar still prevents the importation of sugar other than those imported under the preferential agreements, in the near future the duties will reach such a level that EC sugar production will have to compete with imported sugar from countries with low production costs.

The question whether third countries enjoy *sufficient* access to the EC markets can be approached from two angles. When evaluated against the rules in force in international trade as laid down in the WTO-GATT Agreement on Agriculture, the answer is “yes”. The EC keeps up with the rules and stays within the limits specified in the Agreement. However, when the criterion would be whether the major exporting countries have effectively access to the EC sugar markets, the answer is “no”.

The sugar trading relations of the EC with producer countries eligible for preferential import duties have been “smooth” in the sense that volumes where fixed and that there was a common (political) understanding that the effective price should be more or less equal to the Intervention Price. It should be noted that these “smooth” trading relations were not part of the world sugar market.

Non-discrimination in trade relations

On the export side there is no discrimination in trade relations. There are no preferential sugar export agreements. All exported sugar is offered at prevailing world market prices to any interested buyer.

On the import side, third countries do not enjoy *equal access* to the EC markets. This is primarily due to the existence of preferential trade agreements (Preferential Sugar; Special Preferential Sugar; Maximum Supply Needs). Preferential trade agreements have a discriminatory effect in the sense that part of the sugar is traded on the basis of special arrangements different from those prevailing on the world market. Preferential trade agreements for sugar diminish market transparency, redirect trade flows, increase price instability on the world market and may cause discontent among other third countries. Moreover, preferential trade agreements introduced by the EC do not contribute to the creation of a level playing field in sugar trade.

4 Stabilisation of the EC sugar market and the security of supply

4.1 Introduction

This chapter deals with evaluation question 1.5, which reads *"Has the common organisation of the sugar market helped to stabilise Community and world markets in terms of volume and price, and to ensure reasonable security of supply at Community level?"*.

Part of this evaluation question, namely the impact of the CMO Sugar on the *world market*, in particular the stabilisation in terms of volume and price, has already been dealt with in chapter 3. This chapter will therefore focus on the question *"Has the common organisation of the sugar market helped to stabilise the Community (sugar) market in terms of volume and price, and to ensure reasonable security of supply at Community level?"*

"To stabilise markets" and "to assure the availability of supplies" are two central objectives of the Common Agricultural Policy. Whether the CMO Sugar has helped to stabilise the Community sugar market can be measured both in terms of price (indicator: price volatility, see chapter 3) and volume (indicator: development and change in production and consumption volume over time). As total domestic demand determines the total sugar volume required, the question whether the CMO Sugar has helped to stabilise the Community market in terms of volume ultimately depends on the development of EC consumption in relation to EC production and imports.

Whether the CMO Sugar has helped to ensure a reasonable security of supply at Community level is closely related to the stability question. The core question is whether supplies at Community level have been sufficient to meet domestic demand of sugar at any point in time, without large (esp. upward) deviations in price and without any major shortages.

The approach taken in this chapter is an empirical one. On the basis of an analysis of supply and demand facts and figures (production, consumption and price evolution and the CMO Sugar arrangements), a qualitative judgement will be given of how the CMO Sugar has helped to stabilise the Community sugar market and how it has helped to ensure the security of supply.

The chapter is organised as follows. Section 4.2 discusses the market of supply and demand of sugar, analyses the intra- and extra-EC trade in sugar and assesses the contribution of the CMO Sugar to the stabilisation of the Community market in terms of *volume*. Section 4.3 analyses the development of (effective) support prices by Member State, and assesses the impact of the CMO Sugar on stabilising the Community market in terms of *price*. Section 4.4 evaluates the impact of the CMO Sugar on the security of supply. Section 4.5 concludes.

4.2 The EC sugar market: production, consumption and trade

4.2.1 The supply of sugar in the EC

The annual supply of sugar on the EC market consists on average of[26]:

- 14.1-14.3 million tonnes of quota sugar produced in the EC and the French overseas territories;
- about 1.7 million tonnes of preferential imports of sugar (see sections 2.3.9 and 2.3.10);
- 28,000 tonnes of non-preferential imports;
- 74,000 tonnes of duty-free imports from the Spanish and Portuguese islands (Aegan Islands, Azores, Canary Islands and Madeira).

All C-sugar has to be exported outside the EC, and is therefore defined here as not forming part of the Community market. Annex A4 provides a full overview of quota sugar production, C-sugar production and total sugar production per Member State and the EC for the period 1990/91-1998/99. The total supply of sugar in the EC (excluding C-sugar) does not vary much from one year to another, because:

- most Member States produce their full quotas each;
- each year the full quota amounts of ACP sugar (1,305 million tonnes; including 10,000 tonnes from India) and MFN sugar (82,000 tonnes) are imported. Only the import volume of SPS sugar varies in a range of 270,000 to 335,000 per year (period 1995-1999). Variations are mainly determined by the volume of production of cane sugar in the French overseas territories;
- non-preferential imports of sugar are very limited, because of the very high import duties, and do not vary much from one year to another;
- the imports of sugar by Spanish and Portuguese islands is quite stable from one year to another.

In order to assess the share of quota sugar in total sugar production, the annual sugar production has been expressed as a percentage of the quota (see table 4.1). On the basis of this table, the following observations can be made:

- At the level of the EC total production fluctuated between 109 and 122% of total quota. Quota production was 97-98% of the total available quotas.
- Most Member States produce always (substantially) more than their quota, apart from a few exceptions, which were mostly due to climatic circumstances (Belgium in 1998, Denmark in 1992, Ireland in 1993 and the Netherlands in 1998).
- Production in Finland fluctuated considerably between 85 to 125% of the allotted quota.
- For most years Greece produced substantially less than its quota.
- Italy was not able to use its full quota until 1995 (about minus 3% over the years 1990-1996). Quota use has improved since 1996.

[26] See also section 3.4 for more details.

- Portugal did not use most of its quota until 1996. In 1997 it started importing sugar beets from Spain in order to use its quota.
- Spain did not use its full quota during the years 1989-1992. Since 1992 it produces on average about 15% more than its quota.

Table 4.1 Total sugar production as percentage of quota, by Member State, 1990/91-1998/99

Member State	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99
Austria	-	-	-	-	-	113	126	124	125
Belgium	128	108	108	126	105	108	115	123	*96*
Denmark	128	110	*97*	123	105	102	119	127	125
Finland	-	-	-	-	-	110	*93*	125	*85*
France	131	122	131	131	122	127	126	142	129
French DOM	*51*	*52*	*60*	*50*	*44*	*51*	*55*	*51*	*50*
Germany	165	113	117	126	106	111	122	117	117
Greece	*90*	*86*	111	*96*	*78*	*90*	*83*	114	64
Ireland	113	107	112	*88*	107	111	114	103	110
Italy	*93*	*96*	119	*90*	*95*	*95*	*92*	111	102
Netherlands	142	120	132	130	111	113	119	117	*95*
Portugal-c	*3*	*2*	*3*	*5*	*10*	*7*	*4*	100	*94*
Spain	*95*	*86*	*95*	121	112	110	120	114	116
Sweden	-	-	-	-	-	96	108	107	108
UK	108	106	129	125	110	106	129	139	126
EU excl. C*						108.8	115.0	121.8	112.5
EU incl. C*						97.1	96.7	98.4	96.8

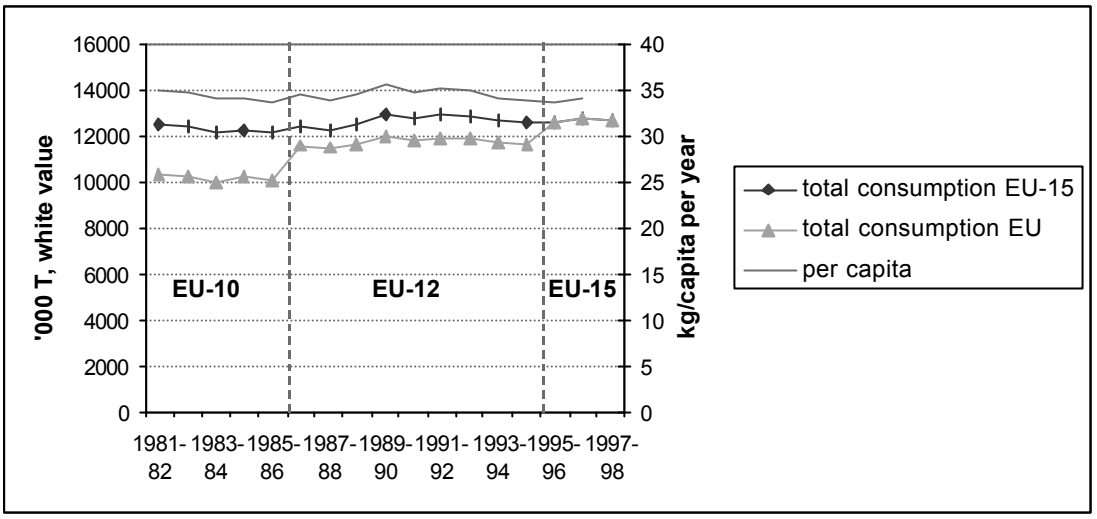
Source: Total sugar production per Member State: Eurostat. Total production figures France and French Overseas Territories (DOM): FIRS, 1999. Tableau C.1 plus tableau B.18.
Note: * Excluding, respectively including C sugar.

4.2.2 The consumption of sugar in the EC

The evolution of EC sugar consumption - both direct consumption and industrial use of sugar - for the period 1981/82-1997/98 is shown in figure 4.1. Since 1990 consumption has been more or less stable at a level of about 12.7 million tonnes per year. The stability of sugar consumption is the result of a stable population and little change in the average consumption per capita. Consumption per capita (currently approx. 34 kg/year) has increased only modestly because of (i) health concerns about too much sugar consumption, and (ii) replacement of sugar by alternative sweeteners (such as isoglucose, inulin syrup and artificial sweeteners). Nevertheless, the replacement of sugar by alternative sweeteners has been relatively limited in the EC in comparison with some other regions in the world, notably the USA and China. In the EC, sugar represents still about 80% of all sweetener consumption. This is partly a direct result of the CMO Sugar[27] (see also chapter 6).

[27] The CMO Sugar has an impact on the use of isoglucose by limiting the supply on the EC market through a quota system. Without the quota restrictions on isoglucose, probably a larger quantity of sugar consumption would have been replaced by isoglucose, because the production costs of isoglucose are notably lower than the intervention price of sugar. The CMO Sugar limits also the supply of inulin syrup through quotas, but that limit is not effective because the producers do not use the entire quotas.

Figure 4.1 Evolution of sugar consumption in the EC



Source: DG Agriculture - Sugar Balances (Total consumption figures) and Eurostat (Population figures).

It is sometimes argued that the CMO Sugar influences the total demand for sugar, because setting and maintaining a relatively high sugar price would have a negative impact on total sugar demand. However, according to calculations of the International Sugar Organisation (ISO), the price elasticity of demand for sugar in developed countries is around zero, which means that sugar price changes have no effect on the demand for sugar (Rabobank, 1995*)*. The income elasticity of sugar is low as well, as is the share of sugar in total household expenditure in developed countries. Sugar represents between 0.1 and 0.3% of family household consumption in the EC and between 0.5% and 1.5% of total food consumption. Expressed in money terms, sugar consumption amounts to about ECU 21-50 per household per year, or ECU 11-20 per adult equivalent.

4.2.3 EC production, preferential imports and consumption confronted

Table 4.2 presents the averages of sugar production, preferential imports and consumption by Member State and the EC during the years 1995/96 to 1997/98. The surplus or deficit per Member State is made up of imports and exports (intra-EC and extra-EC trade, excluding preferential imports) and changes in stocks. The overall balance of the EC is made up of extra-EC exports and imports (excluding preferential imports) and the overall balance of change of stocks. The figures show that from 1995/96 to 1997/98, Spain and Greece faced serious deficits (of 19% and 9% of supply, respectively). Smaller deficits occurred in Portugal (6%), Sweden (4%) and Finland (2%). Member States with substantial surpluses were Austria (17%), Germany (21%), Ireland (25%), the Netherlands (30%), Belgium and Luxembourg (39%), France (40%), and Denmark (46%). About 11% of the total EC quota production (i.e. 20% of total quota production plus preferential imports) was not consumed in the EC and had to be exported with the support of export refunds (disregarding changes in stock levels).

Table 4.2 Supply and consumption of sugar per Member State (in '000 tonnes of white sugar; averages of 1995/96-1997/98)

(1) Member State	(2) Maximum quota	(3) Quota produced	(4) Preferent. Imports	(5) Total supply	(6) Consumption	(7) Surplus or deficit	(8) (7) as % of (5)
Austria	390	390	0	390	322	68	17.4
Belg/Lux	826	826	0	826	508	318	38.5
Denmark	425	425	0	425	229	196	46.1
Finland	147	143	60	203	206	-3	-1.5
France	3,319	3,319	128	3,447	2,088	1,611	40.3
Fr. DOM	483	252	0	252			
Germany	3,449	3,449	0	3,449	2,740	709	20.6
Greece	319	290	0	290	317	- 27	- 9.3
Ireland	200	200	0	200	150	50	25.0
Italy	1,568	1,499	0	1,499	1,481	18	1.2
Netherl.	872	872	0	872	611	261	29.9
Portugal	80	26	292	318	338	- 20	- 6.3
Spain	1,000	1,000	0	1,000	1,193	- 193	-19.3
Sweden	370	365	0	356	371	- 15	- 4.2
UK	1,144	1,144	1,130	2,274	2,166	108	4.7
Total EC	**14,592**	**14,200**	**1,639**	**15,839**	**12,720**	**3,081**	**19.5**

Sources: Column 3 taken from annex A. Column 4: MSN data were taken from table 2.7 in the case of Finland, Portugal and the UK. For France, the figure (1997/98) was taken from FIRS, 1999, tableau C.22 (because part of the MSN of the French refineries is supplied by the French DOMs). Column 5: sum of columns 4 and 5. column 6: FIRS, 1999, tableau B.19.

Notes: **(1)** The calculated surpluses and deficits (column 7) should be equal to the balance of the intra-EC trade plus the sale of quota sugar on the world market plus changes in stock levels. **(2)** Figures of Portugal do include the Azores and Madeira and figures of Spain include the Canary and Aegan Islands, except the duty free imports of these four territories. **(3)** Non-preferential imports, about 30,000 tonnes a year, are not included in this table.

4.2.4 Intra-EC and extra-EC trade in sugar

Table 4.3 provides an overview of EC-intra and EC-extra trade volumes in sugar, measured as annual average over 1995/96-1997/98. Total intra-EC sugar trade amounted to about 1.6 million tonnes in 1996/97, which was equal to about 10% of total supply (13% of total consumption and 11.6% of quota production).

Table 4.3 Average annual supply, consumption, import and export of sugar per Member State, period 1995/96-1997/98 (in 1,000 tonnes of white sugar)

(1) Member State	(2) Quota production + preferential Imports	(3) Consump-tion	(4) Surplus or deficit	(5) (4) as % of (2)	(6) Intra-EC imports	(7) Intra-EC exports	(8) Extra-EC exports + change in stocks
Austria	390	322	68	17.4	13	12	69
Belg/Lux	826	508	318	38.5	459	131	646
Denmark	425	229	196	46.1	56	6	246
Finland	203	206	-3	-1.5	0	1	-4
France	3,447	2,088	1,611	40.3	105	864	852
Fr. DOM	252						
Germany	3,449	2,740	709	20.6	187	404	492
Greece	290	317	- 27	- 9.3	39	0	12
Ireland	200	150	50	25.0	22	29	43
Italy	1,499	1,481	18	1.2	285	24	279
Netherl.	872	611	261	29.9	44	55	250
Portugal	318	338	- 20	- 6.3	4	7	-23
Spain	1,000	1,193	- 193	-19.3	317	1	123
Sweden	356	371	- 15	- 4.2	8	31	- 38
UK	2,274	2,166	108	4.7	89	63	134
Total EC	**15,839**	**12,720**	**3,081**	**19.5**	**1,628**	**1628**	**3,081**

Sources: Columns 2-5, see table 4.2. Columns 6 and 7, see Sweetener analysis, LMC, June 1998, table 1.2. Original source Eurostat.

Notes: See also notes of table 4.2. **(1)** Columns 6 and 7 are figures of 1996/97 only. **(2)** Column 8 is the balance of the columns 4+6-7. This balance should be equal to the change in stock levels plus the export of quota sugar to countries outside the EC with the support of export refunds. The figures of column 8 should be considered as approximates, particularly because columns 2-5 are averages of the years 1995/96-1997/98, while column 6 and 7 are figures of 1996/97 only. **(3)** France exports about 500,000 tonnes quota sugar to Belgium and the Netherlands, which is then exported to countries outside the EC. If incorporated, intra-EC exports of France would be 500,000 tonnes lower than indicated, while extra-EC exports would be higher by an equivalent amount. Intra-EC imports and exports by Belgium and the Netherlands would be similarly affected.

A detailed overview of origins and destinations of intra-EC sugar trade flows is provided in table 4.4, taking the year 1996/97 as an example[28].

[28] Most complete recent figures available at the time of drafting this report.

Table 4.4 Intra EC-trade of sugar in 1996/97 ('000 white sugar)

	Exporting Member States														
Importing Member States	AU	B LUX	DK	SF	F	G	EL	IRL	I	NL	P	ES	S	UK	Intra imports From EC
Austria	0	0	0	0	0	6	0	0	6	0	0	0	0	0	13
Belgium & L'bourg	0	0	0	0	319	130	0	0	0	10	0	0	0	0	459
Denmark	0	1	0	0	0	23	0	0	0	0	0	0	31	1	56
Finland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
France	0	50	0	0	0	39	0	0	0	14	0	1	0	1	105
Germany	3	11	1	0	148	0	0	0	0	22	0	0	0	1	187
Greece	0	0	0	0	1	6	0	0	17	0	0	0	0	14	39
Ireland	0	5	1	0	4	2	0	0	0	0	0	0	0	10	22
Italy	9	6	0	0	108	133	0	0	0	0	0	0	0	30	285
Netherlands	0	15	0	0	23	4	0	0	0	0	0	0	0	1	44
Portugal	0	0	0	0	0	3	0	0	0	0	0	0	0	0	4
Spain	0	39	0	0	218	50	0	0	0	0	7	0	0	2	317
Sweden	0	0	4	1	0	1	0	0	0	0	0	0	0	2	8
UK	0	4	0	0	42	6	0	29	0	8	0	0	0	0	89
Intra exports to EC	12	131	6	1	864	404	0	29	24	55	7	1	31	63	1,628
Net-exports to rest EC	-1	-328	-49	1	758	217	-39	7	-261	11	3	-315	23	-26	0

Source: Eurostat.

For the period 1995/97-1997/98 the following *country-specific* observations and conclusions on intra-EC and extra-EC trade can be drawn:

- *Austria* had a surplus equal to about 17% of total sugar production, which was either absorbed by a built up of stocks, or sold on the world market. The imports and exports to other Member States (Germany and Italy) were small and balanced more or less.
- *Belgium and Luxembourg* had a huge surplus of 39% of total production, (the equivalent of) which was mainly sold on the world market. Belgium imported also a huge quantity of sugar, mainly from France and Germany. Most of that sugar was exported to the world market via the port of Antwerp. Quite a number of French and German sugar exporters prefer to export via the port of Antwerp, because of nearness, efficient port facilities and/or speed of payment of the export refunds. About 80% of the surplus plus the imports was exported to the world market; the remaining 20% was exported to other Member States (mainly France and Spain).
- *Denmark* had also a huge surplus of 46% of its total production, most of which was sold on the world market. A substantial quantity was exported to Norway. Denmark imported also sugar from Sweden and Germany (equal to 13% of its production).
- *Finland's* national production plus preferential imports were more or less equal to the national consumption. There were no other imports than preferential imports. Sugar export was minimal.
- *France* has a surplus equal to about 40% of total production (including cane sugar from the DOMs). Furthermore France imports some sugar from Belgium, Germany and the Netherlands. About 50% of its surplus plus the imports was sold on the world market (and absorbed in stocks), while the other 50% was exported to other

Member States, mainly to Belgium (for re-export to the world market), Spain, Germany and Italy.

- *Germany's* surplus was about 21% of total sugar production. It imported also a substantial quantity of sugar, mainly from France. About 50% of its surplus plus the imports was sold on the world market and absorbed in stocks, while the other 50% was sold to other Member States, mainly to Belgium (for re-export to the world market), Italy and Spain.
- *Greece* had a deficit equal to about 9% of its production. Most of the deficit was met by imports from Italy and the UK.
- *Ireland* had a surplus equal to about 25% of its production. It imported some sugar from other Member States, mainly the UK. About 40% of its surplus plus the imports was exported to the UK and the 60% to the world market.
- *Italy* had a small surplus equal to about 1% of its production. It imports a sizeable quantity of sugar which should have caused extra-EC export of quota sugar and/or the built up of stocks. Small quantities were exported to Greece and Austria.
- *The Netherlands* had a surplus of 30% of its production, most of which was sold on the world market. There was some import and export trade with Belgium, France and Germany.
- *Portugal* had a deficit of about 6% of its national production plus preferential imports. This deficit is met by import from other Member States. A small quantity is exported to Spain. (The negative figure in the last column was most likely compensated by the duty-free import of sugar by the Azores and Madeira – see section 3.5; those quantities are not included in table 4.5).
- *Spain* had a substantial deficit equal to about 19% of its national production. The deficit was met by imports from France (principally), Germany and Belgium. The imports were much higher than the deficit. The balance must have been used for building up stocks or must have caused extra-EC export of quota sugar.
- *Sweden* had a small deficit, which was filled by imports mainly from Denmark and the UK. There was also some export to Denmark. The negative figure indicates either a decrease of stocks or inconsistency of the data used. Sweden does not export to the world market.
- *The United Kingdom* had a surplus equal to 5% of its national production plus preferential imports. It imported also sugar from France and Ireland. About 72% of its surplus and the (equivalent of the) import is exported to the world market, while the balance was exported to other Member States, mainly Italy, Greece and Ireland.

4.2.5 The CMO Sugar and its impact on stabilising volumes in the Community

The Community market of sugar has been quite stable over the years. Consumption has been stable at an annual level of about 12.7 million tonnes which is primarily due to an almost constant average consumption per capita and little change of the population figure. Consumption per capita has increased very modestly because of (i) health concerns about too much sugar consumption, and - to a lesser extent - (ii) replacement of sugar by alternative sweeteners (such as isoglucose, inulin syrup and artificial sweeteners). The level of consumption of alternative sweeteners in the EC is, however,

limited as compared to other developed countries which is predominantly due to the CMO Sugar (see further chapter 6).

EC quota production has been more than sufficient to cover EC consumption needs. About 11% of the total EC quota production (i.e. 20% of the total quota production plus preferential imports) was not consumed in the EC and had to be exported with the support of export refunds. The supply of sugar on the EC sugar markets (i.e. excluding C-sugar) has been extremely stable over time. This is almost entirely determined by the CMO Sugar, through:

- The existence of fixed production quota;
- The existence of fixed import quantities (Preferential Sugar and MFN Sugar);
- The regulation of the quantity of Special Preferential Sugar in view of the Maximum Supply Needs (MSN) and the quantity produced in the French overseas territories;
- The support for the exports of surplus quota production (and the equivalent quantity of preferential sugar imports) through the system of export refunds;
- The obligation of EC producers to export all C-sugar;
- The discouragement of non-preferential imports of sugar by very high and largely prohibitive import duties on sugar.

Stable demand and supply has led to a stable Community market in volume terms, for which the CMO Sugar has been largely responsible, at least where supply is concerned. To some extent the CMO Sugar ahs also influenced (protected) the demand for sugar, namely by limiting the production of some alternative sweeteners (notably isoglucose).

Although quota production at the EC level has been more than sufficient to cover EC domestic consumption needs, considerable differences exist between Member States. During the period 1995/96-1997/98, Spain and Greece were faced with large deficits (respectively equivalent to 19% and 9% of supply). Smaller deficits occurred in Portugal (6%), Sweden (4%) and Finland (2%). However, the total deficit of the five deficit Member States is less than 2% of the total sugar supply (quota sugar plus preferential imports) and can be easily filled by imports from sugar surplus Member States.

Although the exact impact of the CMO Sugar on intra-EC trade is hard to disentangle from other factors, it can be argued that the CMO Sugar has prevented/discouraged rather than stimulated the development of intra-EC sugar trade. The main reason for this is the fixation of national sugar quota in the past, based on historical production and national consumption levels. Furthermore, historical import arrangements for supplying sugar refineries were incorporated in the CMO Sugar in the form of preferential sugar import arrangements. The consequence of quotas being fixed close to national demand is that there is not much sugar trade among the Member States. The total intra-EC sugar trade is equal to about 10% of total sugar supply in the EC. About one-third of that trade consists of surplus quota sugar production from France and Germany, which is exported to the world market via Belgium and the Netherlands.

4.3 Sugar producer prices in the EC

4.3.1 Intervention prices and market prices

The intervention price is the main instrument of the CMO Sugar for stabilising sugar buy sugar from the sugar producers. The intervention price is the minimum price at which the CEC is prepared to buy sugar from the sugar producers. It provides a floor to the EC sugar market (see also section 2.3.1 and table 2.1). Actual (market) prices are usually higher than the intervention price. An analysis of the market prices of retail sugar and industrial sugar in the EC is presented in chapter 5.

Between 1981/82 and 1987/88 the *nominal* intervention price (expressed in financial ECUs) increased by 31%[29]. Between 1987/88 and 1993/94 the increase was 2.5%, with even a temporary price decline during this period. Since 1993/94 the intervention price has been kept unchanged (see table 2.1). The stability of the intervention price since 1987/88 is one of the main explanatory factors of the stability of actual sugar market prices in the EC.

The intervention price is the same in all sugar *surplus* Member States. In sugar *deficit* Member States a derived intervention price applies which consists of the intervention price plus a regional premium. The regional premium is meant to be a reflection of the costs of transporting sugar from the nearest surplus area to the deficit area concerned. A regional premium of 2.67% is awarded to Spain and 2.31% to Finland, Ireland, Portugal and the UK[30]. Until 1997/98 Italy had a regional premium of 3.7%. The premium was skipped in 1998/99 because Italy had become a sugar surplus Member State.

Regional premiums may result in higher sugar market prices in the sugar deficit countries concerned. However, it is to be expected that sugar prices in sugar deficit areas will be higher than in sugar surplus areas anyway, because of the costs of transporting sugar from surplus areas to deficit areas and a market premium to attract traders to supply the deficit markets. When the market determines the price differences, then the function of the regional premium is to assure that the farmer gets the benefits of (part of) the market premium, because the regional premium accrues to the farmer.

4.3.2 Intervention prices and effective minimum revenues

The effective minimum revenue per tonne of sugar obtained by the sugar producers[31] is not identical to the intervention price because of the following factors:

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29 See table 2.1, for a full overview of the evolution of intervention prices.

30 Finland and Ireland do not have a deficit anymore (see table 4.2). Greece and Sweden had a small deficit in recent years. The UK has a deficit in terms of national beet production minus national consumption, when the import of preferential sugar is disregarded.

31 The sugar producer (= beet processor) has to share this effective minimum revenue with the farmer. Effective sugar beet revenues per tonne are analysed in section 8.2.3.

- regional premiums;
- differences in B quota /A quota-ratios per Member State, which cause differences in the average levy per tonne of quota sugar across Member States (see table 2.2);
- national support for sugar production in Italy and Spain approved by the EC;
- agricultural exchange rates which differ from the financial exchange rates[32].

The value and impact of these factors, and consequently also the effective minimum revenues, differ across Member States and from one year to another. These differences of the effective minimum revenues will have an impact on the profitability of sugar production per Member State and per year and may have also an impact on the level of sugar market prices.

The effective minimum revenues per year and per Member State, including the various elements of the calculations, expressed in financial ECUs and national currencies are presented in annex B. An overview of the effective minimum revenues per Member States in financial ECUs for the years 1981/82-1998/99 is presented an annex C. Table 4.5 and figure 4.2 hereunder provide a closer look at the evolution of the effective minimum revenues in financial ECUs since 1992/93. The effective minimum revenue is defined as the intervention price plus regional premium, plus national support and minus the average production levy per tonne in a certain Member State. The effective minimum revenue can be expressed in agricultural ECUs, national currencies and financial ECUs.

It can be observed that the effective minimum revenues were quite stable since 1992/93, except in Spain and Italy. In Spain and the North of Italy effective support prices declined because of the decreasing level of the national support arrangements. However, there are notable differences in the level of the effective minimum revenues. Three clusters of Member States can be distinguished:

- A cluster consisting of Austria, Belgium, Denmark, France, Germany and the Netherlands with relatively low effective support prices in the order of 575 ECU/t;
- A cluster of Finland, Greece, Ireland, Portugal, Sweden and the UK with a higher effective support price in the order of 610 ECU/t. The price difference between the first and second cluster was in the order of 8 to 10%;
- A cluster consisting of Spain and Italy with the highest effective support prices, mainly caused by national support.

[32] The agrimonetary system was introduced in 1969, during a period of strong instability on the international currency markets (which few years later was followed by the collapse of the Bretton-Woods system of fixed exchange rates). Its principal goal was to soften the effects of exchange rate changes between the Member States for farmers. This was accomplished by a system of special 'agricultural' exchange rates, which deviated from the financial exchange rates. The deviation became larger and larger during the period 1984/85 to 1994/95 when the system was expanded with the notion of an "agricultural" ECU whose value differed from the "financial" ECU. The objective of this system of agricultural exchange rats and agricultural ECUs was to minimise the impact of changes of the financial exchange rates on the nominal value of farmers' income in national currencies. However, it caused different trends of agricultural revenues across the EC in terms of financial ECUs and real values.

Differences between the three clusters of countries are caused by:
- differences in average levy charges caused by a difference in the B/A quota ratio;
- the regional premiums for the UK, Ireland, Finland and Portugal;
- differences in exchange rate effects;
- national support in the case of Spain and Italy.

The effective minimum revenue for white sugar in the EC as a percentage of the world market sugar price varied from 170% to 300% over the period 1992/93-1998/99. The effective minimum revenues were in the order of 575 to 600 ECU/t, while the world market price varied from about 360 ECU/t in 1995/96 to 200 ECU/t in 1998/99.

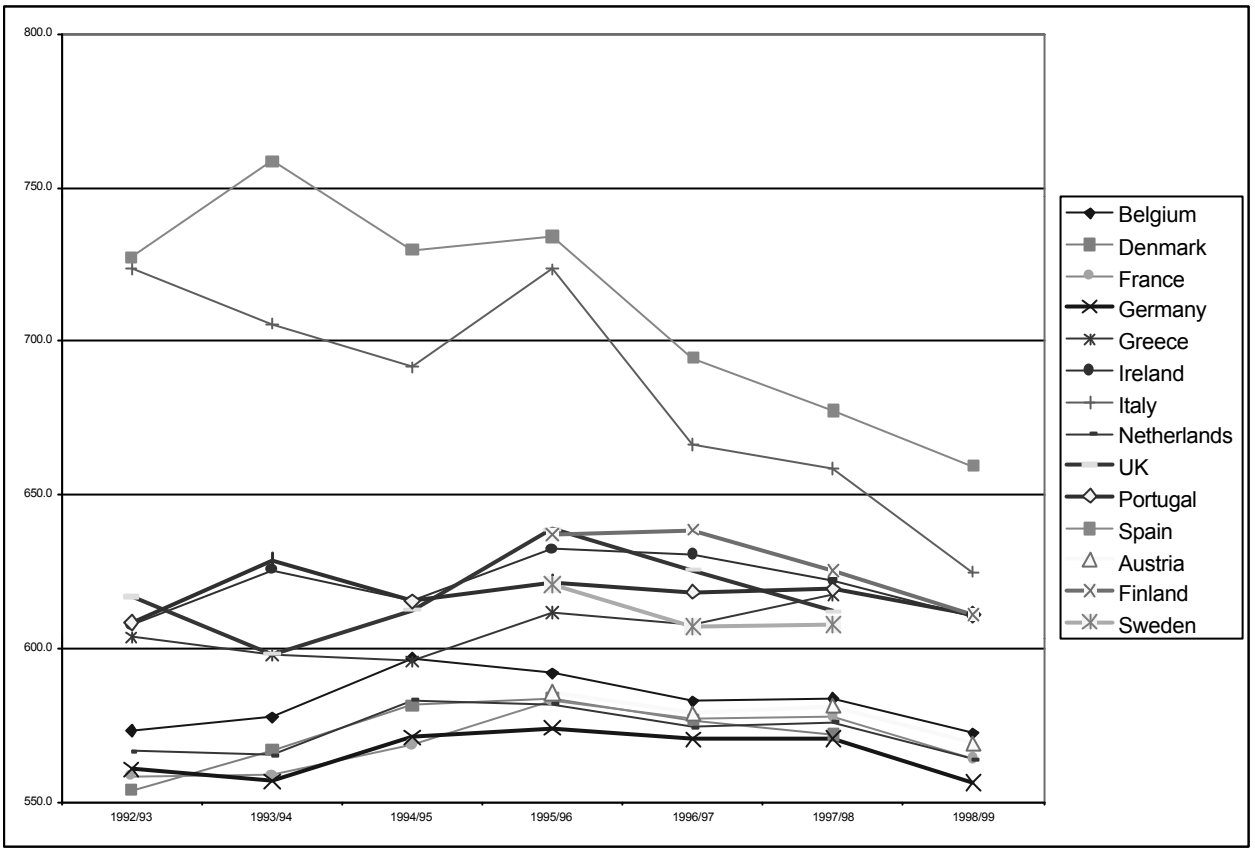
The final conclusion of this analysis is that the effective minimum revenues for sugar producers (valued in financial ECUs/ton):
- were quite stable since 1992/93 except in Spain and Italy;
- differed across the Member States in the order of 8-10%, with larger differences in Italy and Spain. These differences may have caused differences in profitability and actual market prices;
- were 170-300% higher than the world market price of white sugar.

Table 4.5 Effective minimum revenues of sugar production per Member State, period 1992/93-1998/99 (in financial ECUs per tonne)

Member State	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99
Austria	-	-	-	585.4	578.7	581.2	569.0
Belgium	573.2	577.5	596.7	591.7	582.6	583.6	572.3
Denmark	553.9	566.9	581.4	583.7	576.5	571.7	-
Finland	-	-	-	637.1	638.5	625.2	610.9
France	558.3	558.7	568.6	582.9	577.2	577.7	564.3
Germany	560.5	556.6	570.9	574.0	570.3	570.6	556.3
Greece	603.6	597.7	595.6	611.6	607.3	617.3	-
Ireland	607.5	625.4	615.3	632.2	630.3	622.1	610.1
Italy	723.6	705.6	691.4	723.4	666.4	658.5	624.9
Netherlands	566.3	565.2	582.9	581.8	574.1	575.8	564.0
Portugal	608.3	628.5	615.3	621.4	618.4	619.1	610.8
Spain	727.2	758.6	729.6	734.1	694.5	677.3	659.4
Sweden	-	-	-	620.8	607.0	607.6	-
UK	616.9	598.1	612.4	638.7	625.5	612.0	-

Source: Own calculations. See annex B.
Note: Intervention price in financial ECUs was 626.4 ECU/t in 1992/93 and 631.9 ECU/t in the years thereafter.

Figure 4.2 Effective minimum revenues of sugar production per Member State in financial ECUs per tonne, 1992/93-1998/99



Source: Own calculations. See annex B.

4.4 Security of supply at Community level

Security of supply at Community level can be defined in a broad and in a strict sense. In a broad sense security of supply implies that at any point in time there is sufficient supply -measured in volume terms - at Community level to meet domestic (EC) demand. In a stricter sense security of supply means that there should be sufficient supply at Community level to meet Community demand at any point in time, without large (upward) fluctuations in price and average delivery time over time and across the Member States.

In view of the stability of the total volume of production and the prices (see also chapter 5) and in view of the fact that sugar production is much higher than sugar consumption in the EC, it can be concluded that the security of sugar supply at Community level has not been in danger during the last 10 years (at the least). It can be argued that this can be attributed to the CMO Sugar, because the CMO has created favourable conditions for producing sugar in the EC, in particular by its quota system and by guaranteeing a minimum price which has been well above the long-term average world market price.

However, in the absence of the CMO Sugar, when most likely very little sugar would be produced in the EC, most of the EC sugar consumption needs would be met by purchases on the world market. The essence of this argument is that the per unit costs of beet sugar are considerably higher than the costs of producing cane sugar. Evidence shows that throughout the 1990s the production costs of low cost *beet* sugar producers were 60% higher than the costs of low cost *cane* sugar producers (refined sugar compared), while the difference between major exporters of *beet* sugar and *cane* sugar was 80% (refined sugar compared) (see further chapter 7, section 3). Cane growers and cane sugar producers would therefore have a major incentive to step up production, once EU beet sugar support policies and import protection were to be removed. It would not be a problem to import sufficient quantities of sugar on the world market, with world stock levels fluctuating between 48 and 56 million tonnes throughout the 1990's and an EU consumption level of about 14,5 million tonnes (measured in raw sugar equivalents) (see also chapter 3). However, prices would fluctuate much more than presently under the CMO, which could be considered as an aspect of uncertainty. On average, sugar prices would be considerably lower, however. The CMO Sugar is therefore not indispensable to guarantee the security of supply of sugar.

The CMO Sugar comprises three instruments affecting the security of supply:
- The production quota arrangements
- The C-sugar carry-forward mechanism
- The minimum stock requirement.

These instruments are reviewed in the following three sections.

Production quotas

The principle aim of the production quotas is to limit the production of sugar qualifying for price support. In addition these nationally allotted production quotas have also a function in safeguarding the security of supply. Quotas plus preferential imports were originally fixed per Member State at historical production and import levels[33], and have remained at the same level over time. In most cases these levels were set (at least) equal to the national consumption of sugar (Spain being an exception).

Total production of quota sugar plus preferential imports has always been substantially higher than the consumption of sugar in the EC (about 20% over the years 1995/96-1997/98; see table 4.3). At the Community level, therefore, no problem as regards the security of supply exists.

Some Member States are net-importers or Community deficit areas: Finland, Greece, Spain, Italy (until 1996/97), Portugal and Sweden (apart from preferential imports; see table 4.3). Only the import volume of Spain is substantial. Deficits are easily met by surpluses from other Member States which means that there is sufficient availability of sugar within the EC area. The only impact of a deficit is that the sugar price tends to be higher than in areas with a sugar surplus (the price differences equalling at least the costs of transporting sugar from the surplus to the deficit area).

[33] In some cases there were also other considerations, particularly related to accession negotiations.

The C-sugar carry-forward mechanism

Sugar companies are allowed to carry forward a certain quantity of B-sugar and/or C-sugar to the next year up to a maximum of 20% of the A-quotas. That sugar has to be stored for at least 12 months and is considered as the first lot of A-sugar of the next campaign of that particular company. Many companies make use of this mechanism for carrying forward C-sugar because it minimises the risk of not being able to make use of the total quantity of quota sugar the next year (e.g., due to a bad harvest as a result of adverse weather conditions)[34].

At the same time, the carry-forward mechanism contributes also to the security of supply, because it reduces the risk that supply will not be enough to meet demand in a particular year. However, this is only relevant for those Member States, which do not always produce the quota allotted to them, such as Greece, Portugal, Finland and Sweden. The other Member States normally produce more than their allotted quota.

Still exceptional circumstances may occur in surplus countries. For example, in 1998/99 bad weather destroyed part of the beet harvest in the Netherlands and Belgium, and only respectively 95% and 96% of the quota were produced. The Netherlands had no C-sugar carried forward from the previous year and could thus not use its entire quota. Belgium had enough carried forward C-sugar to fill the gap.

The carry-forward of C-sugar per Member State (in tonnes and in percentage of the quota) is presented in table 4.6.

At the EC level, quota production has always been sufficient to meet demand, even without preferential imports. Thus the carry-over mechanism is not really needed from the point of view of assuring the security of supply at the level of the entire EC. For some Member States the carry-over mechanism is of some importance to make better use of their allocated production quota. However, also at the national level, the carry forward mechanism is not really essential for the security of supply, because a national deficit can be met easily by imports from other Member States.

[34] The carry-forward mechanism is also used by manufacturers who speculate on higher world market prices for the next campaign. C sugar that is not carried forward must be exported to the world market before 1 January following the end of the marketing year in question. If some C sugar is carried forward, an equivalent amount of next year's production that otherwise would be quota sugar, becomes C sugar in the next campaign.

Table 4.6 Carry-forward of C-sugar to next campaign per Member State. 1996/97-1998/99 (in '000 tonnes of white sugar)

(1)	(2)	(3)	(4)	(5)	(6)
Country	Allocated quotas	1996/97 to 1997/98	1997/98 to 1998/99	1998/99 to 1999/00	Average carry-forward as % of allocated quotas
Austria	390	41	43	63	12.6
Belg/Lux	826	70	76	23	6.8
Denmark	425	30	43	42	9.0
Finland	147	0	19	0	4.3
France	3,319	333	334	506	11.8
French DOM	483	0	0	0	0
Germany	3,449	139	107	147	11.4
Greece	319	0	45	0	4.7
Ireland	200	18	15	18	8.5
Italy	1,568	11	187	215	8.8
Netherlands	872	0	0	0	0
Portugal	80	0	0	0	0
Spain	1,000	174	174	174	17.4
Sweden	370	28	37	37	9.2
UK	1,144	73	115	115	8.8
Total	14,592	917	1,195	1,340	7.9

Source: FIRS, 1999, tableau B.18.

Note: Average of (3), (4) and (5) as % of (2).

The minimum stock requirement

Sugar producing companies are obliged to keep a permanent minimum stock of sugar. Council Regulation N° 1789/81 has fixed the minimum stock at 5% of the production of the A-quota produced during the twelve months preceding the month concerned. In case of relative shortages on national sugar markets the CEC may decide to reduce the percentage (down to 0%) for some or all Member States, in order to increase the sugar supply on the market. This was for instance the case in 1995, when the CEC decided to reduce the minimum stock to 3%, followed by a further reduction to 0% on the first of July 1996. Since December 1996, the percentage is kept at 3%.

The CEC can also decide to release the minimum stock in one region only. For instance in June 1997, the CEC decided to release the minimum stock in Spain, after a period of a severe drought followed by heavy floods, which caused a deficit of 100,000 tonnes of sugar. Another example is Greece, which faced delays in its beet harvest in 1998 due to climatic circumstances. As the delay threatened to cause a sugar deficit in the months of August and September 1999, the minimum stock was released during that period.

Although the minimum stock has played a useful role in these two cases, the question is whether the advantage of the minimum stock arrangement outweighs the costs of maintaining these stocks in all Member States. To answer that question a detailed cost-benefit analysis would be needed. At a more general policy level, it can be questioned whether the advantage of avoiding price increases in a deficit region is a sufficient justification for this form of public sector interference in a commercial sector. It can be

argued that prices in deficit regions will, and have to increase in case of deficits, which will then attract sugar from surplus regions. Market forces could easily solve the problem of temporary deficits in certain regions within the EC.

4.5 Conclusions

The CMO Sugar has helped to stabilise the Community sugar market in terms of volume. The CMO Sugar has a direct stabilising impact on the *supply* of sugar, through a system of fixed quota and preferential import arrangements on the one hand, and an effective disposal mechanism for exporting all surplus production to the world market on the other. This export of surplus sugar is accomplished by export refunds for quota sugar and an obligation for EC beet processors to export all C-sugar. Non-preferential imports into the Community are effectively discouraged by largely prohibitive import duties.

The impact of the CMO Sugar on sugar *demand* has not been significant. In fact there was only an indirect effect through a limitation of the production of two alternative sweeteners (isoglucose and inulin; see chapter 6). A stable population figure, little competition of alternative sweeteners and a stable demand for sweeteners per capita caused that total demand for sugar was more or less stable in the EC over the last 10 years.

The CMO Sugar has helped to stabilise the Community sugar market in terms of price, predominantly through its system of intervention prices, which effectively creates a (price) floor in the market. Although in theory the intervention price is the same in all Member States (apart from the regional premiums), the effective minimum revenue for sugar producers varies across Member States and over the years. This is caused by (i) differences in regional premiums, (ii) differences in B/A sugar quota ratios that cause differences in the average levy per tonne of sugar, (iii) national support for sugar production in Italy and Spain, and (iv) agricultural exchange rates that differ from the financial exchange rates. Differences in effective minimum revenues per tonne of sugar produced across Member States have been in the order of 8-10%, apart from Italy and Spain where the minimum effective revenues were notably higher. These differences in producer revenues may have contributed to some degree of instability of sugar market prices in the EC. Nevertheless, it can be concluded that the Community sugar prices have been much more stable than the world market price, although at a much higher level. The producer prices in terms of the minimum effective revenue per tonne have varied from 170% to 300% of the world market price of sugar in the period 1992/93-1998/99 (The actual sugar market prices will be analysed in chapter 5).

Due to the fact that quotas have been based on historical production and import levels, and have been set close to prevailing national consumption levels, the volume of *intra-EC sugar trade* has not been very large. In 1996/97 total intra-EC sugar trade equalled about 12% of quota sugar production.

The *security of sugar supply* at Community level has not been in danger during the last 10 years (at the least). It could be argued that this can be attributed to the CMO Sugar, because the CMO has created favourable conditions for producing sugar in the EC, in particular by its quota system and by guaranteeing a minimum price which has been well above the long-term average world market price. However, in the absence of the CMO Sugar, most likely very little sugar would be produced in the EC as a result of a lack of cost competitiveness vis-à-vis cane sugar. In this case, it is unlikely that there would be problems with the security of sugar supply because the EC sugar deficit could be met easily by purchases on the world market: without the CMO Sugar the security of sugar supply would still be satisfactory.

The *carry-forward mechanism* is not really needed from the point of view of assuring the security of supply at the level of the entire EC. Quota production has always been sufficient to meet demand, even without preferential imports. For some Member States the carry-forward mechanism is of some importance to make better use of their allocated production quota. However, also at the national level, the carry forward mechanism is not really essential for the security of supply, because a national deficit can be met easily by imports from other Member States.

It is doubtful whether the *minimum stock requirement*, as an instrument to improve the security of supply at Member State level, can be justified in terms of costs and benefits. Moreover from a general policy point of view, it can be argued that there is no need for public sector interference in assuring the security of supply at the level of Member States, particularly in view of the overall sugar surplus in he EC. Market forces could easily solve the problem of temporary deficits in certain regions within the EC. Prices in deficit regions will increase and attract sugar from surplus regions.

5 Sugar prices for industrial users and final consumers

5.1 Introduction

This chapter deals with evaluation question 1.1, which reads: *"Has the common organisation of the sugar market provided industrial users (including the chemicals and pharmaceuticals sectors) and final consumers of sugar within the European Union with supplies of sugar at a reasonable price?"*

Reasonableness of prices will be perceived differently by different categories of users. Whether a price for a product is regarded as reasonable depends on individual preferences in relation both to prevailing absolute price levels of the product concerned, and prices other users have to pay, especially compared to other countries or regions. Whether prices are reasonable can also be evaluated from a time perspective: large price increases over a short period of time will generally be evaluated as unreasonable, while relative stability of prices will generally be perceived as reasonable. How reasonable prices are, is therefore a subjective matter. Proxies for judging the reasonableness of prices under the CMO Sugar can, however, be found by comparing the prevailing prices in the EC with prices elsewhere (indicator: price differences compared to other countries) and by comparing prices in the EC over time (indicator: price stability).

Whether the CMO Sugar has provided sugar at reasonable prices will be evaluated for two categories of users: industrial users (including the chemicals and pharmaceuticals sectors) and final consumers of sugar. Direct consumption of pure sugar by households accounts for about 30% of total human consumption of sugar in the EC, while the other 70% is consumed as sugar incorporated in industrially produced food and drinks. Of all sugar, more than 98% is used for human consumption, while less than 2% is used by the chemical and pharmaceutical industries (CEFS 1998).

A distinction can be made between white granulated, liquid and speciality sugars (e.g., European Commission, 1998: L76/6). The standard quality white granulated sugar is EC II sugar[1], which is sold both to the industry and retail traders. Other categories of sugar are: raw, brown, caster and icing sugars, as well as syrups and treacles. Liquid sugars are mainly used by the food-processing industry. The highest quality liquid sugar is made by dissolving white granulated sugar. Lower grades are made only from cane, by blending liquors produced at various stages of the refining process. Throughout this chapter the focus will be on standard quality white granulated sugar.

In order to judge whether prices for industrial users and final consumers have been reasonable and to what extent the CMO Sugar has been responsible for the reasonableness of prevailing absolute and relative price levels in the EC sugar market, the following indicators will be used:

[1] Defined by Council Regulation (EEC) No 793/72 (OJ L94 of 24 April 1972).

- The difference between the intervention price and the world market price over time. The intervention price constitutes the minimum guaranteed price for sugar producers in the EC and can therefore be seen as a reference price for the reasonableness of prices for the users of industrial sugar within the EC area. The world market price plays a similar (reference) role in the perceived reasonableness of prices.
- The difference between the intervention price and the actual market prices paid by industrial users of sugar by EC Member State over time.
- The difference between the sugar retail prices in the EC Member States and third countries, and the intervention price over time.
- Measures that create a level playing field where input costs for EC industrial users tend to be upwardly affected and could lead to a decrease in competitiveness as a result of relatively high price levels.

No absolute judgement criteria can be applied to these indicators because of (i) the subjective nature of "reasonableness" and (ii) the fact that part of the price differences may be caused by differences in costs external to the sugar sector. General notions of reasonableness are that the judgement (feeling) of reasonableness is stronger when price differences are smaller and when prices are more stable over time. The market structure, competitive position of other industrial sugar users and the evolution of the purchasing power of consumers have also an impact on the sense of reasonableness of the sugar prices.

The structure of this chapter is as follows. Some further observations on methodology and judgement criteria are presented in section 5.2. Section 5.3 deals with a comparison of the intervention price, the effective support price and the world market price. In section 5.4 the actual market prices of industrial sugar across the EC Member States are analysed, while section 5.5 deals with the retail (final consumer) prices of sugar in the EC. Final conclusions are presented in section 5.6.

5.2 Further methodological observations

The reasonableness of prices - defined in terms of what establishes a "fair" or "just" price - has been the subject of an interesting debate in economics and moral philosophy in the 19th and 20th century. According to current mainstream neo-classical economic theory market prices reflect in principle the relative scarcities of the underlying factors of production. The question is not so much whether prices are "fair", but rather whether they are "right" from a relative scarcity point of view. Prices have a signalling and rationing function: they equilibrate supply and demand. From a social welfare maximisation perspective, the "right" price is a price that equals marginal costs with the (ideal-type) model of perfect competition serving as a benchmark or judgement criterion. From a purely economic point of view, the ultimate criterion for judging the reasonableness of prices is whether prices reflect adequately the prevailing relative scarcity of the resources involved in the production and use of sugar.

The outcome of the (free) market process might by felt as sub-optimal by certain categories of the population. In other words, "right" prices from an economic point of view may not be perceived as reasonable by each and everyone. The two categories of stakeholders under consideration here - industrial users and final consumers of sugar - will generally prefer low sugar prices. Yet their perception of the reasonableness of sugar prices may differ.

A sugar *consumer* will prefer the lowest price possible in order to improve his purchasing power (*ceteris paribus).* A consumer might find that the sugar price he pays is unreasonable when the price he has to pay is (considerably) higher than the sugar price in other regions of his country, in other Member States or in other third countries. The relative price a consumer pays is not the only criterion that matters in the perception of reasonableness. Other factors are (i) the nature and intensity of his preferences, and (ii) the share of sugar in his total household or consumption expenditure. Illustrative for the preferences argument is the question whether sugar can be considered essential and/or unique, or easily substitutable by other sweeteners. It may also be that final consumers express - by paying a higher price than necessary - a political preference rather than to choose for the lowest price option. Some consumers may agree to pay higher prices than necessary, because of socio-political or other considerations, others may for example buy a different sugar product (cane sugar) to support small farmers in the third world. The expenditure share argument holds that the smaller the share of sugar is in total (household) expenditure, the less weight the consumer will attach to the price of sugar, and the less he will care about the level of the sugar price.

An *industrial user* of sugar will perceive the sugar price as unreasonable when the price of the sugar he has to pay is higher than the price his main competitors have to pay. His main judgement criterion for reasonableness will therefore be whether the price he has to pay offers a level playing field vis-à-vis his main competitors. If not, he will perceive the prevailing price as unreasonable. The level playing field argument is relevant for both the domestic EC market and the world market. The latter is especially important for producers of products containing sugar which include the category of Non-Annex I products.

Because of the difficulty of formulating *absolute* benchmarks for judging the reasonableness of the sugar price, the answer on the evaluation question will be sought by comparing various sugar prices. This will be done by (i) analysing the price formation process along the production process from sugar beets to sugar sold in the food stores, (ii) analysing price trends over time and (iii) comparing prices across countries (within and outside the EC). Large price differences between Member States, and between the EC and third countries could imply that prices are perceived as unreasonable. For producers of Non-Annex I products and chemicals and pharmaceutical sectors the level playing field criterion will be measuring-rod.

5.3 Intervention prices and world market prices

Price formation in the EC sugar market is greatly influenced by the CMO Sugar. The intervention price determined by the CMO Sugar functions as a (price) floor in the EC sugar market. Actual market prices are usually higher as the result of a bargaining process between producers and users of sugar. Furthermore, the *effective* price faced by certain categories of industrial sugar users is lower than the actual market price due to (i) the export refunds for sugar used for the production and export of Non-Annex I products and (ii) the production refunds for sugar used by the chemical and pharmaceutical industries. Final prices to be paid by industrial users and consumers reflect also the costs of other, downstream, industries: the packaging, transport, and - in the case of final consumers - the retail industry.

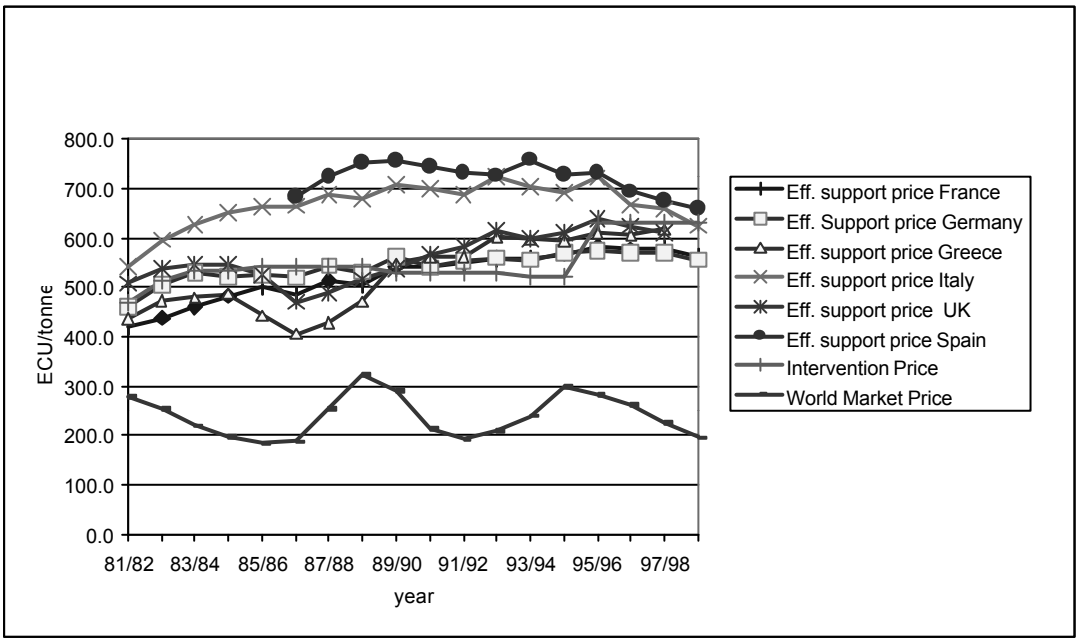
The intervention price is the price at with intervention agencies are obliged to purchase all sugar offered to them. The intervention price is in fact the minimum guaranteed price. However, a number of additional factors have to be taken into account:

- Intervention prices in Finland, Ireland, Portugal and the United Kingdom are 2.31% higher than the standard intervention price due to a regional premium. Also Spain and Italy have a regional premium of respectively 2.67% and 3.7% (see section 2.3.1).
- In case of selling sugar to an intervention agency no storage levy has to be paid, while for any other sale of sugar a storage levy of (presently) 20 ECU/t has to be paid (see section 2.3.7 and chapter 16). This means that the sugar producers will start selling to the intervention agencies as soon as the sugar price is less than the intervention price plus the storage levy. Thus *the actual minimum guaranteed price is equal to the intervention price plus the regional premium plus storage levy.*
- The real value in national currencies of the actual minimum guaranteed prices may differ from one country to another because of differences in the agricultural exchange rates and the financial exchange rates. These differences were substantial from 1984 to 1995, but are small since 1995 (see chapter 4 and annexes B and C). This distortion ended for the countries joining the EMU in 1999.
- Sugar producers and sugar beet producers have to pay production levies. The levies differ between A and B quota sugar and from one year to another (see table 2.1). Moreover the ratio of A and B quota sugar varies from one country to another. The final result is that the average levy per tonne of sugar differs per Member State and per year (see also annex C). The sugar producers pay 42% of the levies and the sugar beet producers 58%. These levies do not influence the intervention price but the 42% paid by the sugar producers may have an impact on the actual market price of sugar (which has generally been higher than the intervention price).
- In Italy and Spain national support is provided to the sugar sector. In as far as this support is provided as a subsidy to the sugar beet farmer, it does not influence the sugar price. The support paid to the sugar industry does not influence the intervention price either. It may, however, have an impact on the market behaviour of the sugar producer and thus impact on the actual market price.

In chapter 4 and annexes B and C an analysis was made of the magnitude of the regional premiums, levies, national support and differences in exchange rates in relation to the intervention price. The *effective minimum revenue* per tonne was calculated, which has to be shared by the sugar industry and the beet farmers (beet farmers receive 58% of the intervention price and a large share of the national support in Italy and Spain, and contribute 58% to the levy costs).

Figure 5.1 shows the trends of the world market price of sugar, the EC intervention price (in financial ECUs) and the effective minimum revenues per tonne of sugar in six Member States (France, Germany, Greece, Italy, Spain and the UK). Since 1983/84, the intervention price has always been two to three times higher than the world market price. The effective minimum revenues were always considerably higher than world market prices too, with the lowest effective minimum revenue per tonne being a factor 1.5 to 2 higher, and the highest effective minimum revenue being a factor 2.5-3.5 higher than the world market price. The extent to which actual market prices are higher than the intervention price will be analysed in section 5.4 (industrial user prices) and 5.5 (consumer prices).

Figure 5.1 World prices, the intervention price and effective minimum revenues (in financial ECUs per tonne)



Source: Own calculations on the basis of data from DG Agriculture (see also annex C; world market prices: Paris sugar stock exchange.

Note: In the legend "effective support price" should be read as "effective minimum revenue".

5.4 Industrial user prices of sugar in the EC

5.4.1 Formation of industrial user prices of sugar

Industrial sugar is sold either in solid or liquid form, in bulk (tanker), big bags (1 tonne) or 50-kilogram bags[2]. The sugar is usually sold on the basis of individual contracts between the sugar processing company and the industrial user (direct bargaining). Most contracts have a duration of one year, but are often renewed with minor changes only. Normally the contracts cover quite a number of items, including prices, product specifications (polarisation, moisture content, colour, ash content), delivery schedules (e.g. frequent, rapid (just-in-time), guaranteed and regular) and other services. Contracts may differ widely depending on the type and size of the buyer.

Usually sugar processors sell the sugar to the industrial users at a "delivered price", and not at an ex-factory price. The "delivered price" is based on an ex-sugar factory price (depending on quality) plus a mark-up for transport costs, handling costs, delivery schedules and other required services.[3] The exact price will depend on the (potential) market powers of the supplier and purchaser concerned and on the structure of the market. Quantity rebates or discounts are often rewarded, but no consistent pattern in granting of rebates appears to exist. According to industrial users rebates do not dependent on volume or buyer size. Conclusive evidence on what criteria rebates are provided could not be retrieved, however.

Anti-trust case law at both the EC and Member State level gives evidence that in a number of cases sugar producers have colluded and/or have behaved in anti-competitive ways. Furthermore, industrial users of sugar represented by CIUS[4] point at a lack or even absence of alternative supply possibilities. It would be difficult or even impossible to find other EC-based sugar processors willing to sell sugar other than the one with which contractual relationships already exist. Applications for deliveries from alternative EC sugar processors are said to be turned down or ignored. Whether or not active and deliberate collusive activities between sugar processors have occurred which resulted in this lack of alternative buying possibilities could not be established.

The sugar price for industrial users is generally much lower than the price of retail sugar, because of the lower handling and distribution costs (for retail prices and costs, see section 5.6)[5]. Contrary to retail prices, no public price series of industrial sugar exist. An unofficial (industry) source is the CAOBISCO price list which is based on a survey

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2 For example, about 10% of all sugar sold to the French processing industry is in liquid form (Conseil de la Concurrence, 1997: 14).

3 Sometimes the wholesale price is used which is defined as the ex-factory price plus an allowance for transport to the wholesale markets.

4 CIUS (Committee of Industrial Users of Sugar) represents the interests of about 3,000 industrial users of sugar in the EU.

5 E.g., in France, according to a report of the Conseil de la Concurrence (1997: 14) 1995 industrial user prices were about 4850 FF/tonne ±2% on average, whereas retail sugar prices stood at about 7,200 FF/tonne which is almost 1.5 times higher.

among a number of (associated) industrial sugar users regarding the prices they had to pay for the industrial sugar. From June 1998 to September 1999 CAOBISCO held five surveys, the results of which are presented in tables 5.1 and 5.2. It is not clear whether or not the CAOBISCO list is based on a representative sample of industrial sugar users. The CAOBISCO figures indicate that:

- Prices did not vary much over time, except in Greece (+5.7%) and the UK (+4.7%).
- Prices were quite different from one country to another. In September 1999, prices in the UK were 17.3% higher than in Denmark.
- Prices were high in Spain and Sweden, two typical sugar deficit countries, but also in France and the UK, two typical sugar surplus countries. Prices were not high in Greece, although it has a sugar deficit. Thus no clear correlation between the price list and the supply/consumption balance can be established.
- In September 1999 prices were on average 14% higher than the minimum guaranteed sugar price (= intervention price plus storage levy); varying from 8.3% in Denmark to 24.2 % in the UK.

Table 5.1 Prices of industrial sugar collected by CAOBISCO (in ECU/t bulk, ex-factory, excluding local taxes)

Member State	June 1998	Sept. 1998	Dec. 1998	May 1999	Sept. 1999
Austria	731	731	n.a.	n.a	n.a.
Belgium	n.a.	n.a.	n.a.	n.a.	n.a.
Denmark	704	705	705	706	706
Finland	n.a.	n.a.	n.a.	n.a.	n.a.
France	764	764	764	772	772
Germany	711-721	711-721	711-721	716-726	716-726
Greece	698	721	721	738	n.a.
Ireland	747	747	743	n.a.	756
Italy	727	725	725	726	726
Luxembourg	n.a.	n.a.	n.a.	n.a.	n.a.
Netherlands	720	720	714-727	732	732
Portugal	n.a.	757	n.a.	n.a.	n.a.
Spain	770	766	n.a.	776	776
Sweden	n.a.	766	n.a.	728	n.a.
United Kingdom	791	791	788	815	828

Source: CAOBISCO. * Prices for a 5-10,000 tonnes buyer in major countries and a 1-5,000 tonnes buyer in small countries.

Table 5.2 The differential (in %) between the industrial user price and the minimum guaranteed price (= intervention price plus storage levy plus regional premium)

Member State	June 1998	Sept. 1998	Dec. 1998	May 1999	Sept. 1999
Austria	12.1	12.1	n.a.	n.a.	n.a.
Belgium	n.a.	n.a.	n.a.	n.a.	n.a.
Denmark	8.0	8.1	8.1	8.3	8.3
Finland	n.a.	n.a.	n.a.	n.a.	n.a.
France	17.3	17.3	17.3	18.4	18.4
Germany	9.0-10.6	9.0-10.6	9.0-10.6	9.8-11.4	9.8-11.4
Greece	7.0	10.6	10.6	13.2	n.a.
Ireland	12.0	12.0	11.5	n.a.	13.4
Italy	7.7	11.1	11.1	11.4	11.4
Luxembourg	n.a.	n.a.	n.a.	n.a.	n.a.
The Netherlands	10.5	10.5	9.6-11.5	12.2	12.2
Portugal	n.a.	13.6	n.a.	n.a.	n.a.
Spain	15.3	14.6	n.a.	16.0	16.0
Sweden	n.a.	12.9	n.a.	11.7	n.a.
United Kingdom	18.7	18.7	18.2	22.2	24.2

Source: CAOBISCO. * Prices for a 5-10,000 tonnes buyer in major countries; 1-5,000 tonnes in small countries.

For a selected number of Member States a longer time series of industrial user prices from CIUS is available (see table 5.3). According to these data the differential between the actual sugar prices and the minimum guaranteed price - defined as the intervention price plus storage levies and regional premiums - has grown substantially over the years in three major sugar-producing Member States, all three having a sugar surplus: Germany, France and the UK. This is surprising because in the period concerned:

- processing and energy costs in beet sugar production have decreased;
- sugar extraction rates of beet have gone up;
- beet transport costs per tonne of produced sugar have declined.

Table 5.3 The differential between the industrial user price and the minimum guaranteed price over the period 1992-1999, for selected Member States (in %)

Survey date	Germany	France	UK
April 1992	4.1	7.7	8.2
September 1993	4.6	10.9	8.5
August 1994	3.5	8.6	8.1
October 1995	8.0	10.1	7.0
October 1996	11.6	16.9	9.9
January 1997	9.6	16.9	16.0
September 1998	9.0-10.6	17.25	18.7
September 1999	9.8-11.4	18.4	24.2

Source: CIUS (1998) *Sugar and the Single Market: the differential in prices and availability within the Union*. Various CAOBISCO sugar lists.

According to the sugar processing industry the figures collected by CAOBISCO and CIUS cannot be considered as the average industrial user price in the Member States

concerned. The actual average prices would be much lower. The French sugar processing industry requested the French Paying Agency FIRS to carry out a detailed investigation of the average sales price of three large sugar producers in France. FIRS confirmed that it had access to all relevant documents. FIRS concluded that the difference between the effective intervention price and the average sales price was "considerably less than 10%" and thus much lower than the 18% calculated by CAOBISCO[6].

On the basis of logical reasoning, and assuming effective competition on the sugar market, it could be expected that the prevailing market prices would not be (much) higher than the minimum guaranteed price plus the costs of additional quality requirements and services (transport, timely and regular delivery, etc.), because of the surplus of quota sugar on the EC sugar market. About 11 to 12% of the annual quota sugar is exported for a net price about equal to the world market price plus the export refund, which is about equal to the minimum guaranteed price (defined as the intervention price plus storage levy plus applicable regional premium).

Assuming effective competition, prices in sugar surplus countries should be close to the sum of the minimum guaranteed price and the costs of additional services (see earlier). In sugar deficit countries prices should be higher reflecting the transport costs between the surplus and deficit areas. On the basis of these considerations, one would expect a difference between the minimum guaranteed price and the actual market prices in France and Spain in the order of respectively 5 to 10% and 7 to 12%. This judgement differs from the figures presented by CAOBISCO which reveal a much higher differential. In the case of France and Spain these were 18% and 16% respectively.

The above mentioned estimate regarding the possible differential between the market prices in France and Spain and the minimum guaranteed price is based on the assumption of effective competition. That assumption can, however, be questioned on the following grounds:

- The EC sugar market is not really one integrated market at EC-level, but consists of a number of compartmentalised national markets. In most national markets, the supply side is made up of 1 to 3 large sugar processors (see chapter 14), whereas the demand side is made up of a large number of firms of different size. There is only one sugar producing firm in each of seven Member States, while the four largest firms account for almost half the EC sugar production. Thus the market structure can be categorised as oligopolistic, which is not conducive for effective competition. The control of national markets by a few processors in combination with the limited intra-EC trade (related to the fixedness of quota), effectively limits competition on the EC sugar markets. This might have an (upward) effect on sugar prices.
- The sugar markets in the EC are rather intransparent, as reflected by the lack of consistent market information regarding sugar trade in the EC, despite the relative homogeneous character of sugar as a product.

6 More figures could not be disclosed because of confidentiality reasons. FIRS carried out the investigation twice, in December 1997 and December 1998.

- There are many complaints of industrial sugar users regarding the difficulty to find alternative sugar suppliers willing to deliver sugar, which could point at collusive activities among sugar processors.
- There are a number of anti-trust cases investigated by the EC and national competition authorities over the years as well as recently, inter alia in France, Denmark, Ireland, the UK, Italy, Spain, and Austria[7], which point at price discrimination and other forms of anti-competitive behaviour of sugar suppliers.

The available information is insufficient to draw a firm unequivocal conclusion regarding the differential between the intervention price and the actual market price of industrial sugar. The market premium has varied from 4% to 25% across Member States and over time[8].

5.4.2 The CMO Sugar and the reasonableness of sugar prices for industrial users

Sugar using industries in the EC have to buy sugar produced in the EC at a relatively high price (compared to prices on the world market). Buying sugar cheaply on the world market is not a realistic alternative for industrial sugar users, because high import duties make imported sugar even more expensive than EC sugar[9].

Although the prices of industrial sugar are high in the EC, the users of industrial sugar are not specifically disadvantaged by those high prices, because:

- all sugar using industries in the EC have to pay sugar prices within the same high price band;
- producers of sugar containing Non-Annex I products are protected against cheap imports through an import duty on the sugar incorporated in imported Non-Annex I products. That import duty makes the sugar incorporated in the imported products more expensive than EC sugar;
- EC exporters of sugar containing Non-Annex I products receive export refunds for the sugar incorporated in those products. The export refund is based on the weight of the sugar incorporated in the product and the export refund for sugar as determined by the weekly tenders for export refunds. In fact the lowest bid of the weekly tender for export refunds is taken minus 30 ECU/t (see section 2.3.5 of the main report regarding the export refund mechanism; see annex G for more details on the export refunds for Non-Annex I products);
- the chemical and pharmaceutical industries get a production refund for the sugar they use as input. The production refund is aimed at reducing the sugar input costs

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7 See, inter alia, for the UK and Ireland: Commission of the European Communities, 1988; 1992; 1997; 1998; Court of First Instance of the European Communities, 1999; for France: Conseil de la Concurrence France, 1997; and general, i.e. EC sugar industry as a whole: Commission of the European Communities, 1973. Furthermore, similar evidence exists for Italy (Italian Antitrust Authority, 1998), Spain (Tribunal de Defensa de la Competencia, 1999 and Denmark and Austria (European Commission, ongoing).

8 CIUS argues that the effective sugar support price could be decreased by 16.5% in view of the actual production costs, while maintaining the minimum beet price. The CEFS has heavily criticised the estimates of CIUS regarding the present production costs of sugar.

9 The only exception being Inward Processing Relief (IPR) which is granted on an ad hoc and sparse basis.

to a level comparable with the world market price of sugar, in order to create a level playing field for the EC industries vis-à-vis their extra-EC competitors, both on the EC markets and external markets. The production refund is equal to the export refund minus 84.5 ECU/t; part of the latter amount is meant as a deduction for the lower transport costs when sugar is bought from a near by supplier in the EC (for details see annex G).

The export refund system is criticised by the exporters of Non-Annex I products on two grounds:

- the industry has to buy the sugar in the EC at the actual market prices, which are higher than the minimum guaranteed sugar price (=intervention price plus regional premium plus storage levy) on which the calculation of the export refund is based. Thus the exporters of Non-Annex I products are not compensated for the difference between the actual EC market prices and the minimum guaranteed price in the EC;
- the deduction of 30 ECU/t is not justified by any cost price consideration and puts the exporters at a disadvantage compared to extra-EC competitors.

These two factors imply that the exporters of Non-Annex I products can not compete entirely at par with the extra-EC producers, as far as the cost of sugar is concerned. The same criticism and conclusion applies to the production refunds for sugar used by the chemical and pharmaceutical industry. In fact the second mentioned disadvantage is even bigger, because in the calculation for production refunds a deduction is made of 84.5 ECU/t. Thus also the chemical and pharmaceutical industries in the EC can not compete entirely at par with the extra-EC producers, as far as the cost of sugar is concerned. This is particularly a disadvantage for producers in Member States with relatively high sugar prices (e.g., Spain and the UK) and for products with a high sugar content (e.g., chocolates).

Apart from these criticisms, the above mentioned arrangements compensate to a large extent the differences in prices in the EC and on the world market. They create more or less, but not perfectly, a level playing field for EC industries and extra-EC industries. Because of these arrangements, the EC sugar price is on average not unreasonable for the industrial users of sugar as regards the extra-EC competition. However, in the case of Non-Annex I products, the final consumer may feel that the sugar price is unreasonable. It is the final consumer who pays the bill of the high sugar price (see section 5.5).

This does not mean that all sugar using industries are satisfied with the present high prices of sugar. They strive for a reduction of the price, which will allow them either a higher margin, or an increase of sales (through a lower sales price) or both. Although many sugar using industries will be in favour of a lower sugar price, most likely many of them will not be in favour of dismantling the CMO Sugar, just because the CMO Sugar at the same time protects the sugar using industries through the high import duty on sugar contained in food and drinks.

In many individual cases this advantage of import protection for the industry will be greater than the disadvantage of a relatively high sugar price, keeping also in mind that the bill is passed on to the final consumer. In this respect, it should be remarked that sugar containing products generally show a low price elasticity of demand. Industrial producers of these products will not be very concerned about a price increase of sugar, because they can pass on the higher costs to the final consumer without a large drop in sales volume. They will generally favour a decrease of the sugar price, because this enables them to add most of the cost savings to their profit margin. There will be no strong incentive to pass on these savings to the final consumers.

The reasonableness of sugar prices can also be approached from a different angle, by comparing the industrial user prices with the (average) costs of producing sugar in the EC. As will be shown in chapter 7, average production costs in the EC during the 1990s have been estimated at around US$ 450 per tonne in low cost producing Member States (the Netherlands, Belgium and the UK) and around US$ 660-710 per tonne for the EC as a whole, whereas 1998 prices provided by CAOBISCO were on average ECU 720-750 per tonne[10]. Especially for low cost producers within the EC, these figures would point at a considerable profit margin per tonne, in the range of 45-55%. If the CAOBISCO price figures and cost data are indeed correct, sugar users could rightly perceive actual prices of industrial sugar as non-reasonable in view of the actual production costs of sugar.

5.5 Final consumer prices of sugar in the EC

5.5.1 Introduction

The final consumer generally buys his sugar in a retail (food) store, in packets or bags of 500 g up to 5 kg. This retail price of sugar or final consumer price is made up of the ex-factory price plus the costs of transport, storage, packaging, advertising, running the retail shop and a profit margin. Sugar is either sold directly by the sugar processor to the retailer, or is marketed through a sugar merchant[11] or wholesaler, who passes the product on to the retailer[12]. In 1993/94-1995/96, the sugar retail price was almost twice the ex-factory selling price paid by industrial users in the EC (LMC 1997: 33).

In order to evaluate whether the price paid by final consumers in the EC has been reasonable, a number of price comparisons will be made. In section 5.5.2 the price developments in the various Member States will be compared in nominal terms. Section 5.5.3 discusses the usefulness of a comparison of price developments in real terms. In

10 The CEFS has heavily criticised the estimates of the production costs made by CIUS.

11 Merchants are involved in 'nominal merchanting' and 'principal merchanting'. In 'nominal merchanting' merchants act as agents for producers and take care of order processing, invoicing and collecting payments in return for a fixed commission or fee. In 'principal merchanting' the merchant purchases sugar either from producers and through imports on its own account and sells it in its own name fixing the terms and profits for itself.

12 Price bargaining between individual sugar processors (refiners) and individual retailers proceeds on an individual basis, and is in principle similar to the bargaining process between industrial users and sugar processors (see section 4 on *Industrial user prices of sugar*).

section 5.5.4 the developments of retail prices are compared with the trend of the price indexes of food. Section 5.5.5 is focussed on a comparison of retail prices among Member States and a number of other countries using the purchasing power parity concept. A number of observed price differences are discussed in section 5.5.6 Conclusions regarding the reasonableness of the retail prices are presented in section 5.5.7.

Contrary to the industrial user case discussed earlier, a comparison between the intervention price and the retail price of sugar is not very illuminating because the intervention price makes up only about half of the retail price. The other half of the retail price is determined by the costs and margins in the distribution chain. An assessment of the difference in shares earned in the distribution chain of the final consumer price in the various Member States would add to the understanding of how *other* factors - among which the CMO Sugar - have contributed to the perceived reasonableness of prices.

Cost differences in the sugar distribution and retailing among Member States are caused by differences in market structure (the existence of monopolistic or monopsonistic-type markets, the (ab)use of market power), and the (macro)economic and policy environment. Differences are reflected in different transport costs, labour costs, investment costs, value added and profit taxes, etc, which together make up the cost side of the distribution and retail sector. These cost differences will be reflected in differences in retail market prices. An assessment of the cost in the distribution and retail chain is however beyond the scope of this study.

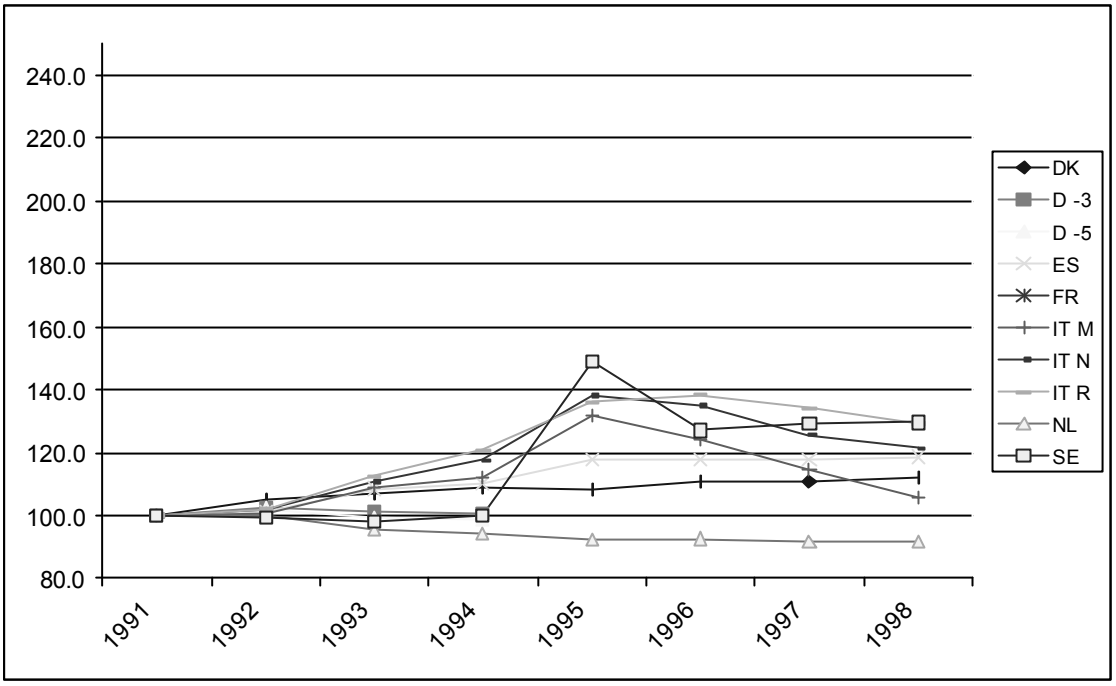
5.5.2 A comparison of nominal price developments between Member States

Nominal price developments represent the actual evolution of average prices paid by final consumers. Nominal prices do not correct for inflation and do not take account of increases in purchasing power. Yet nominal prices play an important role in the perception of final consumers whether of prices and their trend are reasonable or not. A rise in nominal prices gives consumers the impression of a price increase, even if prices would decrease in *real* terms (i.e. corrected for inflation).

Figure 5.2 shows the *nominal* sugar retail price trends in a number of Member States (see annex D.1 for the underlying basic data). It appears that only the Dutch sugar retail prices have declined in nominal terms between 1991 and 1998. Highest nominal price increases were recorded in Spain, Italy (Naples and Rome regions) and Sweden. Interestingly, the Swedish nominal sugar retail prices jumped at the time of Sweden's accession to the EC in 1995. Before and after the accession the sugar price declined slightly in Sweden.

Nominal sugar retail prices in Denmark, Spain and the North of Italy increased slightly over the years. The case of Italy shows that there can be substantial regional differences within a country as regards the trends of sugar retail prices.

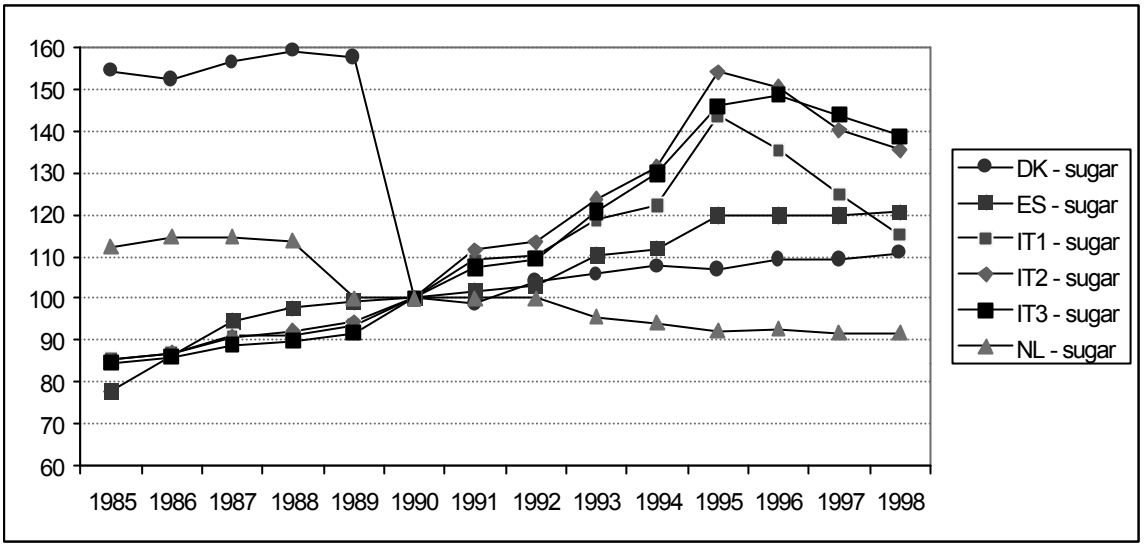
Figure 5.2 Trends in nominal sugar retail prices in some EC Member States (indices based on prices in national currencies, 1991=100)



Source: International Labour Organisation.

If the longer time-series of 1985-1998 are observed, which are shown in figure 5.3, it appears that a sharp drop in prices occurred in Denmark from 1989 to 1990, with price levels staying at that structurally lower level afterwards. In the Netherlands a similar, but less pronounced drop can be observed in 1988/89, with again a structurally lower stable price level thereafter. In Spain, a continuous nominal increase in prices can be observed from the time of EC membership until recently. For Italy holds that prices between regions have started to diverge only after 1990, which makes price divergence a recent phenomenon.

Figure 5.3 Nominal development of EC retail prices in selected Member States (national currency indices, 1990=100)



Source: International Labour Organisation.

Official Eurostat data of nominal sugar retail prices exist only for a limited number of Member States and only until 1994. According to available figures, nominal retail prices of sugar, expressed in ECU/kg, increased substantially in Belgium and France, and to a lesser extent in Germany, Ireland and the Netherlands from 1991 to 1994 (see table 5.4).

At the same time, prices decreased in Greece, Italy and the UK. In 1994, prices were highest in Belgium and France, and lowest in Greece and the UK. The price difference between Belgium and the UK was as high as 45%. It is not clear to what extent these differences in trends and absolute value of the nominal retail prices in ECUs were caused by differences in ex-factory sugar prices, by differences in costs and competitive forces in the distribution and retail sector, or by exchange rate changes.

Table 5.4 Consumer prices for sugar in some EC member states (refined sugar, ECU/kg)

Member State	1991	1992	1993	1994	% change 1991-1994
Belgium	0.92	0.94	1.15	1.22	+32.6
Denmark	1.14	n.a.	n.a.	n.a.	n.a.
Germany	0.92	0.96	1.00	0.99	+ 7.6
Greece	0.92	0.81	0.84	0.85	-7.6
France	0.94	1.03	1.12	1.15	+22.3
Ireland	1.06	1.08	1.08	1.11	+4.7
Italy	1.05	1.03	0.96	1.00	-4.8
Netherlands	0.88	0.90	0.87	0.90	+2.3
U.K.	0.94	0.88	0.89	0.84	-10.6

Source: Eurostat.

5.5.3 Comparison of real price developments between Member States

Although nominal price developments play an important role in the perception of final consumers, they are not particularly suited for a comparison of price developments across Member States. One important reason is that inflation[13] rates between countries may differ. A comparison across countries should be based on the trends of the real sugar prices. However sufficiently long time series for all Member States to make a meaningful analysis were not available. The comparison and analysis of the development of sugar prices in relation to the development of the prices of other food products, presented in the next section, is a good alternative for a real price analysis.

5.5.4 A comparison between sugar prices and consumer prices for food across selected Member States

A comparison of the evolution of retail prices of sugar with prices of other food products may yield interesting insights for judging the reasonableness of prices. The most suitable and relatively neutral measure for comparison is the consumer price index for food. That index represents the nominal price (development) of a weighted basket of agricultural and food products. The comparison is useful in that it holds an implicit measure of reasonableness: when the price of sugar develops at the same pace and in the same direction as that of other agricultural and food products, its price can be regarded as reasonable.

The consumer price index for food, however, is an aggregate containing a number of different categories of agricultural and food products. One should not compare the price development of sugar with that of primary agricultural products directly sold to consumers (fruit and vegetables). Better would be to compare the sugar price index with a basket of prices of first- and second-stage processed food products, as sugar has characteristics found with both product categories. In some respects, sugar can be regarded as a first-stage processed product as it is used as an intermediate product in the production of various drinks and food products. In this sense, sugar is comparable to products like (wheat) flower, cereals starch, etc. However, sugar is also sold directly to consumers as a final product. Prices of second-stage processed products usually follow different price patterns than first-stage processed agricultural products. As they usually reveal higher income elasticities of demand, one would expect them to rise faster than first-stage products. As a result, one would expect to observe larger increases in prices of sugar-containing products like soft drinks and confectionery, than in the price of sugar itself.

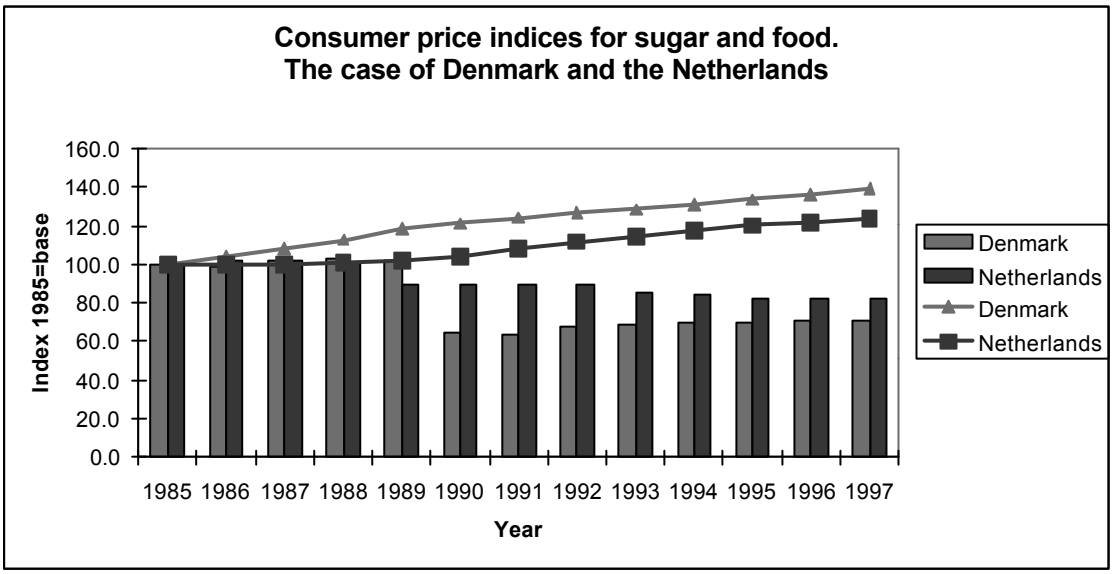
Although there are no sufficiently long time-series for *all* Member States, a comparison was made of a selected number of Member States for which data were available, in order to illustrate and exemplify the existing differences in price development patterns. This presentation is therefore not exhaustive and as a result does not provide a full picture for the EC as a whole. Results of these comparisons are shown in figure 5.4 and

[13] Defined here as a general price increase.

5.5 (see also the annexes D2 and D3 for underlying basic figures of the consumer price index for food).

In figure 5.4, a comparison of the two indices for Denmark and the Netherlands is made. As can be seen, the development of the consumer price for food (indicated by the two increasing lines) shows an upward trend over time, while the nominal price development of sugar prices (indicated by the vertical bars) shows a strongly downward trend in both countries. In 1997, the consumer price indices for food for Denmark and the Netherlands were 139 and 124; for sugar the indices were 72 and 82 respectively.

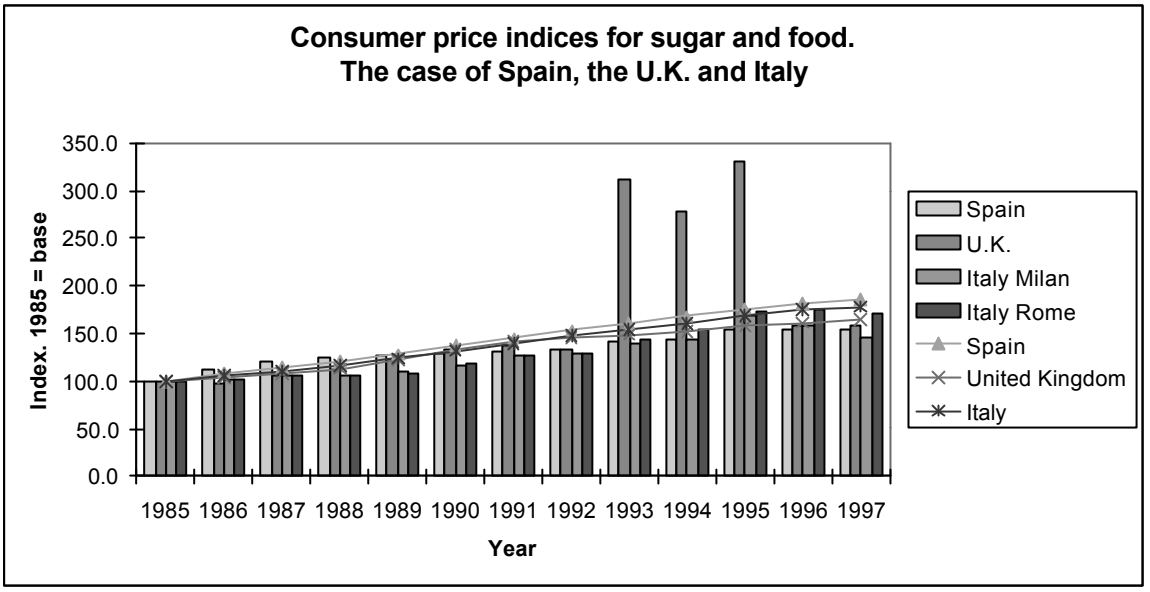
Figure 5.4 A comparison of consumer price indices for sugar and food. The case of Denmark and the Netherlands, period 1985-1997



Source: ILO (price data; indices based on own calculations) and EUROSTAT (consumer price index for food). Explanation: *bars* indicate sugar price indices, *lines* indicate the consumer price index for food.

In figure 5.5, a comparison of the two indices for Spain, the U.K. and Italy (Milan and Rome region only) is made. As can be seen, the consumer price indices for food for the three countries - represented by the three upward-sloping lines - shows an upward trend over time. The price index of sugar follows closely and in line with this general trend in consumer food prices. The biggest gap between the two occurred during the early 1990s. After that period the price gap decreased again. Over the course of time in Spain the consumer price of sugar drops somewhat below the general food price. As has been noted in section 5.2, the U.K. has faced a strong surge in sugar prices during the period 1993-95. After this short period, U.K. prices have returned to their old values and are again in line with the general food price index for the U.K.. In 1997, the consumer price indices for food for Spain, the U.K. and Italy were 186, 164 and 178; price indices for sugar were 154, 158 (Italy, Milan), 165 (Italy, Rome) and 170 respectively.

Figure 5.5 A comparison of consumer price indices for sugar and food. The case of Spain, the U.K. and Italy



Source: ILO (price data; indices based on own calculations) and EUROSTAT (consumer price index for food). Explanation: *bars* indicate sugar price indices, *lines* indicate the consumer price index for food.

It is clear that the differences found between a number of EC Member States are considerable. While the CMO Sugar sets a similar institutional and policy framework for all EC Member States, the outcome in terms of the prices for sugar paid by the final consumer strongly varies across from Member States. As prices have been in line with the general rise in food prices – represented by the consumer price index for food, one could conclude that prices have been reasonable. However, as has been discussed earlier, there are reasons that justify a steeper increase in the general food price index compared than the increase in the consumer price index of sugar. If this is taken as a benchmark, the development of sugar prices of the 5 countries analysed can only be termed reasonable in the Netherlands and Denmark.

5.5.5 A comparison of PPP prices across Member States and third countries

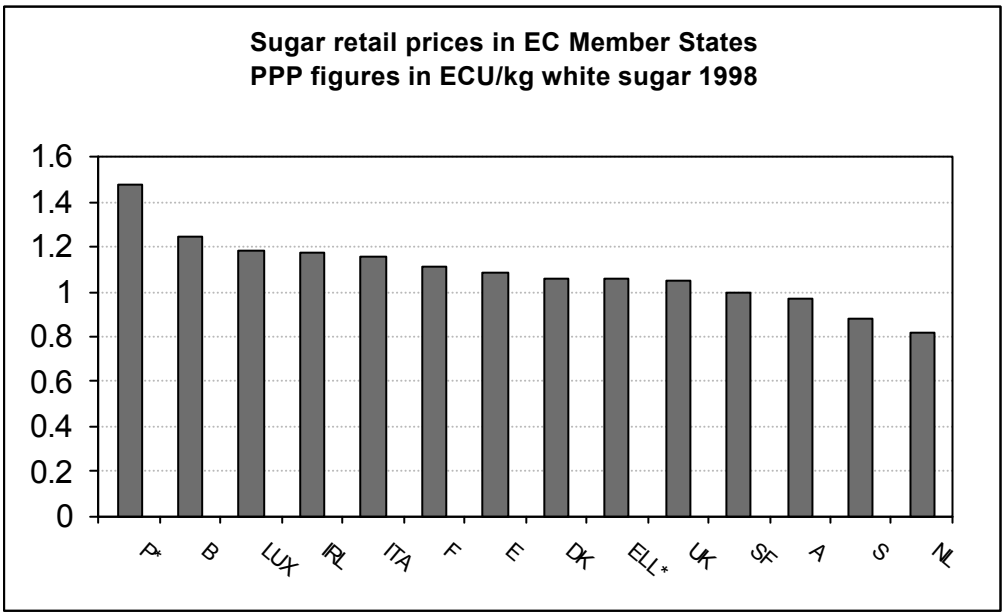
In section 5.5.2 sugar retail prices across Member States were compared by converting all prices in national currencies into ECUs on the basis of financial exchange rates. The drawback of this method is that these 'normal' exchange rate-based prices do not adequately reflect differences in relative price levels and in purchasing power across countries and over time. This is particularly an issue when the price comparison is extended to countries outside the EC, some of them having an economic structure quite different from the EC.

In order to avoid the drawbacks of using the financial exchange rate, the exchange rate based on Purchasing Power Parities (PPP) can be used. The PPP concept - developed by

the World Bank and the OECD - is based on comparing the costs of a pre-specified basket of goods and services of one country, expressed in the currency of that country, with the costs of the same basket of goods and services in another country, expressed in the currency of the latter country. The ratio of the two amounts in national currency is defined as the PPP exchange rate. The PPP thus measures and compares the relative purchasing power of different countries' currencies for the same types of goods and services. PPP-based data are usually converted into one basic currency so as to make comparisons as transparent as possible. Most often PPP comparisons are done in US$.

Two PPP-based comparisons of the price of sugar have been made: one for the EC Member States (figure 5.6), and one for the EC Member States and a number of other important economies in the world (figure 5.7); both apply to the year 1998. Figure 5.6 shows that within the EC, sugar retail prices on a PPP-basis are highest in Portugal, Belgium, Luxembourg and Ireland, and lowest in the UK, Sweden and the Netherlands.

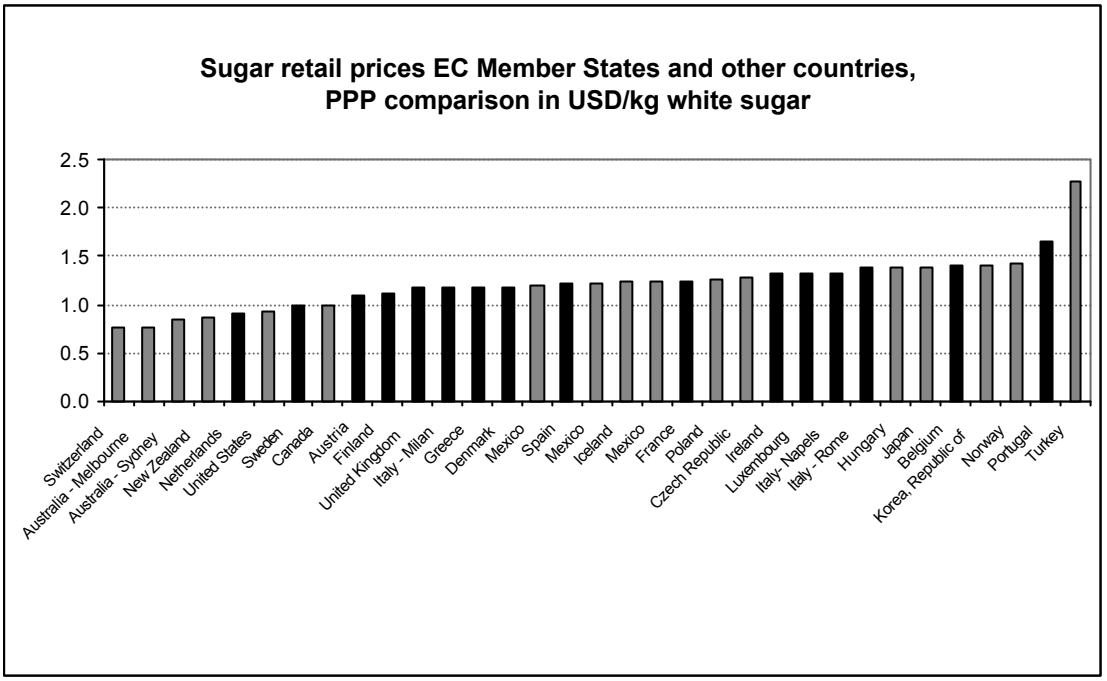
Figure 5.6 Sugar retail prices in the EC valued on the basis of Purchasing Power Parities



Source: ILO (prices) and OECD (PPP). Recalculated from US$ into ECU, using the 1998 exchange rate average 0.89303 (Eurostat figure).

Figure 5.7 shows that sugar retail prices, based on the PPP concept, are very high in Turkey which has by far the highest price, followed by Portugal, Norway, Korea, Belgium and Japan, and comparatively low in Switzerland, Australia, New Zealand, the Netherlands and the United States. The EC countries are spread all over this scale, with Portugal and Belgium at the very high end of the scale and the Netherlands and Sweden at the lower end.

Figure 5.7 Sugar retail prices in various countries valued on the basis of Purchasing Power Parities in US$



Source: ILO and OECD.

5.5.6 The CMO Sugar and the reasonableness of sugar prices for final consumers

In a strongly and uniformly regulated market with intervention prices set at the same level for all Member States and the same prohibitive levels of protection along the EC border, one would expect prices (in ECU/kg) not to differ very much between Member States. Furthermore, one would expect prices to converge rather than diverge among Member States over time. With intervention prices having remained more or less constant in nominal terms over the last 10 years, and declining in real terms, one would expect constant or decreasing sugar retail prices in the various EC Member States. However, this is not at all what is observed in reality.

Sugar retail prices were about two times the ex-factory price of sugar in the middle of the 1990s. Since 1984 ex-factory sugar prices in the EC have been two to three times higher than the world market price. However, since 1981/82 effective minimum revenues in national currencies for the sugar producer have declined by 18 to 36% in real terms per Member State (see chapter 4 and annex B). Evaluated from this perspective, the sugar price in the EC may be perceived as unreasonable. It can, however, be doubted whether ex-factory, world market price and production cost levels play a large role in the perception of the average final consumer.

Closer in the perception of the average consumer are the differences in sugar retail prices between Member States, which are considerable. Consumer prices, whether calculated in nominal or PPP terms, or compared to the consumer price index for food,

vary substantially across EC Member States. In nominal terms, the price gap between the highest and the lowest recorded sugar prices during the mid- and late 1990s has been about 40% (see figure 5.2). Striking also is that the sugar retail prices in two sugar surplus Member States (France and Belgium) were found to be much higher than in two Member States with a very tight sugar supply (Italy and Greece), both in 1993 and 1994 (see table 5.4). The price difference between Belgium and Greece was as high as 44%. There are good reasons to believe that existing price differences between Member States may be perceived as unreasonable by consumers.

Price comparisons on the basis of Purchasing Power Parities indicate that, within the EC, sugar retail prices are highest in Portugal, Belgium, Luxembourg and Ireland, and lowest in the UK, Sweden and the Netherlands. The price gap between the highest price (Portugal) and the lowest price (the Netherlands) is around 70%. Furthermore, a comparison with a number of third countries shows that the national prices in the EC are ranked from low to high on the price list, with Finland and Portugal at the high end of the scale and the Netherlands and Sweden at the low end. On the basis of this comparison, consumers in Finland, Portugal, Belgium, Luxembourg and Ireland may perceive sugar prices as unreasonable.

Existing differences in retail sugar prices between EC Member States raise doubts as to whether sugar retail prices are in fact reasonable across the EC as a whole. This is particularly so since one of the objectives of the CAP is "to ensure that supplies reach consumers at reasonable prices". Retail price differences are difficult to explain by costs of production or scarcity on national sugar markets arguments (see chapters 7 and 4, respectively). The impact of the CMO Sugar on retail prices is difficult to disentangle from other factors. It appears that other factors are quite influential; much more than in the case of the industrial user prices.

The differences in retail prices between Member States are most probably caused by differences in market structure, (pricing) behaviour and performance (efficiency; profit margins) of downstream industries within the various Member States. Until sugar appears in the food store and can be bought by the (final) consumer, it goes through various stages of the sugar supply chain. The ex-factory sugar price is but one cost item that matters in determining the retail price. Costs and profit margins in the distribution and retail sectors, and competitive pressures and forces in these sectors have a large impact on the process of retail price formation. A full assessment of the impact of this complex of factors is, however, beyond the scope of this study.

5.6 Conclusions

Industrial user prices

The CMO Sugar has an important impact on the formation of industrial user prices of sugar. The CMO Sugar isolates the EC sugar market from the world sugar market and has enabled ex-factory price levels within the EC which since 1984 has been two to three times higher than the world market price for sugar. This price level is protected

and maintained through high import duties on sugar and a guaranteed minimum sugar price on the domestic EC market. Sugar using industries in the EC have to buy sugar produced in the EC at a relatively high price compared to prices on the world market and in many other developed countries.

Nevertheless, EC industrial users of sugar are not specifically disadvantaged by these high prices, because the CMO Sugar has been able - through an intricate system of export refunds and production refunds - to maintain a reasonable level playing field for EC industrial users as compared to extra-EC competitors. Export refunds and production refunds do not make up entirely for the difference between EC market and world market prices. Some industrial sugar users may therefore perceive the present high prices of sugar as not reasonable, and strive for price decreases which will allow them a higher margin and/or an increase in sales volume. Although industrial users will be in favour of a lower sugar price, most likely many of them will not be in favour of dismantling the CMO Sugar. For the CMO Sugar also protects the sugar using industries through the high import duty on sugar contained in food and drinks.

Industrial users may perceive prices as unreasonable if prices are much higher than the costs of producing sugar. In other studies the average production costs in the EC during the 1990s have been estimated at around US$ 450 per tonne in low cost producing Member States (the Netherlands, Belgium and the UK) and in the range of US$ 660-750 per tonne for the EC as a whole. These figures point at a considerable profit margin per tonne, especially for low cost producers within the EC.

In a single (common) sugar market, one would expect prices to converge rather diverge between Member States. Unofficial price data from CAOBISCO and CIUS suggest that industrial user prices have diverged rather than converged over the last decade and that different market premiums exist across Member States. CAOBISCO and CIUS figures indicate sugar prices paid by industrial users are 8% to 24% higher than the minimum guaranteed price. These figures are, however, heavily disputed by the sugar industry asserting that the differential is substantially lower than 10%, at least in France.

In view of the surplus of quota sugar on the EC market -about 11% of quota sugar has to be sold on the world market (and 20% when the preferential imports are taken into account)- one would expect the actual price-cost differential to be small, unless there is too little competition on the sugar markets. There are a number of indications that the latter could be the case, namely: little sugar trade among Member States; most national markets controlled by one to three large sugar producers; the four largest companies in the EC accounting for almost half of the EC sugar production; low market transparency in terms of price information; and a number of anti-trust cases investigated by the EC and national authorities.

It should be borne in mind that ultimately, the final consumer pays the bill of the high sugar prices in the EC, either indirectly through the costs of sugar incorporated in foods and drinks or directly by buying sugar in the retail shop.

Retail prices

There are considerable differences in sugar retail prices across Member States. In nominal terms, the price gap between the highest and the lowest recorded sugar prices during the mid- and late 1990s has been about 40%. Striking also is that the sugar retail prices in two sugar surplus Member States (France and Belgium) were found to be much higher than in two Member States with a very tight sugar supply (Italy and Greece), both in 1993 and 1994. The price difference between Belgium and Greece was as high as 44%. There are good reasons to believe that existing price differences between Member States may be perceived as unreasonable by consumers. Price comparisons on the basis of Purchasing Power Parities indicate that, within the EC, sugar retail prices are highest in Portugal, Belgium, Luxembourg and Ireland, and lowest in the UK, Sweden and the Netherlands. The price gap between the highest price (Portugal) and the lowest price (the Netherlands) is around 70%.

Price differences are difficult to explain by differences of production costs or scarcity arguments. The relatively high level of retail prices in some Member States and especially the differences in levels between Member States are less related to the CMO Sugar than to other factors. The ex-factory price of sugar is but one cost item that matters in determining the retail price. Differences in costs, profit margins and competitive pressures in the distribution and retail sectors between Member States are most likely the main causes of the observed differences in retail prices.

6 The relative competitiveness of sugar and sweeteners

6.1 Introduction

This chapter deals with evaluation question 1.2, which reads as follows: *"What has been the impact of the common organisation on the competitive position of the products concerned (including inulin syrup and isoglucose) both in relation to one another, and in relation to other sweeteners (especially new products) on the Community market?"*

The development of the competitive position of a product is influenced by many factors, among which are the development of relative production costs, the emergence of substitutes, the development of people's taste, preferences and income, etc. Measuring the competitive position of products by a single indicator is therefore elusive. Although the development of production and – especially - consumption levels and the evolution of market shares are important indicators because they reflect ultimately the development of competitive positions, they do not explain the impact of and relation between the different underlying factors. For example, consumption patterns may chance as a consequence of various factors, e.g. an increase of disposable income per capita, a change of preferences, a relative price decrease, etc.

In this chapter the impact of the CMO Sugar on the competitive position of the products covered by it will be assessed by comparing and analysing developments in production and consumption levels, prices and production costs, and by analysing incentive structures[14]. Three categories of sweeteners will be analysed:

- Natural sweeteners (sugar, isoglucose and inulin syrup)
- Polyols (sugar alcohols)
- High-intensive sweeteners (HIS).

There are no absolute judgement criteria for the above mentioned indicators. Judgement will be mainly qualitative by assessing how the different aforementioned indicators have been influenced by the CMO Sugar.

The impact analysis performed in this chapter is especially difficult because of the virtual non-existence of public data for sweeteners other than sugar. Sweetener industries are reluctant in providing data, whereas other data sources are largely proprietary and could not be used for the purpose of this study.

The content of this chapter is as follows. Section 6.2 starts with a short introduction on sweeteners other than sugar. Section 6.3 elaborates the concept of competitive position, which forms the methodological basis for the rest of this chapter. Section 6.4 discusses the issue of (technical and economic) substitutability of sugar and sweeteners, which greatly affects the relevance of the notion of competitive position. Section 6.5 deals with the production of natural sweeteners in the EC. Production, consumption and the

[14] The impact of the development in people's tastes (preferences) and incomes have been assumed neutral for the sake of this analysis.

impact of the CMO Sugar on the competitive position of High Fructose Syrup (isoglucose) are discussed in section 6.6. A similar exercise - permitting data - is done with respect to inulin in section 6.7, polyols in section 6.8 and High Intensity Sweeteners in section 6.9. Section 6.10 concludes.

6.2 A short introduction on sweeteners other than sugar

Apart from sugar and sugar-like products (such as maple sugar, artificial honey, caramel, and sugar syrups), various other sweeteners exist. Some of these sweeteners can be regarded as (potential) competitors to sugar in the manufacture of food, soft drinks and confectionery. Three main categories of sweeteners can be distinguished:

- natural sweeteners[15]. Most of the natural sweeteners are starch-based. Isoglucose (starch-based) and inulin syrup (not starch-based) are two well-known sweeteners included in this category;
- sugar alcohols or polyols. Most of the polyols have also a natural base, but they are usually distinguished from the other natural sweeteners;
- artificial sweeteners, not derived from a natural product, including mostly intensive sweeteners.

Natural sweeteners and polyols have similar bulk characteristics and a similar degree of sweetness, although in general less sweet than sugar. Some high-intensity sweeteners combine a very strong sweetening power with a low-calorie content[16]. Calorie content is the basis for another distinction, between caloric and non- or low-caloric sweeteners.

Large-scale industrial production of most of these sweeteners has started since the late 1960s and early 1970s. A lot of progress has been made since in improving industrial production techniques and in developing new products (the latter especially in the area of high-intensity sweeteners).

The regulatory status on the use of sweeteners for the manufacture of food and drinks differs from country to country. Most new sweeteners must undergo stringent safety evaluations before they can be included into legislation and applied. In the EC such evaluations are performed by the Scientific Committee for Food (SCF). Approved sweeteners are listed in Directive 94/35/EC (Amended by Directive 96/83/EC).

Except for isoglucose and inulin syrup, which are part of the CMO Sugar, sweeteners are not subject to market regulation in the EC. Isoglucose and inulin syrup were included in the CMO Sugar in 1977 and 1992 respectively. For both isoglucose and inulin syrup quota arrangements apply (see section 2.3.1, tables 2.3 and 2.4). Neither isoglucose nor inulin syrup are subject to an intervention (buying) mechanism.

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15 This category is sometimes referred to as “bulk carbohydrates”. Strictly taken, sugar (saccharose or sucrose) is part of this category of sweeteners. However, in general, one speaks of ‘sugar and sweeteners’.

16 This is not necessarily so for all intensive sweeteners. Aspartame and thaumatine for instance, two intensive sweeteners, are caloric.

6.3 Further methodological considerations

Competitiveness is a dynamic concept. An entity is competitive if it is able to at least maintain its position in the face of changing market conditions. At the level of the individual firm, competitiveness can be defined as "the ability to profitably create and deliver value at prices equal or lower than those offered by other sellers in a specific market." (Kennedy and Harrison, 1999:3). Thus whether a firm can be regarded as competitive not only depends on its internal cost structure and its efforts to minimise costs, but also on its ability to sell its products. The latter is dependent on consumer demand and the behaviour of its competitors in the output market(s).

Whether a firm is able to maintain or improve its competitive position depends on a number of factors such as:

- The quality and availability of its inputs -apart from price- , including infrastructure, knowledge resources, and human resources.
- The structure, behaviour and performance of related relevant upstream and downstream markets and industries (the overall competitiveness of other segments within the product chain).
- The behaviour and performance of main competitors in its output market(s).
- The structure and openness of its output markets[17].
- Product-specific government policies, the state of the macro-economy and the institutional environment at large.

At the sector or (aggregate) industry level the concept of competitiveness is less straightforward: an industry can still be competitive with stable or increasing aggregate output and profits, even when some firms perform badly, face bankruptcy and go out of business. A similar argument holds for competitiveness at the national level.

Although the concept of competitiveness is generally applied to firms, industries or nations (e.g. Porter, 1990), it could also be used to describe and compare the position of similar products, or - to be more precise - the relative position of close substitutes. Using the analogy of a competitive (business) entity, a product could be described as competitive if it is able to at least maintain its position in the face of changing market conditions. On the basis of this definition, the competitive position of a product deteriorates when:

- its price compared to other substitute products increases, leading to a decrease in market share[18], *ceteris paribus*;
- its market share decreases as a result of the introduction of a new less-expensive substitute, *ceteris paribus.*

The conditional "ceteris paribus" is, however, hard to reconcile with the other constituent element of the definition, i.e. "in the face of changing market conditions". Changing market conditions are usually the cause of a change in competitiveness, and

17 Including factors like purchasing power and availability of substitutes.

18 Defined as market demand for a product as percentage of the aggregate of all related (substitute) products including the product concerned in terms of volume.

should therefore be taken into consideration rather than left out of the analysis. A change in market conditions may occur because of:

- changes in demand and supply of the product concerned. Changes in demand may occur as a result of changing preferences (e.g., towards low-calorie food and drinks), increases in available purchasing power and demographic changes. Changes in supply may occur because of new entry, improved production techniques and lower production costs;
- government policies. Support policies, tax policies, and regulation of the market (e.g., through consumer safety concerns and admission procedures; production quotas; import quotas; industry location requirements) primarily change incentives of (potential) market players and as a result may strongly affect the production, availability and consumption of products;
- changes in other, linked markets, especially close substitute markets, and input markets.

Factors that lead to a change in market conditions are generally interrelated rather than independent, with one factor often conditional on the other. For example, strong food safety requirements for the introduction of new sweeteners may prevent their production and use in country A, while country B may already have cleared the product, with concomitant divergent impacts on industrial activity in both countries. Moreover, while the product is not produced in country A, prevailing conditions in already existing markets of both country A and B may change, because of spillovers from one market to another (e.g. a decrease in demand) due to international trade between the countries concerned. Furthermore, government restrictions on the production of already existing sweeteners may lead to totally different market conditions than otherwise might have been the case.

What does this imply for the measurement of the relative competitive positions of sugar and sweeteners? Measuring the competitive position of a product by focusing on developments in market (volume) share only would appear too narrow. For a decreasing market share does not necessarily imply that demand for a certain sweetener has decreased in absolute terms. On the contrary, it could even mean that demand for a particular sweetener has risen, but that total aggregate demand for *all* sweeteners has increased even more strongly. At the same time, relative price and/or cost developments for different sweeteners might not yield conclusive evidence on the competitive positions of products either, as sweeteners are far from perfect substitutes.

Furthermore, absence of even basic comparable marketing data outside the sugar domain, especially cost and price information, is a major practical drawback. Moreover most data are proprietary, i.e. not for public use. But even if all this information would be readily available, drawing any definite conclusions on the impact of the CMO Sugar on relative competitive positions of sweeteners would still be difficult. In summarising, there are three major reasons why the concept of competitive position is difficult to operationalise, namely:

- the markets for sugar and sweeteners are highly dynamic and interrelated;
- the sugar and sweeteners markets are subject to intensive government intervention in most major industrialised countries which makes an objective comparison of competitive positions complex;
- the mere absence of public data and statistics, particularly where cost and price information is concerned, makes an objective comparison not only complex but merely impossible.

6.4 Substitutability of sugar and sweeteners

Because of different functional properties, sweeteners are not easily interchangeable, not even within one specific category of sweeteners (natural sweeteners, polyols and high-intensity sweeteners). Technical substitutability is, however, a *sine qua non* for factual substitution. Whether sweeteners can be substituted technically depends on their chemical and physical properties (structure, texture, blending capacity, form (solid or liquid), crystallisation, heat resistance, sweetening power), taste and health characteristics. Whether a product is *actually substituted* merely depends on economic factors (price, availability)[19] which, in turn, may be strongly influenced by prevailing government policies. A complicating factor in evaluating substitutability, is the increasing use of blends of sweeteners: not substituting but combining the properties of sweeteners (Corti, 1999: 7).

Technical substitutability bears a close relationship to what is understood by the concept of *relevant product market* in anti-trust and competition law. The relevant criterion for a relevant product market is whether or not products meet the same needs and are substitutable from the customer's point of view[20]. Competition may also occur at different user levels. A good example in this respect is the use of starch sweeteners (carbohydrates) as a major input in the production of polyols (see Table 6.1) for a concise summary of the use of different sweeteners). Both arguments -substitutability and different user level competition- explain why the markets of caloric sweeteners and low-caloric sweeteners are usually analysed as different markets (e.g., Cooper et al., 1995).

6.5 Production of natural sweeteners in the EC

Table 6.1 identifies the starch sweeteners (classified as 'ingredients' under EC food law) and their principal application. Starch sweeteners can be used both directly for the production of food and drinks, and as a raw material for the production of polyols.

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19 Economic substitutability is usually measured as the cross-price elasticity of demand (CPED). The CPED measures how responsive consumption of one good is to a change in the price of a related good: $\Delta X/X : \Delta P_Y/P_{Y,\cdot}$.

20 A recent Commission anti-competitive conduct ruling serves to illustrate how subtle the matter of substitutability in fact is. According to this ruling, liquid sugars and speciality sugars do "not meet the same needs and are not therefore part of the relevant product market because they are not substitutable from the customer's point of view." (European Commission, 1998: L76/22).

Because of the fact that starch sweeteners are used in producing polyols (polyhydric alcohols, classified as 'additives' under EC food law), table 6.1 also includes a number of polyols and their principal use. The category of High Intensity Sweeteners (HIS) - which belongs to the artificial sweeteners - is dealt with separately in section 6.9.

Table 6.1 Ingredients, additives and principal uses of starch sweeteners and additives

Starch sweeteners (Ingredients)	Polyols (Additives)	Principal use
Glucose syrups	Sorbitol, Mannitol, Xylitol, Isomalt	Confectionery, candy
Glucose syrups	Maltitol, Lactitol	Chocolate products
Glucose and Fructose syrups	(Erythritol)	Soft drinks
Dextrose, Crystalline and Syrups	-	Other beverages
Spray-dried Glucose, Glucose Syrups, Crystalline Dextrose	Lactitol, Maltitol	Other foods
Levulose, Malto-dextrins	Sorbitol, Xylitol	Diet products
Malto-dextrins	-	Carriers
-	Sorbitol, Xylitol	Oral hygiene
Glucose syrups, Crystalline, Dextrose, Levulose	Sorbitol, Mannitol, Xylitol, Lactitol	Pharmaceutical/medical
Dextrose, Syrups and Crystalline	Sorbitol	Chemical processes
Glucose syrups	Sorbitol, Mannitol	Miscellaneous

Source: Child, 1999.

The group of natural sweeteners -also referred to as carbohydrates or starch sweeteners- includes high fructose syrup (isoglucose), inulin syrup, glucose, and dextrose syrups, among others. Most natural sweeteners have a sweetness comparable to sugar and a similar caloric value (see table 6.2), with similar bulk characteristics, giving them a vast range of possible applications (see also table 6.1). Glucose, which is also known as dextrose, is usually used along with sugar, as a complement rather than a substitute. Glucose is primarily used in nutritious food and medicine.

An overview of the total production in the EC of the most important natural sweeteners is presented in table 6.3. High fructose syrup (isoglucose) and inulin syrup will be discussed in more detail in the following sections.

Table 6.2 Characteristics of sugar and other natural sweeteners

Products	Sweetness	Caloric value (in kJ/g)	Basic form	Raw material input
Sugar	1	17.6	Crystallised, liquid, candy	Saccharose (beet, cane)
Maltodextrins	Very low	17.6		Starch (maize, potato, wheat,..)
Glucose syrups	0.3-0.6	17.6	Liquid	Starch (maize, potato, wheat,..)
D-glucose (dextrose)	0.72	17.6	Crystallised	Starch (maize, potato, wheat,..)
Isoglucose HFS 42	0.9	17.6	Liquid	Starch (maize, potato, wheat,..)
Isoglucose HFS 55	1	17.6	Liquid	Starch (maize, potato, wheat,..)
Inulin syrup	1.2	17.6	Syrup	Inulin (chicory)
Oligofructose	0.3-0.65	6.3	Powder, syrup	Saccharose, inulin
Fructose	1.2	17.6	Crystallised, liquid	Starch, saccharose, inulin

Source: Child, 1999

Table 6.3 Production of other natural sweeteners in the EC

Products	1,000 tonnes dry matter
Glucose/dextrose syrups	2,400-2,600
Spray-dried products	100-150
Chrystalline dextrose	350-450
High fructose Syrups (> 20% fructose)	400-500
Low fructose Syrups (< 20% fructose)	100-150
Levulose (Chemically pure fructose)	15-25
Polyhydric alcohols (polyols)	350-400
Total	3,715-4,275

Source: Child, 1999

6.6 High Fructose Syrup (HFS) or isoglucose

6.6.1 Introduction

High Fructose Syrup (HFS) or isoglucose[21] is sugar's most direct and successful competitor (Rabobank, 1995:65). HFS accounts for about 7% of the global sweeteners market. It is made of corn (the end product is known as High Fructose Corn Syrup, HFCS), wheat, rice, potato or yam starch. HFS is produced by enzymatic isomerisation (saccharification) of dextrose present in glucose (Child, 1999:4). Over the last 15 years technical progress has made it possible to apply wheat and potato instead of corn in the production of HFS. Currently both wheat and potato starch account for approximately a quarter of the total volume of starch input used in HFS production in the EC.

HFS is only available in liquid form, which limits its use as a substitute for sugar to a certain extent. It is, however, a very suitable sweetener in the soft drinks industry. This high degree of substitutability between sugar and HFS is also shown by economic studies of HFS use in the USA. Results show that industrial demand for sugar has become more responsive to sugar price changes after the introduction of HFS. Compared to sugar, however, HFS has poor storage quality and relatively high transport costs.

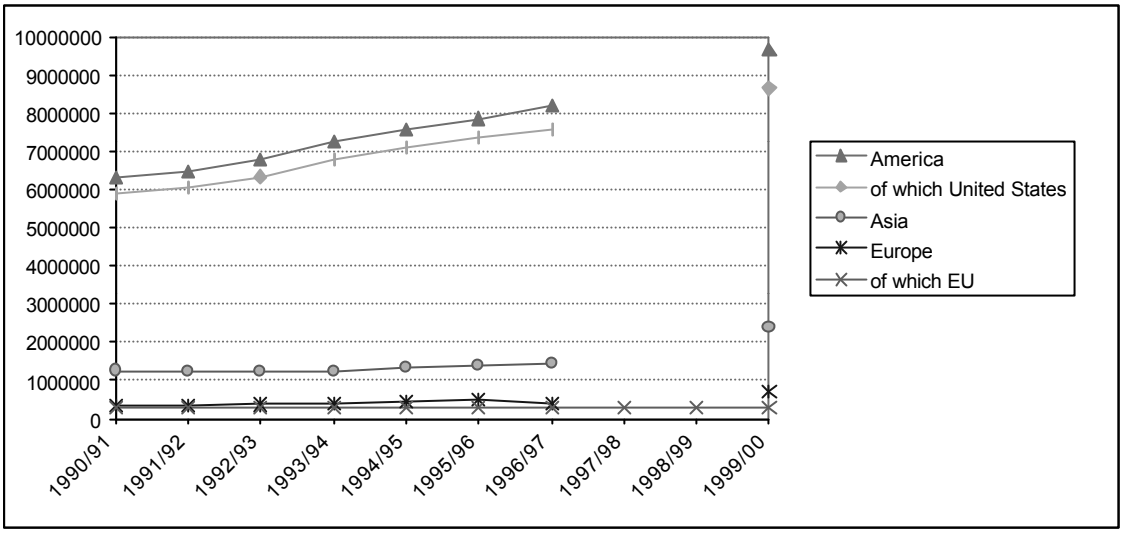
6.6.2 World production and consumption of HFS

World production and consumption of HFS have grown dramatically since the early 1980s. Major HFS producers in the world include the US, Canada, Japan, the EC, South Korea and Argentina (see annex E.). During the 1991/92–1995/96 period, world production of HFS and sugar grew respectively with 20% and 4% (OECD, 1997:8). Figure 6.1 presents the evolution in production by continent during the past decade. The USA still shows the largest growth figures, as it also did in the 1970s and 1980s, followed by Asia, and Europe following in third rank. Production growth in Europe takes primarily place in the non-EC countries, such as Bulgaria, Hungary, ex-

[21] Isoglucose is the term commonly used in the EC. This text, however, sticks to the more widely used international term HFS.

Yugoslavia and the Former Soviet Union (FSU). Due to a tight production quota system, EC production has remained more or less constant over the years, the only changes being new quota allocations for new Member States such as Spain, Portugal and Finland.

Figure 6.1 HFS production in America, Europe and Asia (in tonnes dry matter)



Source: F.O. Licht.

One of the driving forces behind this recent growth in HFS production, at least outside Europe, has been the surge in world sugar prices in 1980. Another important factor has been government policy. In the USA and Japan, which both have policies favourable to HFS production, HFS has reached a market penetration vis-à-vis sugar of 47% and 26% respectively. According to McKeany-Flavell, in 1999 about 75% of total HFCS (volume) demand in the US came from the beverage industry, the remainder from the canning (11%), baking cereal (6%), dairy (4%) and the processed foods industry (4%)[22].

As regards consumption, a similar pattern as in production applies (see table 6.4).

Table 6.4 Estimated developments in world HFS consumption (in 1,000 tonnes sugar equivalent)

	1985	1990	1996
EC	200	300	300
Europe total	100	50	150
Africa	50	100	150
South America	150	150	450
US	4,900	5,700	7,300
North America total	5,100	5,900	7,500
Asia	900	1,200	1,450
Total	6,500	7,700	10,000

Source: FIRS, 1998.

[22] No comparable figures for the EC were available. However, starch consumption may serve as a rough indicator. During the mid-1990s 14% of *starch* production in the EC was used in confectionery, 13% in beverages, 5% in fruit preserves and 22% in other food (Rabobank, 1995:71).

As can be seen from table 6.5, the share of the EC in world consumption of HFS (or isoglucose as it is called in the EC) is declining, while that of Eastern Europe is expected to double between 1995 and 2000. The share of North America is slightly declining; for Asia the opposite holds.

Table 6.5 Estimated development of world HFS consumption in % shares by continent

	1995 (% share)	2000 (% share)
EC	3.1	2.2
Eastern Europe	2.6	5.4
Africa	1.0	1.1
South America	2.1	1.8
North America	72.0	69.6
Asia	19.2	19.9
Total	100.0 (= 10,187,000 t.)	100.0 (= 13,646,000 t.)

Source: McKeany-Flavell, 1999.

6.6.3 EC production, trade and consumption of HFS

As from 1977 HFS production has been incorporated in the CMO Sugar. A system of production quotas and levies was introduced similar to the one existing for sugar. Quotas were allocated to Member States on the basis of historical production levels. B-quotas were set within a narrow range of 23.5% and 27.5% of the allocated A-quota, except for Finland and Spain (each 10%). As can be seen from table 6.6, no changes in quota allocations have occurred since 1981/82, apart from the quota allocations of the new Member States: Spain, Portugal and Finland. Sweden and Austria have not been allocated with HFS quotas.

Table 6.6 HFS quota allocation by Member State in 1981/82 and 2000/01 (tonnes dry matter)

Member State	1981/82		2000/01		
	A-quota	B-quota	A-quota	B-quota	Total
Belgium	56,667	15,583	56,667	15,583	72.250
Finland			**10,845	**1,085	11,930
France	15,887	4,135	15,887	4,135	20,022
Germany	28,882	6,802	28,882	6,802	35,684
Greece	10,522	2,478	10,522	2,478	13,000
Italy	16,569	3,902	16,569	3,902	20,471
The Netherlands	7,426	1,749	7,426	1,749	9,175
Portugal			*8,094	*1,906	10,000
Spain			*75,000	*8,000	83,000
United Kingdom	21,696	5,787	21,696	5,787	27,483
EU (x 1,000)	*157,649*	*40,436*	*251,588*	*51,427*	*303,015*

Source: European Commission, DG Agriculture. * As from 1986/87. ** As from 1995/96.
Note: In the CMO Sugar one tonne of dry matter isoglucose (HFS) is considered to be equivalent to one tonne of white sugar.

The extra-EC exports of quota-HFS are eligible for export refund just as the extra-EC export of quota sugar (see section 2.3.5). The export refund for one tonne of HFS (dry

matter) is equal to the export refund of one tonne of white sugar[23]. The extra-EC exports of HFS equalled on average about 2,000 tonnes per year from 1995/96 to 1997/98, as is shown in table 6.7. This low figure is due to the high transport costs and difficult storage of HFS. Extra-EC imports of HFS are effectively limited by a system of (prohibitive) import duties. Import duties are also applied to HFS incorporated in imported food and drinks.

Table 6.7 EC production and extra-EC exports of HFS (in tonnes dry matter)

Production	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	Quota*
Belgium	72,252	71,668	72,250	72,250	72,250	72,109	72,091	72,232	75,670	72,250
Finland	9,000	15,000	20,000	20,000	11,930	11,930	11,930	11,930	11,930	11,930
France	20,022	19,926	20,022	20,022	20,022	20,022	20,022	20,023	20,022	20,022
Germany	35,684	34,496	35,684	35,684	35,684	35,684	35,328	35,684	35,684	35,684
Greece	9,795	12,334	11,712	12,736	12,985	12,985	13,000	13,000	13,997	13,030
Italy	20,463	20,439	20,476	20,475	20,490	20,459	20,465	20,468	21,395	20,471
Netherlands	9,159	9,176	9,175	9,175	9,175	9,175	9,175	9,140	9,175	9,175
Portugal	5,214	6,609	7,899	9,261	10,000	10,000	10,000	10,000	10,324	10,000
Spain	83,000	82,999	82,992	83,000	83,000	83,000	83,000	83,000	83,000	83,000
UK	27,469	27,432	27,397	27,303	27,318	27,343	27,016	27,246	27,983	27,483
Total EC	292,060	*300,080*	*307,610*	*309,910*	*302,850*	*302,707*	*302,026*	*302,722*	*308,180*	*303,010*
Extra-EC export	n.a.	n.a.	n.a.	n.a.	n.a.	848	419	4,937		-

Source: F.O. Licht and European Commission, DG Agriculture. *Sum of A and B quotas.

The system of production levies applying to *quota sugar*, also applies to HFS quota production. The percentages of the levies for HFS and sugar are the same and, again, one tonne dry matter of HFS is considered to be equivalent to one tonne of white sugar. However, there is one major difference with sugar. As is the case of sugar and inulin syrup producers, HFS producers have to pay an amount equivalent to 42% of the production levies on sugar[24]. For sugar and inulin syrup, the remaining 58% is paid by the beet/chicory farmers. The input suppliers of the HFS industry do not contribute to the production levies. The total of the production levies charged on HFS production amounted to about 6.9 million ECU on average per year over the period 1994/95 to 1998/99[25].

However, no intervention provisions or other institutional prices are in force for HFS. HFS does not have minimum stock arrangements, nor a storage levy equalisation scheme. The use of HFS by the chemical and pharmaceutical industry does also not qualify for production refunds.

HFS production is kept closely within their allotted national quotas in most Member States (see table 6.7). Apparently, the HFS industry is not interested to produce HFS on top of the allocated quotas and to sell that additional production on the world market.

23 HFS with a fructose content of less than 10% is save guarded from the CMO regulations.

24 In the case of sugar and inulin syrup 58% of the costs of the production levies is passed on to the farmers; producers of sugar and chicory respectively.

25 More precisely respectively 6.9 million, 6.1 million, 6.5 million, 6.6 million and 8.2 million ECU.

Moreover, the HFS industry is able to plan production quite precisely, in contrast to the sugar industry. Sugar industries have an obligation[26] to the sugar beet farmers to buy all the beets, which are produced on an agreed beet area. Hence, total sugar beet supply will depend on climatic circumstances. The HFS industry uses maize, wheat and starch potatoes (all covered by CMOs under the CAP) as main raw material. It can buy more or less the exact quantity it needs to produce the allocated HFS quota. Moreover, HFS can be produced the whole year round, because the raw material can be stored.

Extra-EC trade of HFS is minimal. However, there is quite some intra-EC trade as shown in 6.8.

Table 6.8 Intra-EC exports and imports of HFS, 1998 figures (in tonnes dry matter)

Member State	Imports	Exports
Belgium	5,063	*n.r.
Denmark	7,876	27
France	43,646	n.r.
Germany	76,747	**47,300
Ireland	120	n.r.
Italy	21,188	10,502
Netherlands	48,353	20,503
Austria	7,515	n.r.
Finland	664	n.r.
UK	21,495	4,647

Source: F.O. Licht. * n.r. = not reported. **Including dextrose.

No reliable publicly available data with respect to the consumption of HFS in the EC exist, neither at EC level, nor at Member State level. Estimates provided for the EC in table 6.4 assume that production roughly equals consumption.

There are no public data on HFS market prices, neither at the Community nor at the individual Member State level. The same holds for production cost data. This implies that the assessment of the competitive position of HFS vis-à-vis other sweeteners and third countries has to be based on relative production, export and consumption figures and cost of production and price estimates.

6.6.4 The impact of the CMO Sugar on the competitive position of HFS

Soon after the technology for large-scale industrial production of HFS became widely available in the early 1970s, HFS was incorporated in the CMO Sugar. The implicit objective of this inclusion can (in retrospect) be evaluated as to create an instrument to control the impact of HFS production and consumption on the sugar sector. Its effect was that it prevented HFS from becoming a real major competitor to sugar on the EC market.

[26] This obligation follows from the mutual dependency between beet growers and sugar producers, which does not apply for HFS.

The inclusion of HFS in the CMO Sugar meant that HFS production was put under quota and that the existing production capacity in each Member State was fixed ("frozen"). As a consequence HFS production and consumption in the EC remained at a low level compared to most other countries in the world. The allotment of quota on the basis of historic production levels has allowed the existing HFS industry to remain in business, but has at the same time acted as a considerable, i.e. prohibitive, barrier to entry. The production quota and the high import duties on HFS have kept the HFS price high, which can be considered as an economic cost to the users of HFS.

The allocation of quota per Member State and the absence of quota readjustments between Member States have added to the rigidity and immobility of production. To the fact that economies of scale apply in HFS production, the quota system has led to a relatively high level of production costs per tonne HFS within the EC. According to the OECD (1997:46) HFS production costs in the EC were about 50% higher than in the USA (see also table 6.10). This is mainly caused by the small size of the HFS plants in the EC. Furthermore prices of raw materials are higher in the EC than in the USA, mainly due to the CMOs for the crops concerned. Finally, also the revenues for by-products affect the net production costs.

When comparing HFS and sugar, it can be noted that at the technical level, the production of beet sugar is more efficient than the production of HFS. On a per hectare basis, beet sugar yields 8 to 10 tonnes of sugar, while corn yields 4.5-7 tonnes of white sugar equivalents in the form of HFS and cereals only 4-5 tonnes (see table 6.9).

Table 6.9 Comparison of beet sugar and HFS production (in tonnes per hectare)

	Sugar from beet	Sugar from cane	HFS from cereals	HFS from maize
Raw material: yield in t/ha	55-60	n.a.	8	n.a.
Sugar yield in t/ha:				
- Source: Rabobank	8-8.5		4-5	
- Source: CEC				7
- Source: OECD	10	15	4-5	4.5

Sources: Rabobank, 1995, p.69. OECD, 1997: 5. CEC, internal document, DG Agriculture, 1992.

However in terms of costs, HFS appears to be more efficient than sugar. Table 6.10 shows that the production cost of HFS is only about 33-40% of the production cost of sugar in the major sugar exporting countries. Thus HFS appears to be more competitive than sugar. Similar differences exist regarding the HFS prices and sugar prices, as table 6.11. shows. In the USA sugar prices were about 55% higher than HFS prices, while that percentage was about 15% in the EC (in white sugar equivalents).

Table 6.10 Costs of production of HFS (net of by-products revenues) and sugar by country group (annual averages)

Product	Country group	Cost (US$/t) 1989-94	Cost (US$/t) 1994-98
HFCS-42 dry weight	15 Major producers*	278 (249-298)	279
	USA	(211-234)	186-245**
Beet sugar w.s.e.	Low cost producers: Belgium, Netherlands, Chile, Turkey, UK and the USA	456 (434-479)	450
	Major exporters: EC, Turkey and Ukraine	656 (566-713)	710

Source: Haley, 1998; Hannah, 1999, p.6; F.O. Licht; and own calculations.
Notes: Data between brackets indicate upper and lower extreme annual values. * Average of 15 countries, namely Belgium, Finland, France, Germany, Italy, Spain, the Netherlands, U.K, USA, Argentina, Canada, Hungary, Japan, South Korea, and Taiwan. ** F.O. Licht figures autumn and winter 1999.

Table 6.11 Comparison of sugar and HFS prices (in US$/t)

Product	Wholesale price (US$/t)	Price in sugar equivalent (US$/t)
Sugar world market	300	300
Sugar USA	690	690
Sugar EC	1,000	1,000
HFS-55 USA	400-450	420-470
HFS-55 EC	800-850	840-890

Source: OECD 1997 (based on Rabobank 1995).
Note: Calculations based on HFCS relative sweetness factor of 0.95.

The cost competitiveness of HFS vis-à-vis sugar highly depends on prices per tonne of raw material. The production costs of HFS are sensitive to many variables and difficult to predict (Hannah and Spence, 1996:111). In 1992 about 60% of the total cost of HFS in the EC was raw material cost (European Commission, 1992: 3). No recent figures were available on current raw material costs. However, in view of the shift from price support toward direct income support in the cereals sector brought about by the 1992 MacSharry reforms, it is likely that raw material prices have decreased. The MacSharry reforms have therefore led to an improvement in cost competitiveness of HFS compared to sugar within the EC.

In the USA, the net corn costs – defined as the cost of corn less the value of co-products - were 40 per cent lower than the average of the corn costs in other HFS producing countries. This advantage stemmed from abundant corn supplies and efficient production and marketing systems. The relatively low corn price in the USA, and the relatively high corn and cereal costs in the EC has contributed to the fact that HFS production costs in the USA were far below HFS production costs in the EC (see table 6.10). Apart from the differences in input costs, the over-capacity of the HFS industry in the USA has also contributed to the low HFS prices in the USA (see table 6.11). (Schenk, 1999: 510).

There are no firm figures about the production costs of HFS in the EC, but it is generally believed that, while HFS prices are 10 to 15% below the sugar prices, the

difference between the production costs of HFS and sugar is much larger. This would imply that HFS production is more profitable than sugar production. Also Child (1999:8) concludes that the production of HFS is highly profitable, because of prices well above the production costs due to the price protection of the CMO Sugar, continuing scarcity of fructose syrups on the EC market and reduced grain costs.

Cooper et al. (1995: 441) analysed the possible impact of unrestricted HFS production in the EC. They estimated that HFS could replace approximately 25% of the industrial use of sugar which equals about 17.5% of total EC sugar use. The net welfare effect of such a shift in consumption of HFS and sugar would depend, inter alia, on how the producers of HFS would respond in terms of pricing. With HFS producers keeping prices about 5-10% below sugar prices as is the current practice, a net welfare loss for society of 23 million ECU would occur (Cooper et al., 1995: 440-442), made up of:

- a loss of sugar production of an amount of approximately 325 million ECU;
- the benefits of the HFS industry (increased production) and the consumers (lower prices); and
- additional public expenditure due to more income support (direct payments) to be paid to farmers who have shifted to alternative crops, which qualify for direct payments.

Not taken into account is the impact of (de)investments. However, setting up and extending HFS production capacity requires large investments. According to Hannah and Spence (1996: 112) for each bushel (25.4 kg) of newly built (daily) capacity, an investment is required of up to US$ 3,000. Expansion of existing capacity would cost $ 1,600 per bushel. At the same time, part of the investments made in the sugar industry will become redundant and have to be written off.

6.7 Inulin syrup

6.7.1 Introduction

Inulin syrup is a product with very similar characteristics as HFS and liquid sugar. It is used as a sweetener by the foods and drinks industry. It is made from inulin, which is extracted from chicory roots and Jerusalem artichokes. Chicory is a well-established crop in certain countries in North-western Europe and is used in leaf form as food vegetable or in coffee blends. Chicory roots contain around 15-20% of recoverable inulin. Chicory roots are harvested in autumn and are processed in almost the same manner as sugar beet. Once the inulin juice is extracted, starch conversion and glucose refining techniques are applied to produce inulin syrup. Inulin syrup has a content of 80-85% fructose and 10-15% glucose[27]. The appearance on the EC market of inulin syrup in the early nineties can be explained from an unsatisfied demand for fructose.

[27] As from 1994/95 'inulin syrup production' under the CMO sugar is defined as 'the quantity of the product obtained after the hydrolysis of inulin or oligofructoses with a content by weight in the dry state of at least 10% fructose in free form or as sucrose, irrespective of its fructose content in excess of that limit, expressed as dry matter equivalent sugar/isoglucose (..)".

Improvement in production technology made that inulin syrup could become a serious competitor of HFS and sugar. Inulin syrup was therefore brought under the control of the CMO Sugar in 1992.

6.7.2 EC production, trade and consumption of inulin syrup

Production of inulin syrup is subject to production quotas and a system of production levies, while the extra-EC export of quota inulin syrup may benefit from export refunds, similar to HFS. The regulations of the CMO Sugar regarding inulin syrup are exactly identical to the regulations regarding HFS (isoglucose). Extra-EC export of inulin syrup falling under the quotas is eligible for export refunds (see section 2.3.5). The export refund for one tonne of inulin syrup in white sugar equivalents is equal to the export refund of one tonne of white sugar (1.9 tonne of dry matter inulin syrup with a fructose content of 80% is considered to be equivalent to one tonne of white sugar)[28]. However, no inulin syrup has been exported since 1992.

The production levies, which are applied to quota sugar are also applied to inulin syrup quota production. The percentages of the levies for sugar and inulin syrup, expressed in white sugar equivalents, are the same. The total of the production levies charged on inulin syrup amounted to about 2 million ECU on average per year over the period 1994/95 to 1998/99[29]. Part of the costs (58%) of the production levies are shifted back to the growers of the basic agricultural product (mainly chicory), as in the case of sugar (Article 35, basic Regulation).

No intervention provisions or institutional prices are in force for inulin syrup. Inulin syrup does not have minimum stock arrangements, nor a storage levy equalisation scheme. The use of inulin syrup by the chemical and pharmaceutical industry does also not qualify for production refunds. Inulin syrup produced in excess of the quota has to be exported to countries outside the EC and does not qualify for export refunds, as in the case of sugar and HFS.

Initially, the A-quota of each inulin syrup producing company was set at 65% of installed technical capacity on 1 October 1992 (ED&F Man, 1996: 25). However, the resulting large quotas were heavily disputed, and were adjusted downwards later on. B-quotas were set at 23.55% of the A-quotas. A- and B-quotas are expressed in sugar equivalents (see table 6.12).

As can be seen from table 6.12, production of inulin syrup has stayed within the assigned quotas. France has not used its quota at all. The production of the three existing chicory-processing plants in Belgium and the Netherlands increased steadily from 1994/95 to 1997/98, followed by a decline in 1998/99, because of insufficient demand in the EC. The production level has remained below the level of the A-quotas. In 1997/98 only 65% of the allocated quotas were used.

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28 Inulin syrup with a fructose content of less than 10% is save guarded from the CMO regulations.

29 More precisely respectively 1.1 million, 1.6 million, 2.2 million, 2.8 million and 2.4 million ECU.

Extra-EC export started in 1995/96 (see table 6.13). The high export figures of 1998/99 and a considerable decrease in production indicate a falling demand for inulin syrup in the EC.

Table 6.12 Inulin syrup: production and quota volumes, period 1994/95–98/99 (in tonnes white sugar equivalent)

	94/95	95/96	96/97	97/98	98/99*	A quota	B quota	A+B Quotas
Belgium	58,165	89,446	129,400	153,279	103,186	175,577	41,348	216,925
Netherlands	22,847	38,800	47,500	64,681	52,449	65,994	15,542	81,536
France	0	0	0	0	0	19,991	4,708	24,699
Total	81,012	128,246	176,900	209,200	155,636	261,562	61,598	323,160

Source: European Commission, DG Agriculture. * Provisional data.
Note: 1.9 tonne of inulin syrup with a fructose content of 80% is equivalent to one tonne of white sugar.

Table 6.13 Extra-EC exports of inulin syrup, 1994/95–98/99 (in tonnes of white sugar equivalent)

	1994/95	1995/96	1996/97	1997/98	1998/99
Belgium	0	378	910	11,988	29,605
Netherlands	0	0	4,376	13,699	24,057

Source: European Commission, DG Agriculture. * Provisional data.

6.7.3 Impact of the CMO Sugar on the competitive position of inulin syrup

There are no public data on inulin syrup market prices, neither at the Community nor at the individual Member State level. The same holds for production cost data. This implies that the assessment of the competitive position of inulin syrup vis-à-vis other sweeteners and third countries has to be based on relative production, export and consumption figures and cost of production and price estimates.

The development of the technology to produce inulin syrup on the basis of chicory roots is directly related to the existence of the CMO Sugar, and induced by the search for high-fructose containing products not restricted by the CMO Sugar. The technical progress in the processing of chicory roots and inulin juice combined with the availability of redundant sugar beet factories made the production of inulin syrup feasible (Child, 1999: 4). However, the EC responded quickly by including inulin syrup in the CMO Sugar. Production quotas were established because of fears that inulin syrup would become a serious competitor of sugar. The quota arrangements for inulin syrup should therefore be regarded as a logical side-effect of the sugar regime.

The facts that (i) the entire B-quota for inulin syrup is not used, (ii) the production of A-quota was reduced as soon as demand in the EC decreased, (iii) extra-EC exports increase, and that (iv) France does not use its quota at all, are indications that:

- production of B-quota is not profitable because of the B-levy (up to 37.5%);
- production of A-quota is only profitable for the EC market, but not for export; even not with the support of export refunds.

Both sugar and inulin syrup can be used for the production of levulose (fructose) (see also section 6.5; and Child, 1999: 4). Although sugar is affected by quota restrictions and inulin syrup in practice not (only part of the quotas used), only sugar is used for the production of levulose. This is an indication that inulin syrup is relatively more expensive than sugar.

6.8 Sugar alcohols or polyols

Sugar alcohols or polyols (*poly*hydric alco*hols*) are bulk low-calorie sweeteners. Polyols have specific technical, physical and nutritional properties, including mass adding and texture improving capacity. Some polyols are non-cariogenic (teeth-friendly), have a neutral taste, but they generally also have a lower sweetening power than sugar (see table 6.14).

Table 6.14 Sweetness and caloric power of various polyols (compared to sugar and kJ/g)

Polyols	Sweetness relative to sugar (sugar = 1)	Caloric power (in kJ/g) (sugar = 17.6)
Hydrogenated glucose syrup, Sorbitol	0.6	8.4
Mannitol	0.5-0.6	6.3
Maltitol	0.8-0.9	11.7-13.4
Xylitol	0.8-1	8.4
Isomalt	0.4-0.5	10-12.1

Source: Child, N. ,1999.

The polyols approved for food use in the EC are sorbitol (E420), xylitol (E967), lactitol (E966), mannitol (E421), maltitol E(965) and isomalt (E953). Chrystalline erythritol is not yet permitted for food use in the EC. Categorised under EC food law as additives, approved polyols may be used on a "quantum satis" basis (as much as necessary). As is shown in table 6.15, polyols are usually made from carbohydrate ingredients.

Table 6.15 Raw material and ingredients of polyols

Raw material	Natural sweeteners (ingredients)	Polyols (additives)
Grain	Glucose/dextrose syrups and spray-dried glucose	Hydrogenated glucose syrup, Sorbitol
	Malto-dextrins*	Mannitol
Grain, sugar	Chrystalline dextrose (monohydrate and anhydrous)	Maltitol
Grain, chicory, potato	Fructose syrups**	Xylitol
Chicory	Inulin syrups (80% fructose content)	Isomalt
Sugar	Levulose (chemically pure fructose)	Lactitol

Source: Child, N. ,1999.
Notes: * Atomised, very low dextrose-containing powders, made from starches. ** Including is oglucose and inulin syrup.

Polyols are widely used in the food, confectionery, pharmaceutical, cosmetic and manufacturing industry. Applications include (Rabobank, 1995: 75-76):

- Sugarless chewing gum;
- Beverages, particularly alcohol-free/low beer;
- Diabetic foods;
- Confectionery, bakery and dairy products, in particular because of their drying-out preventive powers which increase shelf-life and improve product appearance;
- Pharmaceutical and cosmetic applications. The structure of polyols make them particularly suited for use as carrier or base in tablets, syrups, injectable forms, cosmetics and toothpaste.

Sorbitol is by far the most important polyol with a large variety of possible applications. Mannitol is far more costly than sorbitol and is, as a result, mainly used for niche applications (e.g., chewing gum; pharmaceutical products like chewable tablets and granulated powders). Maltitol is a relatively new second generation polyol with good nutritional properties, and flavouring and texture improving characteristics. Xylitol is the sweetest of all polyols (as sweet as sucrose), but far more costly than sugar; it has pleasant cooling effects which makes it very suitable for use in confectionery and oral hygiene products.

Polyols are made in response to specific market demand and cannot be considered as sugar-substitutes, except in certain specific cases where legislative measures have been taken to protect traditional EC sucrose outlets (Child, 1999: 3). As table 6.16 shows, polyol prices are higher than sugar prices both in absolute kg terms and in sugar equivalent terms. Because of these price differences and because of functional differences, substitution of sugar by polyols is not likely to occur. The market demand of polyols as compared to sugar is extremely limited, though increasing, both at world and EC level. The market share of polyols as a percentage of total sugar and sweetener use is shown in table 6.17.

Table 6.16 Comparison of sugar and HFS prices (in US$/kg)

Product	Wholesale price (US$/kg)	Price in sugar equivalent (US$/kg)
Sugar world market	0.30	0.30
Sugar EC	1	1
Sorbitol	3	5
Xylitol	6	6
Isomalt	5	10

Source: OECD 1997 (based on Rabobank 1995).

Table 6.17 Market share of polyols as a percentage of total sugar and sweetener use

	1980	1990
World	0.32	0.41
EC	p.m.	1.00
USA	2	1

Source: FIRS.

As follows from table 6.15, there is however a close link between natural sweeteners (including sugar) and polyols in the sense that natural sweeteners are used as inputs for producing polyols. Sugar can be used to produce isomalt, and isoglucose and inulin syrup can be used to produce mannitol. As such the CMO Sugar has an impact on the competitive position of isomalt and mannitol. Although it is technically possible to produce many of the other polyols from sucrose sugar or fructose (isoglucose and inulin) as well, this is not what is happening in practice. Because of the high prices of sugar, isoglucose and inulin syrup, and the limited availability of fructose (restricted by quota), grain is usually the preferred starting material for polyol production in the EC (see also Child, 1999: 3).

6.9 High intensity sweeteners

Most High Intensity Sweeteners (HIS) are synthetic products. They are increasingly used in a wide range of diet foods and soft drinks. In many cases a combination of two or more high-intensity sweeteners is used (blending). The absence of mass and low heat resistance limits the use of HIS. There is only limited competition between sugar and HIS because of the very specific use of the latter.

The four most important High-Intensity Sweeteners are:

- *aspartame* (E 951). Main characteristics: protein with low calorie content; leading intense sweetener; 200 times sweeter than sugar; 10 times more expensive than saccharin; accounts for almost three-quarters of world HIS demand in volume terms (Corti, 1999, 10); 62% of worldwide sales in terms of sugar equivalents (ibidem, 11); increase in share of total sweetener demand in the EC from slightly above 1% to about 3% in 1998. Important with respect to production and use of aspartame has been the expiration of the patent for aspartame, both in the EC (earlier) and the US, leading to a decrease in price and a rapid expansion of the market (Hannah and Spence 1996:114); present price is about 10 US$ cents, which is about 10% of the price of sugar; demand growth rates of 15% In Japan, 6% in the EC and 5.5% in the USA. The USA accounts for 83% of world aspartame consumption. In the EC aspartame has partly displaced sugar in soft drinks.
- *saccharin* (E 954). Main characteristics: 300 times sweeter than sugar; second most widely used HIS, predominantly in pharmaceutical, vitamins, toothpaste, foods and beverages; calorie free; requires blending with other sweeteners because of bitter aftertaste; cheap; price is only about 1% of the price of sugar when measured in sugar equivalents; consumed particularly in Asia; accounts for 5% of the global sweetener demand and 6-7% of total sweetener demand in the EC during the period 1985-1998.
- *cyclamate* (E 952). Main characteristics: 30 times as sweet as sugar; high-quality sweetener with little aftertaste; soluble; about 0.6% of total sweetener demand in the EC; 2.5% demand growth; not approved for food use in the USA and Japan.

- *acesulfame-K* (ace-K, E 950). Main characteristics: 200 times sweeter than sugar; used in chewing gum; calorie-free; requires blending with other sweeteners because of bitter aftertaste.

Saccharin and cyclamate belong to the first generation of HIS and were discovered in 1879 and 1937, respectively. Aspartame and Acesulfame K belong to the second generation HIS. Other recent HIS are Thaumatin (E957), Neohesperidin DC (E959), Sucralose, Alitame, Twinsheet (a mixture of aspartame and acesulfame salt), Neotame, D-Tagatose and Stevioside. Sucralose, Alitame and Twinsheet are undergoing safety evaluation at the SCF and are not yet allowed on the EC market (Corti, 1999). Stevioside has recently been rejected by the SCF because of safety doubts. Thaumatin and neohesperidin DC are both natural (i.e. not synthetic) sweeteners.

As can be seen from table 6.18, the major part of the world production of HIS consists of saccherin, followed by aspartame in second ranking. Over the last five years, world wide growth rates of HIS varied from 3% to 8% per year. The current worldwide share of HIS as part of the total sugar and sweeteners market is 8.9% (Corti, 1999: 10).

Table 6.18 World production of High-Intensity Sweeteners as percentage of total production

Product	1980 Volume	1985 Volume	1990 Volume	1995 Volume	1999 Volume*	1999 Value*
Aspartame	0	13.9	19.5	19.2	18	62
Saccharin	93.4	79.8	73.0	70.4	73	17
Cyclamate	6.5	5.8	6.1	6.1	5	5
Others	0.1	0.5	1.4	4.3	4	16

Source: Own calculations based on LMC figures. * 1999 consumption data derived from Corti, 1999.

As table 6.19 shows, the EC share of the total world production of aspartame has grown considerably between 1985 and 1997. The EC market share of saccharin has decreased somewhat, while the EC share of cyclamate has dropped significant during the period 1985-1990, but shows an upward trend since then.

Table 6.19 EC consumption of High-Intensity Sweeteners as percentage of world production

Product	1980	1985	1990	1995	1997
Aspartame	0	2.4	12.9	18.3	22.6
Saccharin	15.8	19.0	16.3	14.5	14.6
Cyclamate	20.6	19.5	13.4	15.7	15.6
Sugar	15.3	13.5	12.7	11.7	11.6

Source: Own calculations, based on LMC figures.

In the USA prices of aspartame and ace-K measured in sugar equivalents were about 70% of the price of sugar in the mid 1990s (see table 6.20). Prices for saccharin were substantially lower. Prices of cyclamates are usually similar to those of saccharin. According to Rabobank (1995: 81), the price of intensive sweeteners in Europe,

Australia and Japan are comparable to those in the USA. That is obvious in the case of aspartame, because most of the aspartame used in the EC is imported from the USA and Japan.

Table 6.20 Prices for sugar and high-intensity sweeteners in the USA, mid-1990s* (in US$/kg)

Year	Sugar EU	Sugar US	Saccharin	Aspartame	Ace-K	Cyclamate
1989		0.64	0.02	0.79	0.44	n.a.
1990		0.66	0.02	0.62	0.62	n.a.
1991		0.57	0.02	0.62	0.62	n.a.
1992**		0.55	0.02	0.37	0.37	n.a.
1993		0.55	0.02	0.37	0.37	n.a.
1994		0.55	0.02	0.37	0.37	n.a.
1995		0.57	0.02	0.37	0.37	n.a.
Rabobank***	1.00	0.69	0.015	0.35	n.a.	0.18

Source: ISO; own calculations.
Notes: *`Wholesale prices expressed in sugar equivalent terms. ** Expiration of Nutrasweet patent. *** Rabobank 1995.

6.10 Conclusions

At present, of all sweeteners, only High Fructose Syrups (HFS, or isoglucose) can be considered as a real *potential* substitute for industrially used sugar. Cost competitiveness of HFS relative to sugar in the EC has improved in recent years, which is predominantly due to (i) the MacSharry reform of the EC cereals regime which has reduced the raw material input cost (wheat and corn) necessary for the production of HFS, and (ii) technical progress in the industrial production of HFS, which have made it economically feasible to use potato as raw material.

However, the existing quota system under the CMO Sugar has prevented production increases and HFS becoming a real threat to the EC sugar industry. The HFS production and consumption volumes in the EC stays far behind the volumes in other major economies. The current production volume of HFS in the EC is only approximately 2% of the total production volume of sugar in the EC. However, it is not very likely that the HFS industry will exert strong pressure to increase the quotas, because most HFS production facilities are presently owned by sugar industries.

Inulin syrup has been incorporated in the CMO Sugar because it can be used as a substitute for sugar. Inulin syrup is only produced in the EC. It has been developed as a response to the high price of sugar in the EC under the CMO Sugar. However, the inulin syrup producers do not use the entire quotas, which is an indication that production at *current* costs and prices is only marginally profitable. Inulin syrup can therefore not be considered as a serious threat to the competitive position of sugar.

The other sweeteners - the polyols and high-intensity sweeteners - do not form a threat to the competitive position of sugar either. Although some of them are much cheaper than sugar in the EC, the functional properties and the use of these other sweeteners are

for a great deal different from sugar. Mostly they are used as complements of, or in combination with sugar or other sweeteners (blending). Nevertheless, technological developments, which improve the functional properties of the sweeteners concerned, could enlarge the range of possible applications (e.g. in cooking) and thereby increase their competitive position vis-à-vis sugar.

7 Price differentiation and external competitiveness

7.1 Introduction

This chapter deals with evaluation question 1.3, which reads "*What impact has price differentiation for A and B quotas and for C sugar, had in strengthening external competitiveness (in terms of volume, price and quality)?*"

Competitiveness is defined here as "the ability of the EC sugar industry to profitably produce and deliver sugar at prices equal or lower than those offered by foreign sugar producers"[30]. *External* competitiveness explicitly refers to the ability of the EC sugar industry to compete on *external* markets. Two factors are of primary importance for the external competitive position of EC sugar on external markets:

- The cost of producing sugar in the EC, both in absolute terms and relative to its major foreign competitors;
- Domestic and export support policies regarding sugar of the EC and its major competitors.

The structure of the external or world market, the costs of production and pricing behaviour of competitors and support policies together determine the playing field for the EC sugar industry and the competitive position of EC sugar.

In the short term, EC sugar exporters are not confronted directly with the production costs of competitors when operating on the world market, but with the ruling world market price. Even though it is often argued that the world market price is partly a residual market and that the world market price is not a correct reflection of the production costs of competitors, the (medium-term) average world market price is the ultimate benchmark for judging the external competitiveness of EC sugar exporters.

The focus of this evaluation question is not on the overall impact of the CMO Sugar on competitiveness, but on one particular constituent element: the impact of the price differentiation between A- and B- quota sugar and C-sugar on strengthening external competitiveness in terms of volume, price and quality.

The impact of the system of price differentiation on external competitiveness will be analysed at two levels:

- the (net) export position and the production costs of the EC. Where possible the production costs will be specified at Member State level in order to illuminate differences per Member State;
- the impact of the system of price differentiation on production and exports both at the level of the Member States and the processing industry.

Thus the major indicators are: (net) export position and production costs. There are no absolute judgement criteria. Judgement will be based on a qualitative and logical

[30] See also Kennedy and Harrison (1999:3).

analysis of how the CMO sugar has impacted on the export performance and the production costs through price differentiation.

The relationship between quality and external competitiveness is not discussed in this chapter, because of:

- the general notion that the quality of the white sugar exported by the EC is fairly uniform; and
- the absence of more specific public and reliable private data on this issue.

The structure of this chapter is as follows. The volumes of exported surplus quota sugar and C-sugar are presented in section 7.2. A comparison of sugar production costs in a number of major sugar producing countries is given in section 7.3. The external competitiveness of EC quota sugar and C-sugar are discussed in the sections 7.4 and 7.5 respectively. The relationship between C-sugar production and the world market price is analysed in section 7.6. Section 7.7 concludes.

7.2 Exports of quota sugar and C-sugar

Tables 7.1 and 7.2 present the export volumes of surplus quota sugar and C-sugar. The quota sugar surplus is equal to the production of quota sugar in the EC plus the preferential imports minus sugar consumption in the EC (disregarding small quantities of non preferential imports and changes of stock; see further chapter 4). The average annual export volume of quota sugar (excluding sugar incorporated in foods and drinks) was about 2.8 million tonnes per year in the 1990s, which equals about 20% of the total production of quota sugar. Most of the exported surplus quota sugar originated from France, Germany, the UK, Belgium, Italy and Denmark.

The average annual export volume of C-sugar amounted to about 2.2 million tonnes in the 1990s, which is about 16% on top of the quota production. The major exporters were France, Germany, the UK, Spain and Denmark.

Table 7.1 Extra-EC exports of quota sugar per Member State (in 1,000 tonnes)

Member State	1990 /91	1991 /92	1992 /93	1993 /94	1994 /95	1995 /96	1996 /97	1997 /98	1998 /99
Austria	-	-	-	-	-	32	0	29	n.a
Belgium	655	787	730	949	1,215	670	553	467	n.a
Denmark	110	129	135	108	109	118	125	120	n.a
Finland	-	-	-	-	-	38	28	33	n.a
France	905	782	857	735	369	881	1,078	1,072	n.a
Germany	578	623	564	483	640	558	229	309	n.a
Greece	0	0	0	0	0	0	18	44	n.a
Ireland	0	6	6	0	9	5	18	16	n.a
Italy	50	129	194	84	110	150	63	291	n.a
The Netherlands	202	137	159	223	104	50	52	61	n.a
Portugal-c	0	1	0	1	4	4	5	30	n.a
Spain	78	93	60	87	74	46	93	80	n.a
Sweden	-	-	-	-	-	24	44	24	n.a
United Kingdom	161	120	209	223	210	171	134	326	n.a
EC sugar pure	2,739	2,807	2,914	2,893	2,844	2,747	2,440	2,902	n.a
EC sugar in processed products	566	600	631	734	739	853	873	816	n.a
EC total	3,305	3,407	3,545	3,627	3,583	3,600	3,313	3,718	n.a

Source: Sugar supply balance sheets of the CEC.
Notes: (1) Sugar in processed products included only in the last two rows.
(2) Substantial quantities of French quota sugar are exported to the world market via Belgium. Those quantities are recorded as exports of Belgium in this table.

Table 7.2 Extra-EC export of C-sugar per Member State (in 1,000 tonnes)

Member State	1990 /91	1991 /92	1992 /93	1993 /94	1994 /95	1995 /96	1996 /97	1997 /98	1998 /99
Austria	-	-	-	-	-	24	88	92	80
Belgium	155	77	66	203	99	42	100	186	21
Denmark	119	43	0	96	23	7	49	100	106
Finland	-	-	-	-	-	15	0	18	0
France	718	745	963	1,039	993	797	733	1,403	803
Germany	741	443	589	892	407	337	704	628	536
Greece	0	0	0	0	0	0	0	0	0
Ireland	25	19	23	0	0	20	24	8	16
Italy	0	0	153	0	0	0	0	2	0
Netherlands	282	174	278	317	119	116	163	148	0
Portugal-c	0	0	0	0	0	0	0	0	0
Spain	0	0	0	82	125	96	201	144	161
Sweden	-	-	-	-	-	0	0	17	29
UK	97	72	193	289	217	127	307	402	296
EC-15	2,130	1,573	2,265	2,918	1,983	1,581	2,369	3,148	2,048

Source: Sugar production sheets of the CEC.
Note: Carry-forward system taken into account.

7.3 Sugar production costs in major sugar producing countries

7.3.1 International comparison of average production costs

The ultimate benchmark for judging the (overall) external competitiveness of the EC sugar industry is whether the EC sugar manufacturers are able to profitably produce and deliver sugar at prices equal or lower than those offered by foreign sugar producers. One important element in that judgement is (average) production costs. In this section the costs of production of EC sugar manufacturers are compared with the costs of other major sugar producers in the world. Because of the largely proprietary nature of production cost data, reference is made to country aggregates only rather than to individual countries. Yet, individual countries included within these aggregates are mentioned which enables a global assessment.

Table 7.3 shows the average costs of production of sugar specified per type of sugar (cane or beet) and per category of producer (low cost producer or major exporter). In the cited studies, Belgium, the Netherlands and the UK are ranked as low cost producers of beet sugar, while the EC as a whole is categorised as a major exporter of beet sugar. The difference in production costs between the two categories is considerable: the average production costs of the low cost producers are 63 to 69% of the average of the major exporters in the periods surveyed.

Table 7.3 Average cost of sugar production for country aggregates (in US$/tonne)

Product	Country group	Cost Period 1989-94	Cost Period 1994-98
Refined beet sugar Low cost producers	Belgium, Netherlands, Chile, Turkey, UK, US	456 (434-479)	450
Refined beet sugar Major exporters	EU, Turkey, Ukraine	656 (566-713)	710
Refined beet sugar High cost producers	Bulgaria, Kazachstan, Moldova, Romania, Russia, Ukraine, Japan	989 (791-1221)	n.a.
Raw cane sugar Low cost producers	Brazil, Colombia, Malawi, Guatemala, Zambia	198 (177-219)	197
Refined cane sugar Low cost producers	Brazil, Colombia, Malawi, Guatemala, Zambia	280 (258-303)	n.a.
Raw cane sugar Major exporters	Australia, Brazil (CS), Cuba, Colombia, Guatemala, Thailand, Mauritius, South Africa	277 (246-329)	335
Refined cane sugar Major exporters	Australia, Brazil (CS), Cuba, Colombia, Guatemala, Thailand, Mauritius, South Africa	366 (332-429)	n.a.

Source: Haley, 1998. Hannah, 1999, p.6; own calculations.
Notes: the price stated is the arithmetic average of annual price averages. The prices stated between brackets indicate annual extremes within the period stated. * Average of 15 countries which also include, apart from the countries stated, Argentina, Canada, Hungary, Japan, South Korea, and Taiwan.

If a broader look is taken, by including cane sugar, cost differences between producer countries are even more pronounced. According to the figures of table 7.3 the production costs of low cost *beet* sugar producers were 60% higher than the costs of low cost *cane* sugar producers in the 1990s (refined sugar compared), while the difference between major exporters of *beet* sugar and *cane* sugar was 80% (refined sugar compared). According to Hannah and Spence similar differences existed in the 1980s. They concluded that the average costs of production of *beet* sugar was approximately 50-70% higher than those of *cane* sugar during the period 1980/81-1991/92 (Hannah and Spence, 1996: 53).

A generally accepted benchmark for international competitiveness is a level of production costs of about US$ 230 per tonne[31]. However, it is reported that industry leaders in Brazil and Australia can break-even at a price of US$ 150/tonne nowadays, when they operate very large factories (capacity over 10,000 tonnes of cane per day) and large-scale efficient cane farms (Tyler, 1999:3). Moreover, Agra-Europe reported recently (October 29, 1999: M/11-12) that "Brazil, Colombia and Guatemala are likely to be able to expand their market shares, by means of their low production costs. Brazilian sugar producers in the key centre-south region have an estimated production costs of 95-110 US$/t, while world raw sugar prices are currently just under 150 US$/t. According to the same source, the production costs in the EC were around 4-6 times higher than in Brazil in 1999[32].

Thus, based on a comparison of average costs of production, cane sugar is by far outperforming beet sugar. Even the production costs of the most efficient producers in the EC (notably in the Netherlands, Belgium and the U.K.) have production costs, which are much higher than the international benchmark of US$ 230 per tonne. The high beet price paid to beet farmers, which is about 58% of the intervention price level, is a major cause of the high production costs. However, the *guaranteed* remuneration level for beet processors which is about 42% of the intervention price is much higher than in major competing countries.

This comparison of the *average* production costs between the EC and its major competitors shows that the EC sugar producers, under the present circumstances (including the CMO Sugar) can not compete with the major competitors. However, in practice the EC sugar manufacturers and exporters do not have to compete with their external competitors on the basis of average costs, but they can compete on the basis of marginal costs (in the case of C-sugar), or on the basis of the intervention price (in the case of surplus quota sugar). That will be analysed further in the sections 7.4 and 7.5.

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31 Other benchmark values are (1) Yields of sucrose of around 1 tonne/ha/month, (2) a sugar recovery of over 84%, (3) at least 180 milling days, (4) a capacity utilisation index of over 15 (tonnes raw sugar divided by tcpd capacity).

32 It could be that the production costs of cane sugar in Brazil were temporary low in 1999 due to a recent and substantial devaluation. It is a normal effect that a substantial part of the "devaluation gains" (in terms of lower local prices expressed in international currencies) will be eroded in the course of 1 to 2 years, due to inflation (caused by the devaluation). Even in case of good macro-economic management, up to 50% of the devaluation gains may erode within 2 years. If that happens in Brazil production costs of sugar, expressed in US$, will increase again.

7.3.2 Structure of the production costs in the EC

An assessment of the structure of sugar production costs in the EC in 1993 and 1998 is presented in table 7.4. The total cost figures of table 7.4 (624 and 559 ECU/t) can be situated in between the categories of "low cost producers" and "major exporters" mentioned in table 7.3.

While it has to be kept in mind that figures for 1998 are estimates rather than final, the tendency shown is that total costs had gone done by about 10% between 1993 and 1998 (percentages per cost item range from 17 to 36%). This can be interpreted as the result of a further rationalisation of the production process.

The figures of table 7.4 show that the variable *processing* costs are quite low, around ECU 39 per tonne. However, seasonal personal is not mentioned as a separate cost category. Those costs could be estimated at half the permanent personnel costs (see also chapter 14). Taking this into account, variable processing costs would be in the order of ECU 58 per tonne.

Table 7.4 Beet sugar production costs in the EC: comparison between 1993 and 1998 (in ECU per tonne)

	1993	1998e
Beet	400	388
Capital costs	100	80
Permanent personnel	52	37
Maintenance materials	20	15
Fuel (sugar only)	18	15
Lime	14	9
Total overheads	20	15
Total	624	559

Source: Rabobank 1995, p .39 (original source: Zuckerindustrie). Note: e= estimated.
Notes:

- Farmers are paid 58% of the intervention price, which is equal to ECU 366.5 ECU per tonne of white sugar. The beet costs in this table are higher. Probably some costs other than the payments to the farmers, are included in the beet costs.
- In this table production levies are not included as a cost category. Production levies can be treated as either a cost category or a "deduction on revenues. The average levy on quota sugar varies from year to year and across the Member States. For the major sugar producing Member States the average production levy ranges from 8 to 12% of the intervention price (see annex B). Thus an amount of 51 to 76 ECU/t. Sugar processors pay 42% of that amount, which is 21.4 to 31.9 ECU/t.

7.4 External competitiveness of A- and B-quota sugar

About 80% of the quota sugar is sold on the EC market at prices well above the intervention price (see chapter 5). About 20% of the quota sugar is exported outside the EC (see chapter 4). Exported quota sugar is sold at world market prices, but EC exporters receive the world market price plus the export refund which is approximately equal to the intervention price. Most of exported quota sugar originates from France, Germany, the UK, Belgium, Italy and Denmark (see table 7.1). Member States normally

produce their entire A- and B-quota allocations except for Finland, Greece, Portugal and the French overseas territories (see table 4.1). The A-quota/B-quota ratio differs per Member State (see table 2.2).

For a sugar producer, the major difference between A- and B-quota sugar is the level of the levies to be paid. In principle, the producer has a choice between either producing A-quota sugar only, for which he has to pay a levy of 2%, or to produce A-quota and B-quota sugar. For B-quota sugar he has to pay a levy of up to 39.5% (disregarding additional levies). The facts show that in all Member States, except three, producers find it worthwhile to produce B-quota sugar, notwithstanding the high B-levy.

The production levies count as a cost component for the sugar producer. Production costs of B-quota sugar are therefore substantially higher than the costs of A-quota sugar. In terms of marketing there is no difference between A-quota and B-quota sugar: there is just quota sugar. The price to be received for the quota sugar is either the EC market price (which is generally higher than the intervention price, see chapter 5) or, in case of export of surplus production, the world market price plus the export refund which is approximately equal to the intervention price. The latter only applies to producers in Member States from where quota sugar is exported (mainly France, Germany, the UK, Belgium, Italy and Denmark). Producers in these countries find it worthwhile to produce B-quota sugar, for which a relatively high levy has to be paid, and of which a certain portion has to be exported at approximately the intervention price level, which is usually lower than the EC market price.

Most likely the intervention price is not sufficient to cover the average cost of production *including* the production levy on B-quota sugar. Yet the intervention price is higher than the variable costs of producing the B-quota sugar for the extra-EC export, plus the B-levy. This is why in most Member States the entire B-quota is produced. Assuming that the maximum levies have to be paid for B-sugar (39.5%; no additional levies) and assuming that the variable production costs are 58 ECU per tonne (see section 7.3.2), total variable costs for producing B-sugar are:

- Beet price 0.58 x 631.9 ECU/t 366.5 ECU/t
- Variable production costs 58 ECU/t
- Levy 0.42 x 0.395 x 631.9 ECU/t 105 ECU/t +
- Total 529.5 ECU/t

This total is still lower than the equivalent of the intervention price (632.9 ECU/t), which the sugar industry will receive when exporting the quota sugar.

In the absence of the current price differentiation and the export-refund-cum-production-levy system, sugar within the EC would be sold at (at least) the intervention price, without production levies being charged. Most probably the intervention price level would be much lower than present one, as pressure on intervention buying would go up in the absence of export supports[33]. The present surplus quota production would

[33] Pushing that line of thought a little bit further, leads to the observation that the consumers pay for the subsidised export of surplus quota sugar, through a relatively high intervention price (because part of the intervention price has to cover the production levies to be paid).

have to be sold on the world market at the prevailing world market price, or would not be produced at all. Regarded from this point of view, it can be concluded that the system of export refunds has made a quantity of sugar of 20% of the total of the produced quota sugar externally competitive.

7.5 External competitiveness of C-sugar

All C-sugar produced has to be exported and is not eligible for export refunds. Measured against the average costs per tonne shown in tables 7.3 and 7.4, C-sugar production will not be profitable because the average costs in the EC are much higher than the world market price. However, if all fixed and overhead costs are covered by the production and sale of A- and B-quota sugar, then C-sugar production is attractive as long as the world market price is higher than the marginal costs of producing C-sugar.

If variable processing costs are 58 ECU per tonne and if farmers receive about 60% of the proceeds of C-sugar exports (see section 2.3.1), then C-sugar export is still profitable for the sugar manufacturer when the 40% of the world market price he receives is higher than 58 ECU/t. This is the case when the world market price is higher than 145 ECU/t (58/0.4). When the world market price is 200 ECU/t a producer with a variable cost level of less than 80 ECU/t (200/0.4) could still export C-sugar profitably.

Apart from profitability motives of individual sugar manufacturers, there is another factor which explains at least part of the C-sugar production. Both beet producers and processors are interested in using always their entire production quota, because of (i) of the attractive rate of return on producing quota sugar and (ii) the risk that part of the quota will be reallocated to another company if during a few consecutive years full quota are not used. Therefore the area of beets planted by farmers is usually based on a *conservative* estimate of the potential yield per hectare. As a consequence, in most years the actual production lies above the allotted quota. This surplus, estimated at about 6% of the quota production (or about 0.8 million tonnes), is categorised as C-sugar but was actually intended to secure the full quota volume in a cropping year. Of the average total C-sugar production of 2.2 million tonnes therefore about 36% is produced because of the above mentioned strategy (see further chapter 12). Those 0.8 million tonnes could be called *unintentional* C-sugar production, with the remaining 1.4 million tonnes *intentional* C-sugar production.

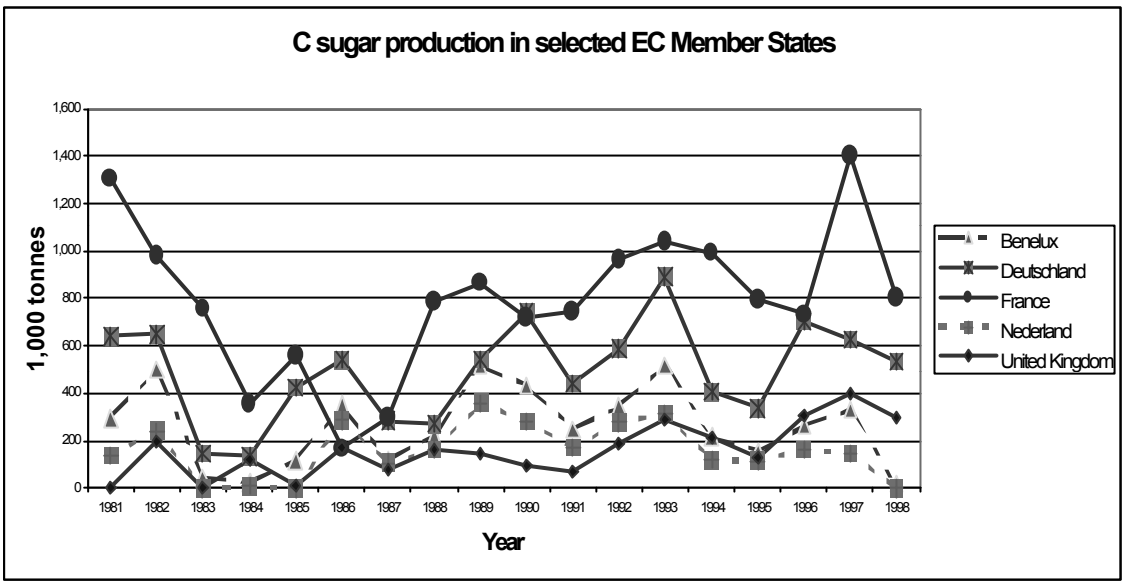
7.6 The relationship between C-sugar production and the world market price

Most C-sugar is produced in France, Germany, the U.K, Spain[34] and Denmark (see table 7.2). Figure 7.1 shows the fluctuations of C-sugar production in a number of Member States since 1981/82. The figure indicates that the level of C-sugar production fluctuates

[34] Spain produces more than its quota, thus it has to export C-sugar. At the same time, its consumption is much higher than its quota, which means that it has to import quota sugar from other Member States.

substantially and that the pattern of fluctuations of the individual Member States is quite similar. Decreases in C-sugar production have occurred during the years 1982/1983; 1989-1991; 1993/1994 and 1997/1998. France and Germany have the largest production and also the sharpest fluctuations in production. The C-sugar production in the Netherlands was declining during the 1990s.

Figure 7.1 C sugar production in selected Member States during the period 1981-1998 (in 1,000 tonnes)



Source: European Commission, DG Agriculture. Sugar production balance sheets, various years.

The main explanatory variables accounting for the volume of C-sugar production are weather conditions and world market prices. Also the Court of Auditors (1991: 30) found a direct statistical relationship between the evolution of the production of C sugar in France and the evolution world prices. In order to filter out the possible impact of world market prices, a closer look is taken at three C-sugar producing Member States: France, Belgium and the Netherlands. These Member States have been chosen because:

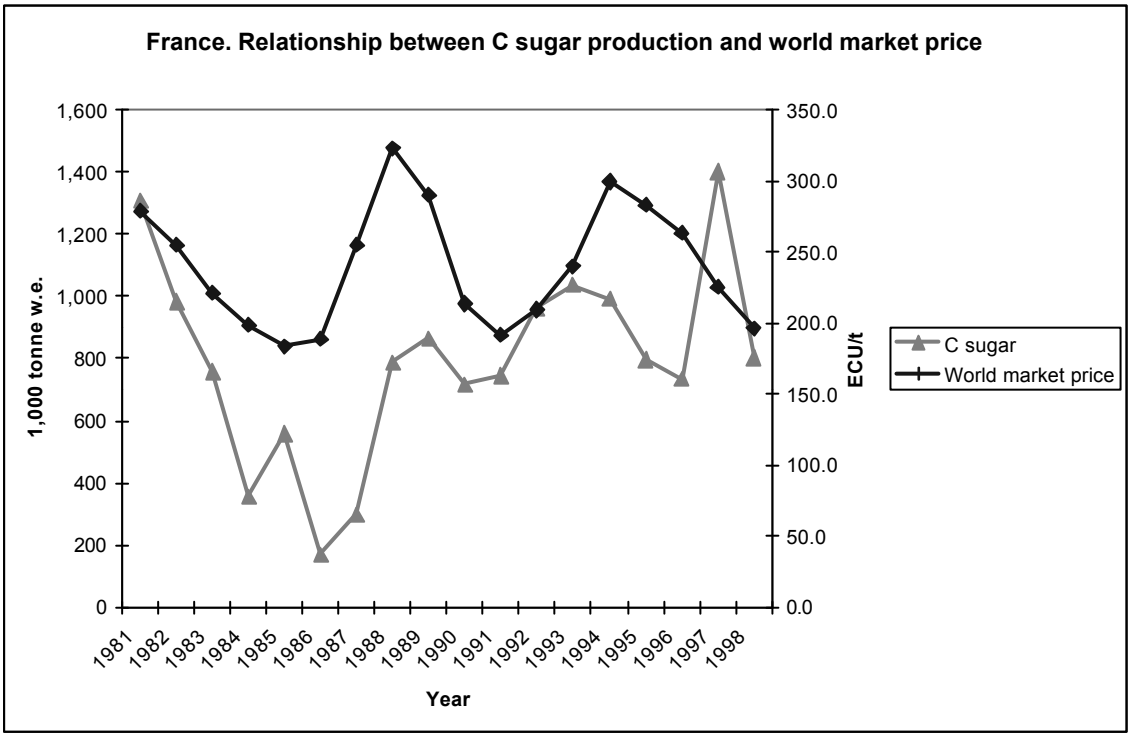
- France is the most important producer of C-sugar over the 1981-98 period, and France is frequently mentioned both by insiders in the EC sugar industry and by other sources (e.g. the Court of Auditors, see above) as the Member State where the influence of the world market price on C- sugar production is most pronounced;
- The Netherlands has a special beet pricing system, which might have an impact on C-sugar production. The industry has fixed one price (a mixed price) for q quantity of beets equal to the total of the A and B quotas plus a mark up of 6% (which will become C-quota beets). For beets produced on top of that 106% of the quota only 58% of the world market price (as is common for C-sugar beets);
- Belgium has also a mixed beet pricing system, but the mixed price applies only to A and B quota beets and does not include a portion of C-sugar, as is the case in the

Netherlands. Thus the Belgian mixed price system is expected not to have a specific influence on the production of C-sugar.

C-sugar production in France

The evolution of the French C-sugar production and the world market price is shown in figure 7.2. It appears that there was a clear correlation between the evolution of the world market price and the production of C-sugar in the 1980s. During the 1990s this correlation was less strong, but still holds, particularly if the peak of the C-production of 1997/98 can be explained by exceptionally good weather conditions.

Figure 7.2 The evolution of C-sugar production in *France* and the world market price (in 1,000 tonnes, respectively ECU/t)



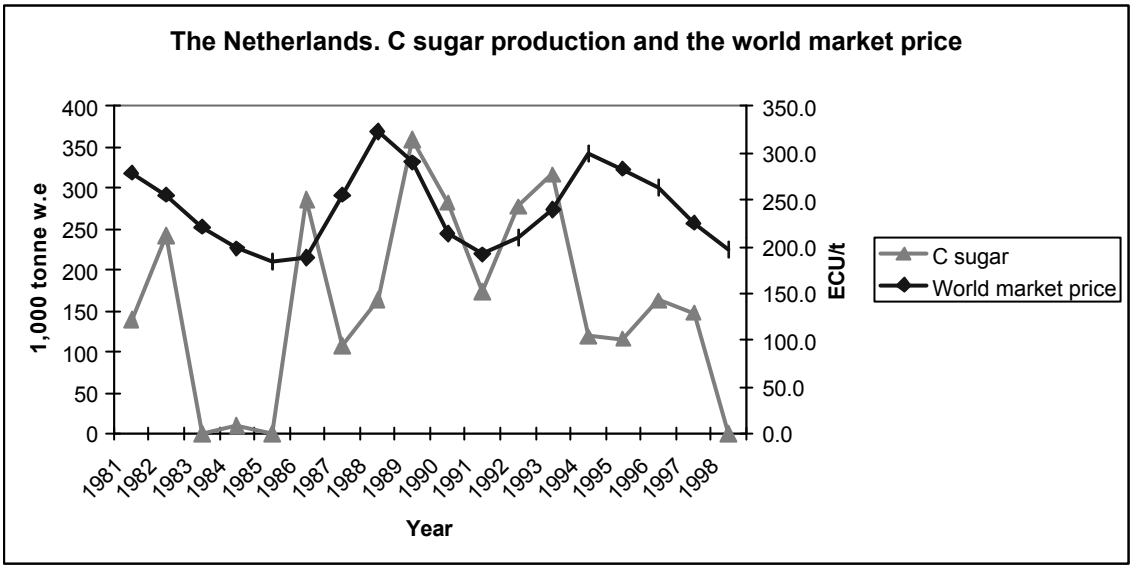
Source: European Commission, DG Agriculture. Sugar production balance sheets, various years.

C-sugar production in the Netherlands

The evolution of the Dutch C-sugar production and the world market price is shown in figure 7.3. The fluctuations of the Dutch C-sugar production are much bigger than those of the world market prices. The correlation between the Dutch C-sugar production and the world market price appears to be much weaker than the correlation between the French C-sugar production and the world market price. That can be explained by the fact that a substantial part of the French C-sugar production is produced purposely for the world market, while most of the Dutch C-sugar production is the result of favourable weather (high yields). In the Netherlands neither the farmers nor the industry aim for C-sugar production, apart from the 6% mark-up on the total of the quotas which is included in the mixed beet price system. It is interesting to note that the 6% mark up

(equivalent to about 52,000 tonnes) was introduced in 1986/87, which appears to be the first year with a substantial C-sugar production after a couple of years with hardly any C-sugar production. The 6% mark up was introduced because the industry was afraid of not being able to use the entire quota in case of bad harvests. The absence of C-sugar production in 1998/99 was caused by exceptionally bad weather.

Figure 7.3 The evolution of C-sugar production in *the Netherlands* and the world market price (in 1,000 tonnes, respectively ECU/t)



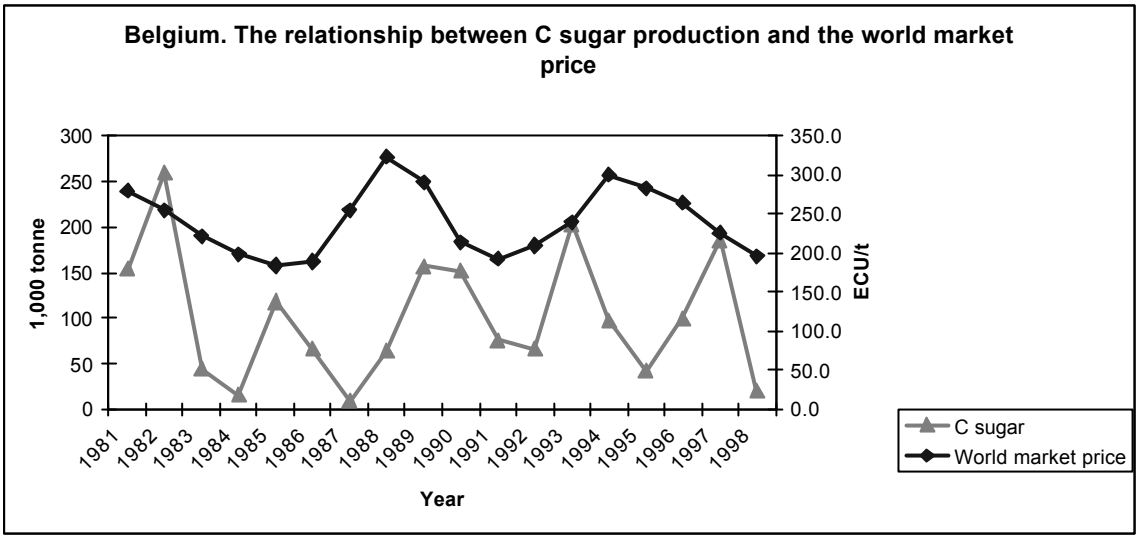
Source: European Co mmission, DG Agriculture. Sugar production sheets, various years.

C-sugar production in Belgium

The evolution of the Belgium C-sugar production and the world market price is shown in figure 7.4. Before 1987 there is no clear relationship between the world market price and the production of C sugar. After 1987 C sugar production has followed the pattern of world market prices with a one year lag. This observation is most clear for the 1987-1993 period, comparable to and even longer sustained than the pattern observed for the Netherlands. After 1993, C sugar production has declined, but less in accordance with the decrease in world market prices, with a marked production of C sugar in the 1995-1997 despite a decreasing trend in the world market price of sugar. The relatively high production levels in 1982/83, 1993/94 and 1997/98 should be explained by favourable weather rather than the world market price influence. Thus the C-sugar production consists partly of C-sugar produced as a safety margin to be sure that the entire quota is used, and partly of C-sugar purposely produced for the world market.

The average level of C-sugar production in the Netherlands is higher than in Belgium, although both countries have about the same quota. Most likely the mixed price being applicable to 106% of the quota has an upward effect on the average volume of C-sugar production in the Netherlands.

Figure 7.4 The evolution of the *Belgium* C-sugar production and the world market price (in 1,000 tonne, resp. ECU/t)



Source: European Commission, DG Agriculture. Sugar production sheets, various years.

7.7 Conclusions

When the average costs of production of refined *beet* sugar are taken as a basis of comparison, the EC belongs to the medium-cost producers, with some countries (the Netherlands, the UK and Belgium) producing at notably lower costs. When compared with refined *cane* sugar the EC is not competitive, however, with EC average production costs a factor 1.8-2.3 higher than the major exporters of cane sugar.

With respect to the impact of price differentiation between A- and B-quota sugar and C-sugar on external competitiveness the following can be concluded:

- Surplus quota sugar can be sold profitably on the world market due to the system of export refunds and production levies. The difference between the selling price - being the world market price - and the intervention price is covered by the export refund.
- EC sugar producers are able to recover most or all of the fixed and overhead costs by producing and selling A- and B-quota sugar on the EC market (at prevailing EC market prices) and the world market (being remunerated the world market price plus the export refund, being approximately equal to the intervention price). Through this, EC producers are able to produce and export C-sugar profitably as long as the world market price is higher than the marginal costs of producing C-sugar.

In most Member States on average 6% of the C-sugar production is the result of the strategy of the producers to plant sufficient beets to use the entire quota also in case of a year with unfavourable weather conditions. As a result weather conditions is one of the two main explanatory variables of the volume of C-sugar production; the other variable being world market prices. The relationship between C-sugar production and world market prices is most clear in France.

8 Income derived from sugar beet production

8.1 Introduction

This section deals with evaluation question 2.1, which reads as follows: *Has the common organisation of the sugar market made a lasting contribution to improving the formation of that proportion of producers' income, which results solely from the cultivation of sugar beet?* This chapter thus focuses on the income derived directly from sugar beet production. That income will be compared with the income from other arable crops in chapter 9. An in-depth analysis of the effect of beet production on total farm income is presented in chapter 10.

Gross margins and net margins per hectare were used as indicators of the evolution of income derived from sugar beet production[1]. Because the evaluation question refers also to assessing the "lasting contribution" of the CMO Sugar on beet income, the indicators are analysed in a time perspective. The analysis is focused on the period 1980-1998, with an emphasis on the last decade and on the Member States Germany, France, Italy, and the United Kingdom. Any improvement in net and gross margins over time is considered as positive, whereas a declining trend indicates a negative result.

Variables determining the margins of beet production are discussed in section 8.2. In section 8.3 the gross and net margins of sugar beet production are analysed by comparing revenues and costs on a per hectare basis. The conclusions are presented in section 8.4. Whenever necessary, reference is made to Annex F, which provides detailed information on sugar beet production in the EC.

8.2 Factors determining gross and net margins

8.2.1 Introduction

The gross and net margins derived from sugar beet production depend on the following variables[2]:

On the revenue side:

- area of beet;
- beet yield (net of tare), sugar content and extraction rate;
- price of beet and by-products;

On the cost-side:

- specific costs (seed, fertiliser, crop protection, fuel);
- farming overheads (machine and building upkeep, contract labour, water, energy, etc.);

1 For a justification on the indicators used, please refer to Annex H.

2 For income and cost variables, the FADN terminology is used whenever possible. A summary of FADN definitions is given in Annex H.

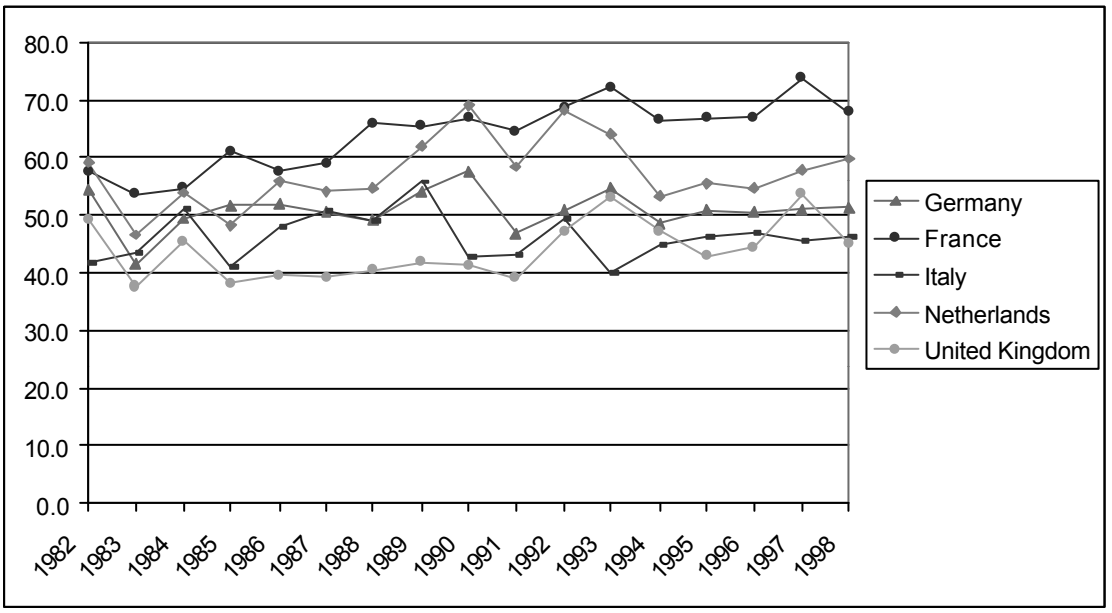
- external factors (wages, rent, interest);
- depreciation.

Of those variables, only the price of beet and the area of beet planted for the production of quota sugar are directly affected by the CMO. Beet yields and most of the specific beet production costs are largely determined by the state and development of the beet production technology. Other cost factors are largely determined by structural changes in agriculture as a whole (e.g. most of the overheads, rent paid) and macro-economic factors (e.g. wages and interest costs). Some variables may be indirectly affected by the CMO, such as land rent and perhaps the price of by-products. The main determinants of both revenue and cost are discussed in the following sub-sections.

8.2.2 Development of beet yields and area

Beet yields per hectare are increasing continuously. Since the 1980s, yield increases were particularly strong in France (2% per annum on average). At present, France has the highest average beet yield per hectare in the EC. Also in Spain yields increased remarkably since the 1980s, but the absolute yield level was, and still is, relatively low. Yields in the Netherlands and Belgium are generally at a high level. Yields in the southern Member States are usually lower due to agro-climatic circumstances (poor soils and too little rainfall). The reunification of Germany has caused a drop in the average yields of Germany as a whole due to the relatively low yields in Eastern Germany. The development of beet yields of some selected Member States since 1982 are shown in figure 8.1. The trend is similar for the other member states.

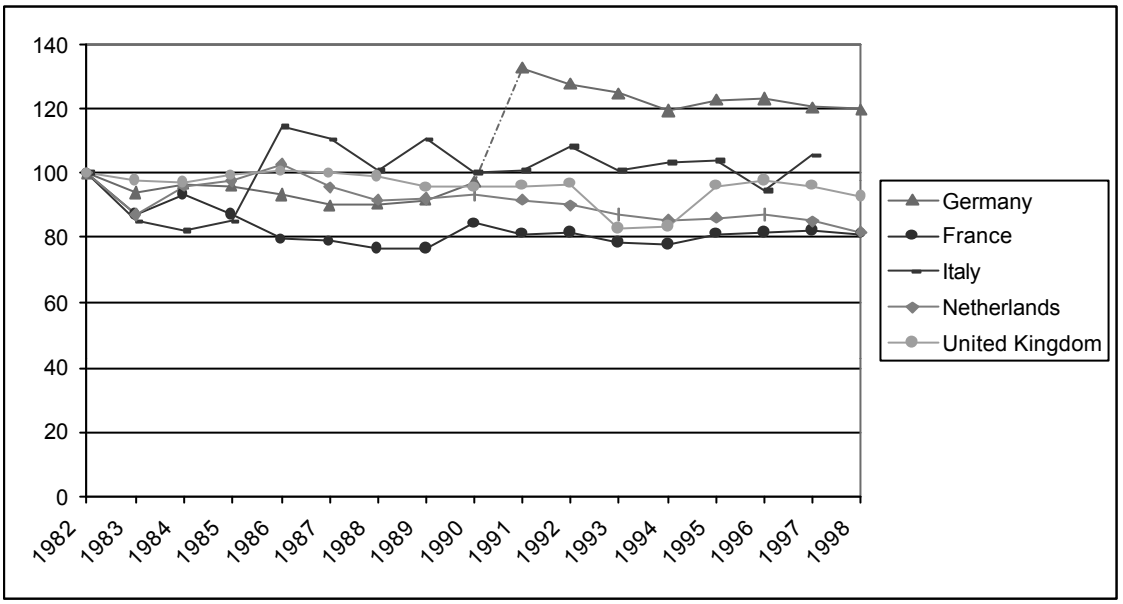
Figure 8.1 Development of beet yields in selected member states (tonne/ha)



Source: Eurostat various years.

Given the fixed production quotas and the increasing yields, beet area has reduced over time. At present, the area under beet is some 10% less than in the early 1980s. The gradual reduction of beet area in a number of Member States is shown in figure 8.2. The jump of beet area in Italy (1985-1986) is most likely due to a change in calculation and reporting methodology. Apart from this jump, also in Italy beet area has reduced over time. Germany's index of beet area is well above hundred due to the fact that in 1982 (the base year) East Germany was not included in the figures.

Figure 8.2 Development of beet area in selected EU member states (index, 1982 = 100)



Source: Eurostat, various years.

Although total beet area has decreased, per farm beet area has increased (see annex F, table F.10). The average beet area per beet farm has increased with 2% per year on average. This increase was most significant in the Southern Member States. This is the effect of a structural scaling up in the agricultural sector. The CMO as such has not affected the increase in beet area per farm.

8.2.3 Prices for beet and by-products

The price that farmers are actually receiving for their beet depends on a number of factors, namely:

- the *basic beet price,* fixed by the Commission as a minimum price to be paid to the beet producers by the beet processors. Since many years the basic beet price is fixed at 58% of the Intervention Price for sugar. Until 1995, those prices were expressed in agricultural ECUs and translated into national currencies by applying the green exchange rates. Deviations of the agricultural ECU from the financial ECU and the green exchange rate from the financial exchange rate have caused quite some

differences in the evolution of the effective sugar beet revenue in national currencies across the Member States until 1995 (for a more detailed analysis see annex I);

- the *share of A, B and C quotas* in the total beet production of a farmer. For A-quota beets farmers receive the basic beet price minus a production levy of 2%, and for B-quota the basic beet price minus (variable) production levies up to a total of 39.5%. Sometimes an additional levy is imposed on A and B quota beets. The price for C-beet is determined by the world market for white sugar and is usually substantially lower than the basic beet price. The ratio between A and B quotas varies per Member State. The quantity of C-sugar produced may vary from one farmer to another (see section 2.3 for more details);
- *National support*. In Italy and Spain, governments were allowed to grant a national subsidy to the beet producers, in order to restructure and modernise the sector. Most of the national support programmes are being phased out between 1995/96 and 2000/01 (see section 2.3.11);
- *Regional premiums* on top of the basic beet price have to paid in sugar deficit Member States (see section 2.3.1);
- *Sugar content*. The basic beet price is based on white sugar content of 16%. The actually paid beet price is based on the actual sugar content of the beets;
- *Extraction rate.* Many processors pay a premium if the extraction rate of sugar is higher than 98% and impose a discount when the extraction rate is lower;
- *Volume of tare*. In principle, factories only pay for the real quantity of sugar beets delivered; thus excluding earth, leave residues, etc.;
- *Allowance for pulp*. The basic beet price is based on the assumption that the pulp will be the property of the farmers. Many processors keep the pulp and pay an additional allowance to the suppliers of the beets. The pulp is processed and sold as fodder (CIBE, 1999);
- *Allowance for early or late delivery*. Some factories encourage delivery out of the peak season in order to make better use of the installed capacity of the factories.

Apart from these factors, the ownership structure determines whether or not the beet producers participate in the profit of the manufacturer. Some companies (Netherlands, N. Germany) are owned by co-operatives of beet farmers. The dividends which these companies pay to the co-operatives is distributed among the members of the co-operatives in proportion to the quantity of delivered beets (CIBE, 1998). This way of distributing the dividends can be regarded as a de-facto component of the beet price. Because no information is available on the amount of these dividends, this factor is not taken into account in the analysis presented in this chapter.

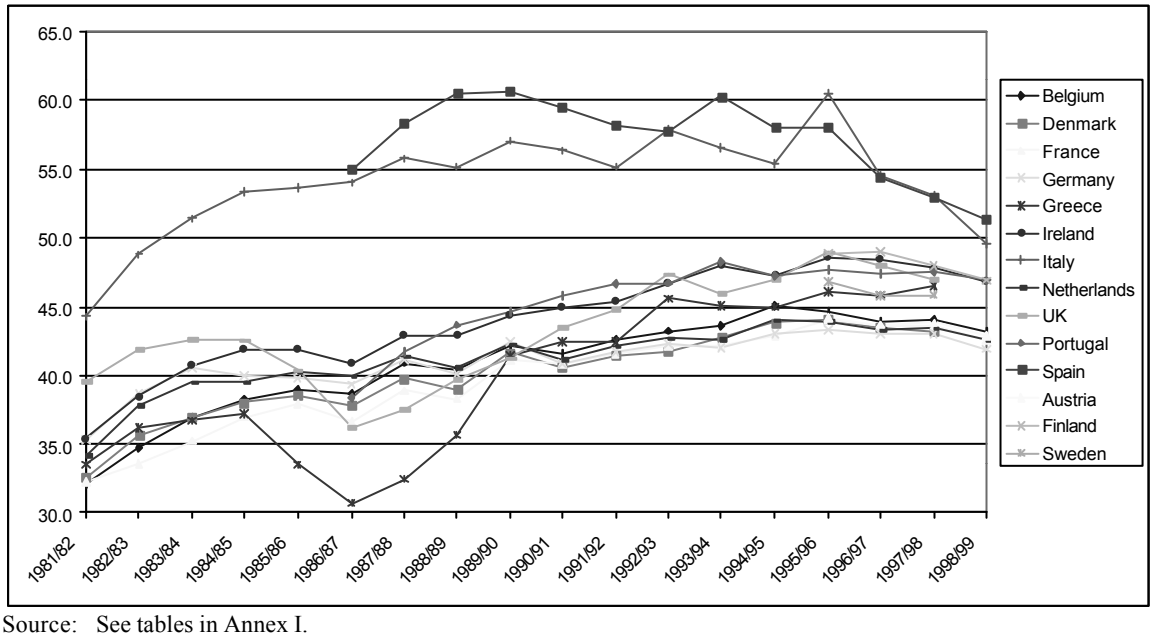
All beet production and supply conditions (quotas, supply of seed, beet prices, delivery schedules, etc.) are laid down in Intertrade Agreements (between the beet processors and suppliers in a Member State) and individual contracts between a farmer and a beet processing company. Arrangements of factors like price reduction for tare, allowance for pulp, etc. may vary largely from one company to another. Hence, it is very difficult to compare beet prices across companies and, for the sake of clarity and simplicity, those factors have been left out. Furthermore, the net balance of those arrangements

usually account for not more than 1-2% of the value of the gross income (e.g. KTBL, 1999, table presented in annex F).

An analysis of the effective gross revenues per tonne of quota-beets (average of A and B quota) in the various Member States is presented in Annex I. Included factors are: basic beet price, ratio of A/B quota, regional premium, deviations between agricultural exchange rates and financial exchange rates and national support[3]. In the following of this analysis, it is assumed that both A and B quota are fully produced in all Member States (which is mostly the case, except in Finland, Greece, Portugal; see chapter 4, table 4.2). Effective gross revenues per tonne of beets are calculated first in national currencies (see annex I) by applying the agricultural exchange rate, and then reconverted into financial ECUs by applying the financial exchange rate. The results of that analysis are presented in figure 8.3.

The main cause of the significant difference between Spain and Italy on one hand, and the other Member States on the other, is the national support, which added some 40% to the basic beet price in the 1980s. Since 1994, the national aid is gradually being phased out (see section 2.3.11). The figure shows that effective beet revenues expressed in financial ECUs have increased in nominal terms until 1993/94. After that, revenues remained more or less stable in most Member States, except in Spain and Italy. Effective beet revenues decreased in the latter two countries, because of the reduction of national support.

Figure 8.3 Trends of effective gross revenues per tonne of quota beets in EC Member States in financial ECUs (nominal)



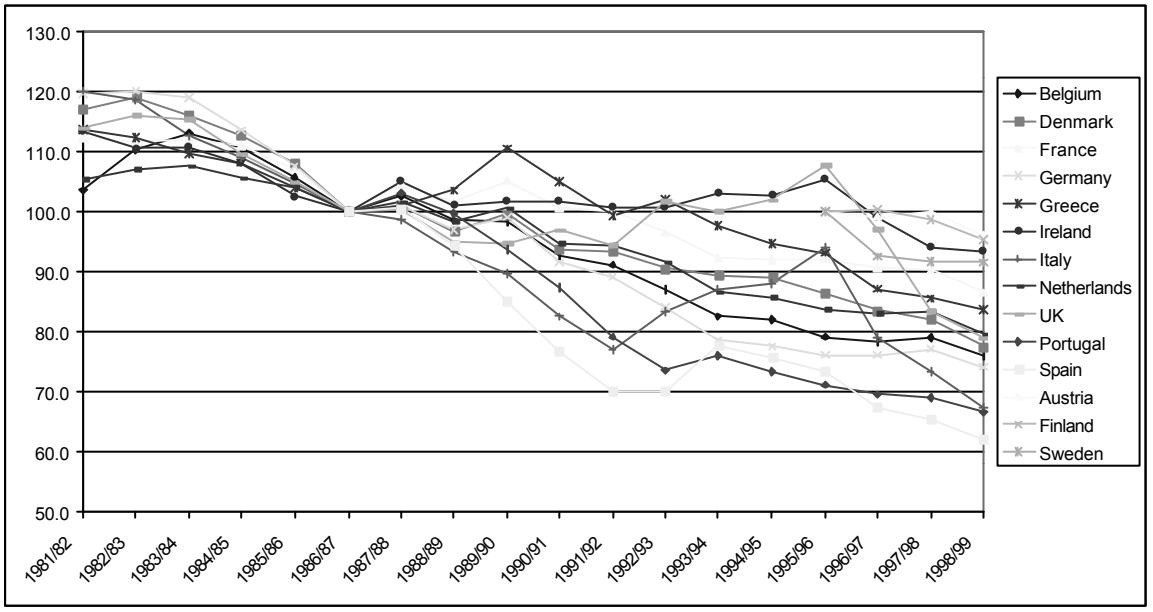
Source: See tables in Annex I.

[3] Other factors, as indicated above, are not included since those may vary from factory to factory and from year to year.

Figure 8.4 presents the analysis of the trends of the effective gross revenue per tonne of beets expressed in national currencies in constant values. The prices in national currencies mentioned in annex I have been deflated with the GDP deflator of the Member State concerned. The figure shows that effective beet revenues in national currencies in constant values have decreased by 10 to 25% since 1986.

It should be recalled that the figures 8.3 and 8.4 refer only to the average gross revenue for A and B quota beets. Gross revenues for C-quota beets may have dropped considerably since 1995 because of the decline of world market prices (see chapter 3, figure 3.1).

Figure 8.4 Index of effective gross revenues per tonne of beets in national currencies in constant values in the EC Member States (1986=100)



Note: Austria, Finland and Sweden: Base year (=100) is 1995/96.

8.2.4 Beet production costs

Most data collection and analyses of agricultural production costs is done on an overall farm basis. There are serious methodological constraints in attributing farm overheads, external factors and depreciation to a specific crop. Furthermore, available data only cover the last decade. As an alternative approach, the development of production cost for agriculture as whole has been analysed, specified in variable costs and investments Eurostat data). Depending on the Member State, real prices of the variable costs of production (seeds, agro-chemicals, etc) have declined by 20 to 40% since 1980. The real costs of investment goods have been more or less constant (see annex F, tables F.2 and F.3).

Some (indirect) indications of the development of the costs of beet production can be derived from FADN data (see annex F, table F.4). The indications point at a decrease of production costs, mainly due to technology improvements. Especially labour costs for weeding have been reduced. Furthermore, bigger machines have made planting and harvesting less costly.

The available studies that deal specifically with beet production cover direct costs only. An estimate from France indicates that, in real terms, direct costs (seed, plant protection, fertiliser) have declined by 32% per hectare (Chatenay, 1999; for details see annex F, table F.5).

8.3 Gross and net margins of from sugar beet production

This section will analyse the development of gross margins and net margins as indicators for income derived from beet production. For more background information see annex F, sections 5 and 6, and annex H.

Data availability has proven to be a limitation to the analysis. Two main sources, both with their own restrictions, have been used:

- FADN data;
- An AIGC study on production efficiency.

FADN data are not crop-specific, although, after data modification, outcomes could be used as proxy indicators. Those data were only available from 1989 onwards. AIGC data provide trends in production costs (both variable and fixed, attributed to sugar beet solely), and covering the last decade only[4]. National or regional sources usually do not go beyond the level of gross margins, but they have been used as a cross-check where relevant[5].

An analysis on the basis of FADN data suggest that in real terms the income of beet production per hectare has reduced in most of the regions. Data are retrieved from farms, which have a large share of beet output in total farm output. The specific costs are attributed to sugar beet according to the share of beet in the total output of arable crops. Other costs are attributed to the sugar beet production in proportion to the share of sugar production in total farm output. Table 8.1 provides the results.

[4] The study of AIGC is the only known study which attributes all production costs to beet production (including farming overheads, external factors) for some 20 EC-regions and over time. Unfortunately, the study team was not allowed to present the AIGC data due to the confidential nature of the data. It was accepted that, in order to cope with those constraints, index figures could be used.

[5] E.g. PAV (Proefstation Akkerbouw en Vollegrondsgroenten): Kwalitatieve informatie 1995-1999 (for The Netherlands), KTBL (for Germany) and MAFF in the UK. Key data from those sources are presented in Annex F, section 7. Data from those sources are by and large in line with the FADN and AIGC data used.

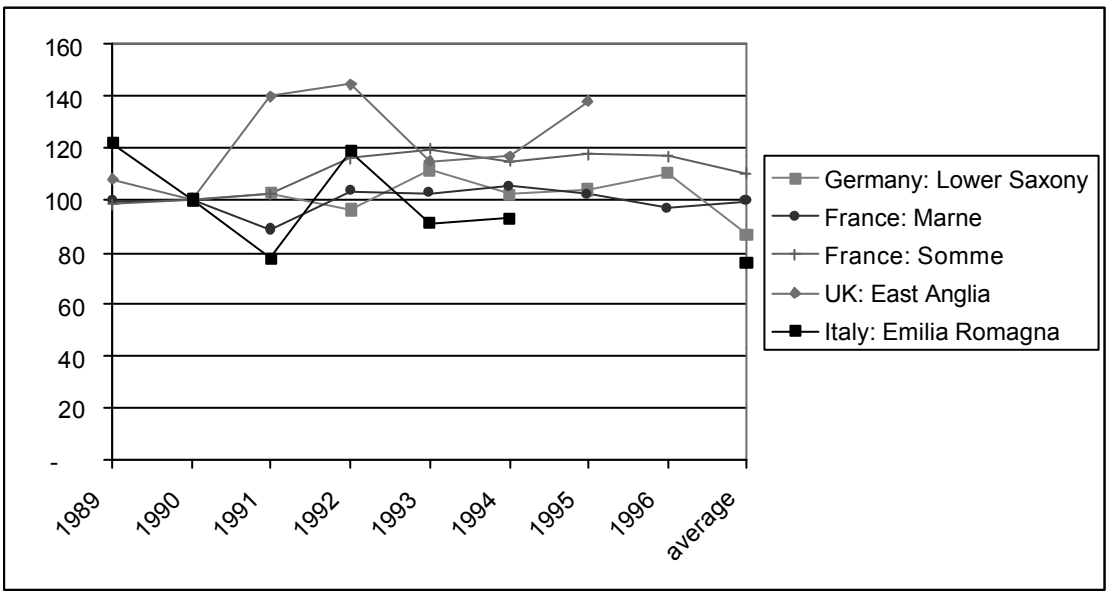
Table 8.1 Trends of real gross and net margins of sugar beet production per hectare (89-91 vs. 94-96), 1996 prices)

	Belgium (*)	Denmark (*)	Germany (**)	Greece (**)	Spain (***)	France (*)	Italy (***)	UK (*)
Sugar-beet yield (tn/ha)	*-2%*	*-15%*	*-6%*	*-1%*	*0%*	*1%*	*-7%*	*6%*
Sugar-beet price (ECU/tn)	*-11%*	*-5%*	*-15%*	*-14%*	*-2%*	*-10%*	*4%*	*-2%*
A. Sugar-beet output	**-13%**	**-19%**	**-21%**	**-16%**	**-4%**	**-9%**	**-6%**	**4%**
Total specific costs	-15%	-15%	-21%	24%	-22%	5%	15%	9%
Farming overheads	23%	-6%	-16%	-13%	-36%	8%	-14%	8%
Intermediate consumption	-4%	-11%	-19%	8%	-27%	6%	4%	8%
External factors	-11%	-17%	-16%	-38%	-55%	95%	-36%	30%
B. Variable costs	**-6%**	**-13%**	**-18%**	**3%**	**-31%**	**13%**	**0%**	**12%**
C. Total input	**-6%**	**-16%**	**-18%**	**-5%**	**-38%**	**13%**	**-1%**	**13%**
D. Gross margin (=a-b)	**-17%**	**-24%**	**-24%**	**-26%**	**29%**	**-25%**	**-10%**	**-9%**
E. Net margin (=a-c)	**-23%**	**-51%**	**-35%**	**-30%**	**161%**	**-52%**	**-12%**	**-34%**

Source: FADN.
Notes: For details on the method of calculation and precautions on interpretation, refer to Annex F.

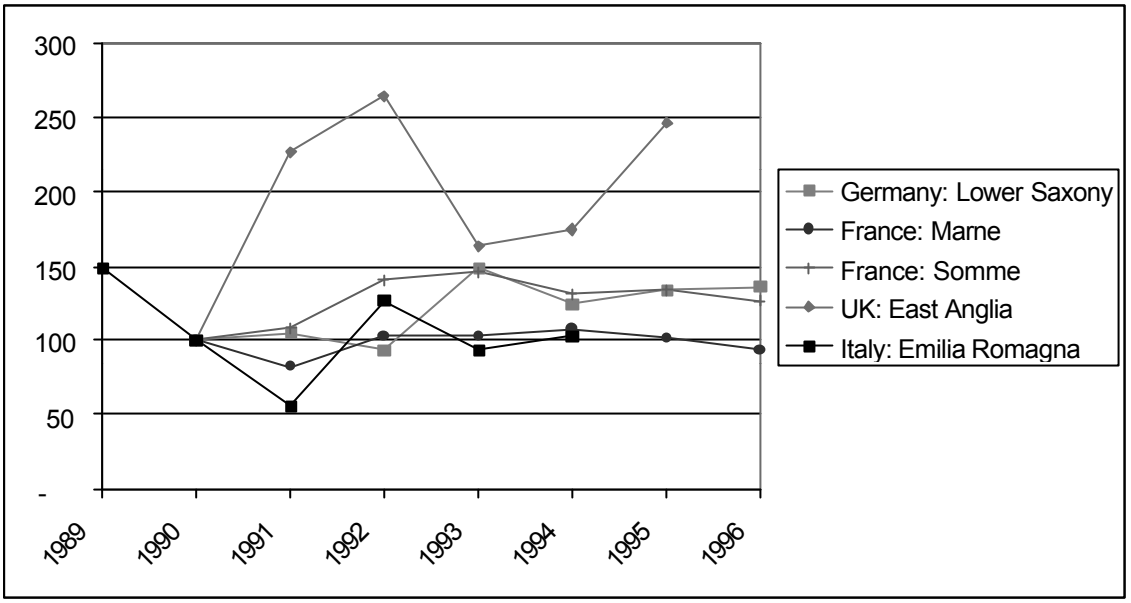
Own calculations, based on beet prices as presented in Annex I and yields and cost estimates from national sources (as standardised in the above-mentioned AIGC study) give the following results for some selected regions (see figures 8.5 and 8.6). Trends in other regions do not significantly differ from those presented.

Figure 8.5 Index nominal gross margins per hectare of sugar beets for selected regions, 1989-1996 (Index, 1990 = 100)



Source: Cost and yields: AIGC 1999. Beet prices: Annex I.
Note: Revenues calculated on the basis of average beet prices of reference period. Average A/B prices as in Annex I and adjusted for amount of C beet per member state.

Figure 8.6 Index of nominal net margins per hectare of sugar beets for selected regions, 1989-1996 (Index, 1990 = 100)



Source: Cost and yields: AIGC 1999. Beet prices: Annex I.
Note: Revenues calculated on basis of average beet prices of reference period. Average A/B prices as in Annex I and adjusted for amount of C beet per member state.

The figures indicate that there is no clear trend notable in the development of nominal gross and net margins of beet. Changes in gross and net margins are mainly caused by yield fluctuations. AIGC data show large differences in costs across regions. The highest net margin is obtained in France. The lowest results are obtained in the Netherlands (Polders) due to high fixed cost (especially own machinery and paid rent). The net margins in the other areas are more or less equal. In general, a correlation between the levels of revenues and costs can be noted, which causes that margins do not differ very much (Massin, 1999).

It is not possible to draw an unequivocal conclusion from the analysis based on the FADN data and the analysis of the AIGC data. AIGC data suggest that in nominal terms margins have improved somewhat, especially the net margins. FADN data show a decrease of margins in real terms, mainly due to a significant decrease of the beet prices.

8.4 Conclusions

Whether or not the CMO has made a lasting contribution to improving the formation of that proportion of producers' income, which results solely from the cultivation of sugar beet depends on the period reviewed and the definition of the "without case". Both methodological (which without case?) and data constraints (availability and consistency) have hampered the answering of the question. Nevertheless, some concluding remarks could be made based on the analyses presented in this chapter.

From the point of view that, most likely there would be very little production of beet sugar in the EU in the absence of the CMO Sugar (because of the relatively high production costs of beet sugar, see section 7.3), it can be concluded that the CMO Sugar has certainly contributed to improving farmers' income derived from beet production.

During the 1980s and early 1990s, gross and net margins of beet production per hectare seem to have developed favourably for the farmers, despite decreasing real beet prices. Lower production costs and increased efficiency contributed to a higher net result. The upward trend seems to have come to an end in the course of the last decade, mainly due to the (further) decrease (in real terms) of the basic beet price. Looking at the whole period of 20 years, margins per hectare obtained from beet production have been fairly stable, despite the decrease of the real beet prices. In view of the fact that beet prices are fixed under the CMO Sugar, it can be concluded that the CMO Sugar has protected and maintained the level of the margins per hectare derived from sugar beet production. Reductions of the real beet price were not higher than the gains in terms of yield increases and cost reductions.

Furthermore, it is relevant to remark that the number of farms engaged in beet production has decreased by 2.5% between 1983 and 1995 and that the average beet area per farm engaged in beet production has increased by 2% between 1983 and 1995 (see annex F, Table F.8 and F.10). The latter percentage causes of course an increase of the income derived from beet production in absolute terms, but possibly not in relative terms (as a percentage of total farm income). These aspects are analysed further in the chapters 9 and 10.

9 Income from sugar beet production compared to other crops

9.1 Introduction

This chapter deals with evaluation question 2.2, which reads '*How has income from sugar beet production developed in relation to income from arable crops?* The most appropriate indicator is the ratio between the gross margin per hectare of sugar beet and that of alternative crops. In section 9.5 the ratios of the gross revenues per hectare are also analysed separately, because it is a good proxy of the ratios of the gross margins (in this particular case, because the trends of the production costs of the crops analysed were more or less identical).

Specific judgement criteria are not required because no judgement is asked for; the question asks only for describing and analysing the development of a ratio.

The comparison of income from sugar beets with that of another arable crop makes only sense if that other arable crop is a real alternative to beet growing. In the context of this study it was not possible to make a detailed analysis of (all) alternatives at the level of each Member State. It was therefore decided to choose one crop for the Northern Member States and one crop for the Southern Member States, which could be considered as the most common direct alternative for beet production. A choice was made for respectively common wheat[6] and grain maize[7]. Of course, the gross margin of cereals is usually significantly lower than the gross margin of sugar beet production, but as the analysis is focussed on the *development of the ratio* of the gross margins from those crops, the absolute difference between both gross margins is not of primary importance.

The chapter is composed as follows. Section 9.2 deals with the evolution of yields of the selected crops, section 9.3 with the development of prices and gross revenues *per tonne,* and section 9.4 with trends of production costs. The elements of the sections 9.2 to 9.4 are combined in section 9.5, where an analysis is made of the gross revenues and gross margins *per hectare*. Final conclusions are presented in section 9.6.

9.2 Yield trends of beets and alternative crops

The trend of beet yields in the EC has already been described in detail in chapter 8. It was found that the overall increase in beet yield per hectare in the EC was about 1.9% per annum over the last twenty years, with substantial differences per Member State. On

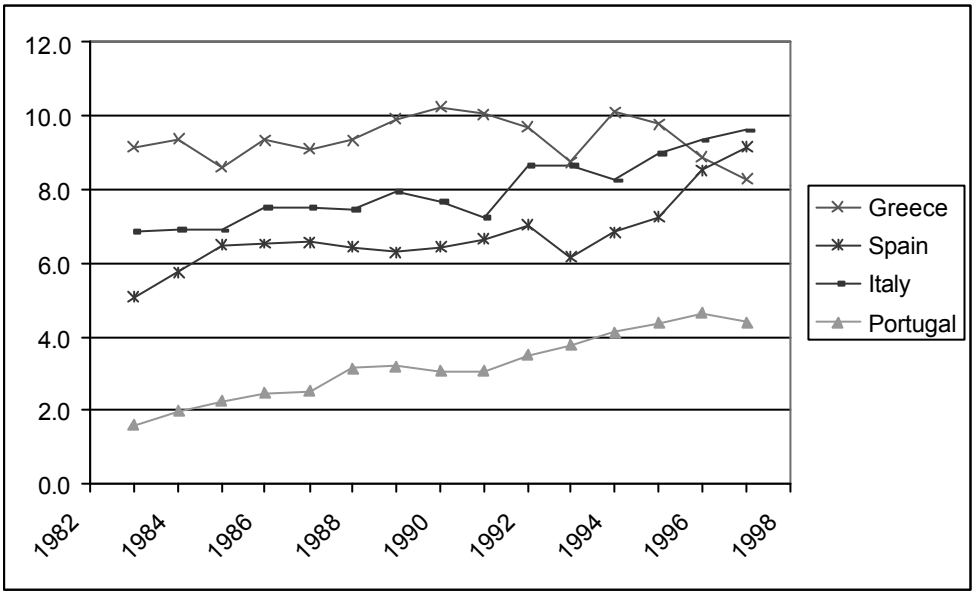
[6] Although in the Northern Member States potato is financially the most attractive crop in most situations, it is not an alternative crop for beet because potatoes are already grown up to the rotation limit (once in four years).

[7] Other, possibly more promising alternatives like cotton in Spain and Greece and Brussels Sprouts in parts of Belgium and The Netherlands were not considered, as they are of local relevance only, and their profitability may fluctuate largely from one year to another.

the basis of Eurostat data, time series for wheat and maize grain yields have been made as well. It should be noted that these trends might be less firm than those for beet, as an in-dept analysis of yield trends for other crops is outside the scope of this study. The results, therefore, should be considered as indicative.

Figure 9.1 shows the trends of maize grain yields in Greece, Italy, Spain and Portugal. The average annual growth can be determined by calculating the linear trend. That calculation shows that maize grain yields have remained constant in Greece, whereas in Spain and Italy, the increase was 2.9% and 2.5% per year respectively over the period 1982-1997. Portugal, starting from a very low base, has experienced a growth rate of 8.5% per annum.

Figure 9.1 Trends in maize grain yields in selected Member States (tonnes/ha, 1982-1997)

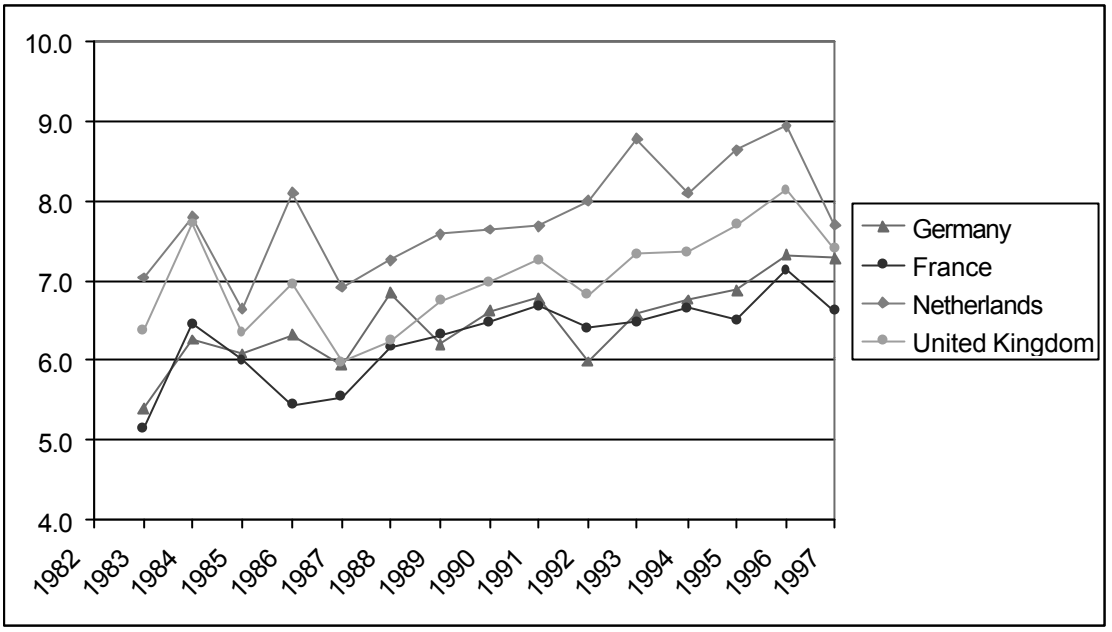


Source: Eurostat, various issues.

Also for common wheat, a general improvement of yields can be noted (see figure 9.2). However, expressed in annual growth percentages, the increase is less significant than in the case of maize. France, Germany, the Netherlands, and the UK have realised an average yield increase of 1.3-1.5% per annum over the period 1982-1997. For Denmark and Belgium (both not shown in figure 9.2), the increase was respectively about 1% and 2.3% per year.

The overall conclusion is that average yields of all three crops (sugar beets, wheat and maize) have improved during the reference period. Although the results are slightly ambiguous, it seems that the improvement of beet yields has lagged somewhat behind that of the other two crops.

Figure 9.2 Trends in Common Wheat yields in selected Member States (tonnes/ha, 1982-1997)



Source: Eurostat, various issues.

9.3 Prices and gross revenues of beets, wheat and maize per tonne

Beet prices have already been analysed in chapter 8. The evolution of the wheat and maize prices is shown in the tables 9.1 and 9.2 and the figures 9.3 and 9.4. The tables and figures show a steady decline of the prices for both crops over time, especially since the beginning of the 1990s. This is partly due to the reduction of the EC price support for these crops, as a result of the MacSharry reforms introduced in 1992 (these reforms were focused on replacing price support by income support, in the form of subsidies per hectare or animal).

Table 9.1 Producer prices of Common Wheat (1983-1996, current ECUs per 100 kg.)

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Belgium	19.71	18.18	17.62	17.97	18.28	17.21	16.66	15.52	15.47	15.59	13.64	12.69	12.60	12.45
Denmark	20.49	19.52	19.01	18.52	17.77	16.66	16.93	15.69	16.19	16.78	14.55	13.61	13.79	13.20
Germany	21.84	20.98	18.89	19.25	19.12	17.52	16.88	16.29	16.05	16.63	15.04	13.73	13.05	13.58
France	17.42	16.67	16.31	17.09	17.59	16.44	16.43	15.72	16.08	15.90	14.97	13.13	13.07	13.20
Ireland	18.15	16.54	12.74	14.30	15.50	16.06	15.59	14.87	14.94	14.35	13.65	11.59	14.14	11.86
Netherlands	20.53	19.16	18.18	18.68	17.50	16.92	16.51	15.31	15.64	15.76	13.68	13.67	13.53	13.13
United Kingdom	21.55	19.28	18.98	16.48	15.78	16.09	16.16	15.84	16.63	16.50	14.58	13.17	13.95	13.82

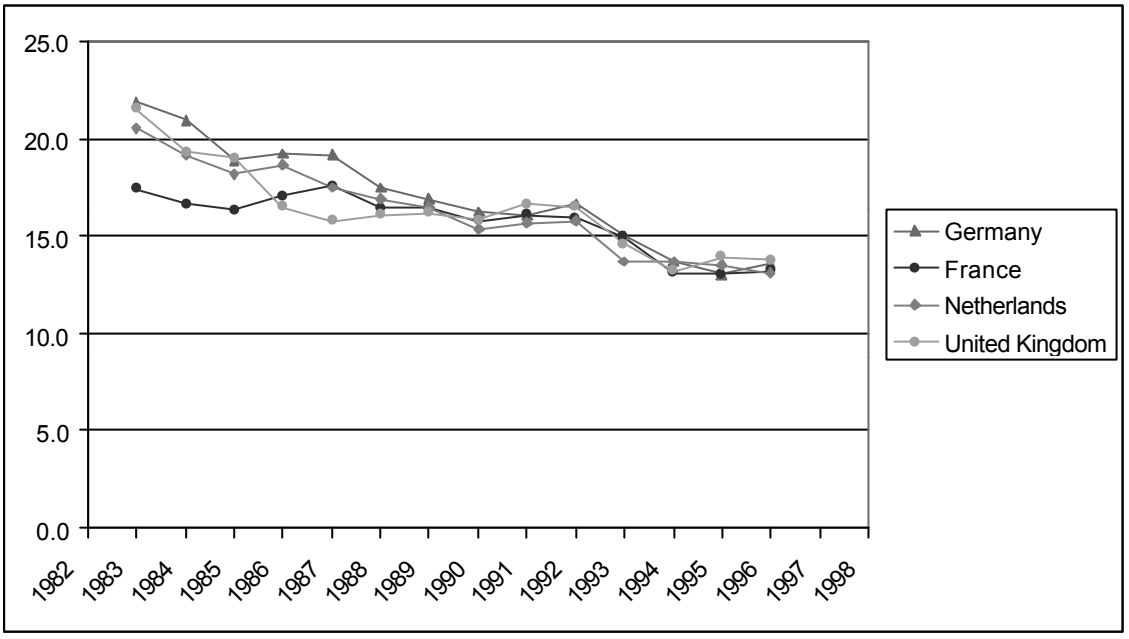
Note: Only Northern Member States are mentioned, as wheat is the competing crop in those countries only.
Source: EUROSTAT various issues.

Table 9.2 Producer prices of maize grain (1983-1996, current ECUs/100 kg.)

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Greece	18.03	18.13	17.19	15.08	14.17	15.55	17.43	17.36	17.21	17.85	16.86	16.36	16.25	15.90
Spain	18.95	20.31	20.28	21.67	19.41	19.29	19.82	21.13	21.34	19.35	19.10	16.37	16.99	16.07
Italy	24.26	25.92	23.45	24.00	24.29	22.39	22.23	23.36	24.51	20.79	18.37	16.67	17.99	18.02
Portugal	22.80	27.66	29.59	27.53	24.91	23.82	23.35	22.36	19.69	19.30	17.13	15.05	15.11	15.32

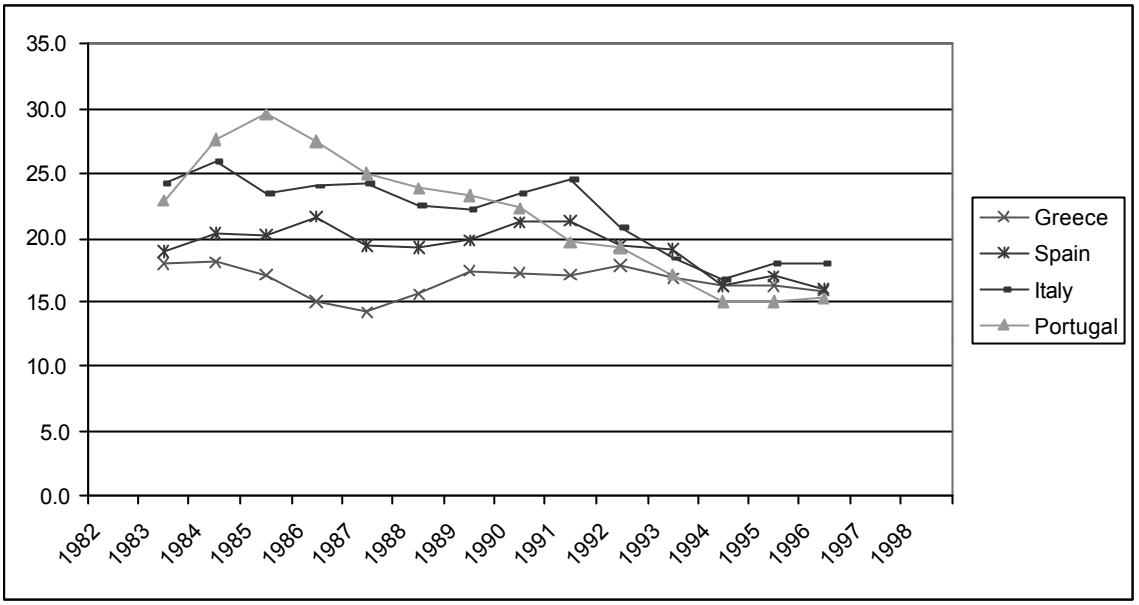
Note: Only southern member states are mentioned, as maize is taken as the competing crop in those countries only.
Source: EUROSTAT various issues.

Figure 9.3 Common Wheat price developments (1983-1997, current ECU/100 kg)



Source: Eurostat.

Figure 9.4 Maize grain price developments (1983-1997) (current ECU/100 kg)



Source: Eurostat.

The price trends shown in the figures 9.3 and 9.4 do not represent the full picture with respect to the income trends of growing wheat and maize. The area subsidies, in place since 1993, should be taken into account as well. These crop specific area subsidies vary significantly across regions and Member States, depending on the historic yields and on the mode of implementation by the individual Member State[8]. For the purpose of this study, a (rough) estimate of area subsidies per hectare of wheat and maize per Member State was made. Results are presented in table 9.3. Those figures are used in the calculations in the remainder of this chapter.

[8] The crop specific area subsidies per hectare are fixed per region on the basis of the historic yields of the region concerned. In general they are paid on condition that producers set aside a defined percentage (5-20%) of the land for which aid is requested. Small producers (farmers who apply for a compensatory payment for less than 92 tonnes of cereals) are exempted from this obligation. The set aside land is also compensated for. Area subsidies for cereals were increased gradually over the period 1993/94-1995/96 along with the gradual reduction of the price support. Since 1995/96, a payment of 54.34 ECU per tonne of "historic yield" is applicable. The historic yield is determined by calculating the average yield over the period 1986-90, excluding the highest and lowest years.

Table 9.3 Estimate of area subsidies per hectare of wheat and maize grain in 1997 (ECU/ha)

Belgium	340	Greece	500
Denmark	360	Spain	350
Germany	340	Italy	400
France	320	Portugal	300
Netherlands	390		
United Kingdom	400		

Notes: In 1997 the area subsidy amounted to 54.14 ECU/tonne of historic yield per hectare. Historic yields per Member State are calculated by taking the average yield of over the period 1986-1990 (based on Eurostat data).

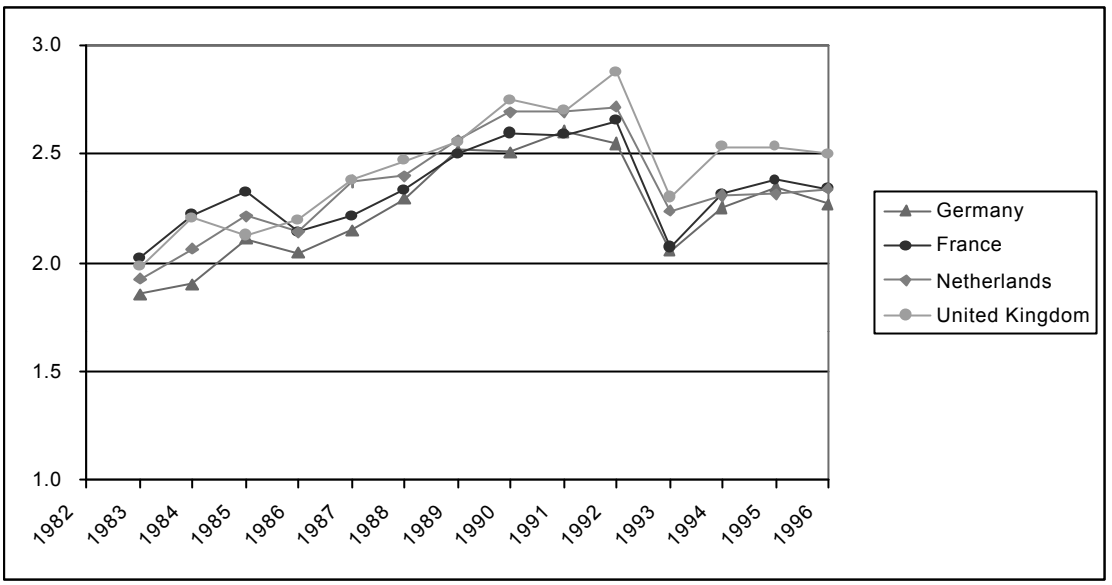
Source: DG Agriculture, 1997, Eurostat and own calculations

According to Van Huylenbroeck these area subsidies may contribute for about 20% to the gross margin of wheat and maize (van Huylenbroeck et. al. 1995). The CAP-2000 Situation and Outlook (CAP working documents, 1997, p 32) states that the share of subsidies on farm net value added was 45% in 1993, 56% in 1994, 65% in 1995 and 59% in 1996. It is expected that this contribution will increase further in the near future, due to a reduction of the intervention price by 15% and the increase of the area subsidies from EURO 58 per tonne of historic yield in 1999/2000 to EURO 63 per tonne in 2000/2001.

Thus the gross revenue per tonne of wheat and maize is equal to the price plus the area subsidy per tonne of yield. Those gross revenues can be compared with the effective beet revenues as calculated in chapter 8 (see also annex I). The effective beet revenues consist of the basic beet price plus the regional premiums, plus national support, minus the average of the production levies, all corrected for exchange rate differences between the agricultural and financial exchange rates. The effective beet revenues refer to A- and B-quota beets only.

The trends of the relative revenues per tonne can be analysed by calculating the ratios of "gross revenue of beets/gross revenue of wheat" and "gross revenue of beets/gross revenue of maize". The trends of those two ratios are depicted in the figures 9.5 and 9.6 for a number of Member States. The figures show that the gross revenue of beet has improved compared to that of wheat during the 1980s. Since the MacSharry reforms, wheat revenues per tonne have been improving. The results for maize are more balanced. It appears that maize revenues have remained more or less at par with those of beet.

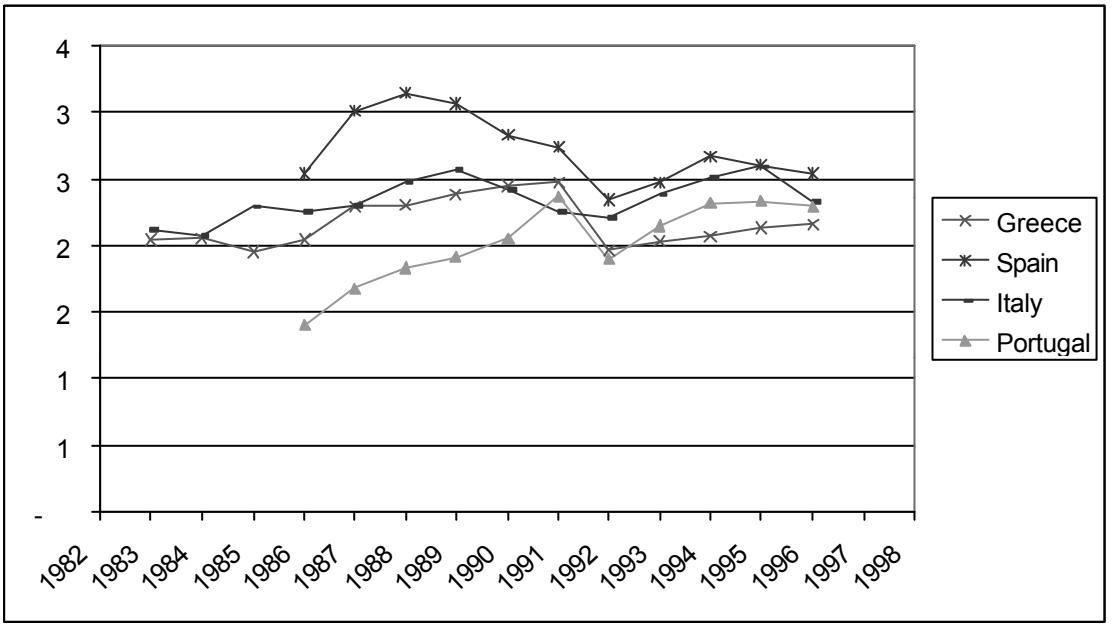
Figure 9.5 Trends of the ratio of sugar beet and wheat gross revenues in some Member States



Source: Eurostat and own calculations.
Notes:

- ▲ Wheat gross revenue per tonne = price plus area subsidy per tonne in ECU; area subsidies as estimated in table 9.3.
- ▲ Sugar beet gross revenue = basic beet price per tonne of quota beets in financial ECUs, corrected for regional premiums, national support, average production levies and differences between the agricultural and financial exchange rates (see annex I).

Figure 9.6 Trends of the ratio of revenues for sugar beet and the revenues for maize grain per tonne in some Member States



Source: Eurostat and own calculations
Notes:

- ▲ Maize grain gross revenue per tonne = price plus area subsidy per tonne in ECU; area subsidies as estimated in table 9.3.
- ▲ Sugar beet gross revenue = basic beet price per tonne of quota beets in financial ECUs, corrected for regional premiums, national support, average production levies and differences between the agricultural and financial exchange rates (see annex I).

The overall conclusion is that beet revenues *per tonne* have improved strongly vis-à-vis those of wheat and maize during the 1980s. Around 1991, the ratio of the gross revenues of beet versus wheat had increased by some 35% and the ratio of the gross revenues of beet versus maize by about 20%. During the 1990s a reversed trend can be observed, mainly due to the area subsidies for cereals and historically high cereal prices on the one hand, and a slight reduction of the gross revenues of beets (per tonne). Nevertheless, the ratios of the gross revenues of beets versus cereals are still 10-15% higher than in the early 1980s.

9.4 Evolution of production costs

Eurostat and the FADN do not provide specific data regarding the evolution of the production costs of sugar beets, wheat and maize. Only indirectly some indications regarding the production costs of these crops can be retrieved from more general data.

For the purpose of this study, the FADN unit has calculated the production costs of farms, of which a large share (40-60%) of the total farm production value is derived from one single crop. The production costs of these farms might be considered as approximates of the production costs of the dominant crop of those farms.

In the tables 9.4, 9.5 and 9.6 the percentage changes from the years 1989-91 to 1994-96 of the production costs (in real terms) of the farms dominated by either sugar beets[9], wheat or grain maize in the various Member States are presented. These tables indicate that, in general, the real production costs of all three categories of farms have decreased. There were no large differences in the magnitude of cost decrease among these farm categories. Thus, to the extent that the cost structures of these three farm categories are identical to the cost structures of the dominant crops, it can be concluded that the percentage decrease of production costs of sugar beets, wheat and maize was more or less the same for all three crops between 19989/91 and 1994/96.

Table 9.4 Changes of the production costs in real terms of farms dominated by sugar beets (%, 1994-1996 vs. 1989-1991)

	Belgium	Denmark	Germany	Greece	Spain	France	Italy	United Kingdom
	(*)	(*)	(**)	(**)	(***)	(*)	(***)	(*)
Total specific costs	-15%	-15%	-21%	24%	-22%	5%	15%	9%
Farming overheads	23%	-6%	-16%	-13%	-36%	8%	-14%	8%
Depreciation	-8%	-22%	-19%	3%	-56%	-10%	5%	8%
External factors	-11%	-17%	-16%	-38%	-55%	95%	-36%	30%
Total input	**-6%**	**-16%**	**-18%**	**-5%**	**-38%**	**13%**	**-1%**	**13%**

Source: Data sheets generated by FADN unit, 1999. For details, see Annex F.

9 A more detailed table for sugar beet is presented in Annex F.

Table 9.5 Changes of the production costs in real terms of farms dominated by Common Wheat (%, 1994-1996 vs. 1989-1991)

	Denmark	Germany	Greece	Spain	France	Italy	United Kingdom
	(**)	(*)	(**)	(***)	(**)	(**)	(**)
Seed & seedlings purchased	-26%	-12%	-13%	71%	-20%	-6%	0%
Fertilisers	-21%	-16%	36%	-7%	-25%	-12%	-7%
Protection	-32%	-33%	63%	21%	-8%	4%	3%
Motor fuel & lubricants	-26%	-8%	67%	-42%	-17%	37%	-3%
Water				-36%		-46%	
Other crop specific costs	-40%	-45%	5%	2098%	-27%	-26%	14%
TOTAL SPECIFIC COSTS	**-26%**	**-22%**	**32%**	**13%**	**-17%**	**-2%**	**-1%**
Mach. & Build. Upkeep	-12%	-18%	-4%	5%	4%	-4%	19%
Energy (exclud. Fuel & lubrifica	-35%	-8%	10%	31%	18%	210%	-14%
Contract works	-30%	29%	-11%	-6%	7%	-36%	17%
Other direct costs	-15%	14%	3%	8%	0%	83%	28%
FARMING OVERHEADS	**-19%**	**-3%**	**-9%**	**1%**	**4%**	**-15%**	**19%**
DEPRECIATION	**-29%**	**-28%**	**-11%**	**-47%**	**-6%**	**12%**	**-5%**
Wages paid	7%	-34%	109%	257%	11%	-56%	5%
Rent paid	-4%	-4%	-14%	-13%	11%	-22%	-8%
Interest paid (less subs.)	-24%	-6%	-19%	-52%	-28%	-63%	12%
EXTERNAL FACTORS	**-19%**	**-13%**	**-12%**	**87%**	**-5%**	**-41%**	**3%**
B. Variable costs	-21%	-16%	19%	21%	-10%	-10%	6%
C. Total input	-22%	-17%	4%	5%	-9%	-6%	3%

Source: Data sheets generated by FADN unit, 1999.

Notes:

(1) Germany does not include here New Länder.

(2) Variable costs are estimated here to equate to the sum of intermediate consumption and wages paid.

(*) Results refer to farms where the output of the crop concerned represents more than 40% of the farm total output. These results should be considered as indicative.

(**) & (***) Results refer to farms where the output of the crop concerned represents more than 50% and 66% of the farm total output, respectively.

Table 9.6 Changes of the production costs in real terms of farms dominated by maize grain (%, 1994-1996 vs. 1989-1991)

	Greece	Spain	France	Italy
	(***)	(***)	(***)	(***)
Seed & seedlings purchased	7%	-3%	-7%	0%
Fertilisers	35%	-25%	-26%	-15%
Protection	-1%	20%	4%	7%
Motor fuel & lubricants	24%	-14%	-22%	40%
Water	47%	-2%		-53%
Other crop specific costs	-35%	-44%	60%	-60%
TOTAL SPECIFIC COSTS	**20%**	**-11%**	**-15%**	**-7%**
Mach. & Build. Upkeep	-27%	-23%	-8%	-18%
Energy (exclud. Fuel & lubrifica	-33%	-24%	1%	-81%
Contract works	-25%	-8%	-11%	-20%
Other direct costs	31%	-37%	-11%	22%
FARMING OVERHEADS	**-24%**	**-16%**	**-9%**	**-16%**
DEPRECIATION	**-19%**	**-52%**	**-6%**	**25%**
Wages paid	-20%	-16%	-9%	-28%
Rent paid	-15%	-50%	53%	47%
Interest paid (less subs.)	-62%	-76%	-44%	3%
EXTERNAL FACTORS	**-28%**	**-33%**	**-12%**	**21%**
B. Variable costs	1%	-13%	-12%	-11%
C. Total input	-9%	-23%	-11%	1%

Source: Data sheets generated by FADN unit, 1999. Footnotes: see table 9.5.

9.5 Gross revenues and gross margins per hectare of beet, wheat and maize

The gross revenues *per hectare* of beet, wheat and maize production can be calculated on the basis of the gross revenues *per tonne* (see figures 9.3 and 9.4 and annex I) and the yields per hectare (see figures 9.1 and 9.2 and annex F).

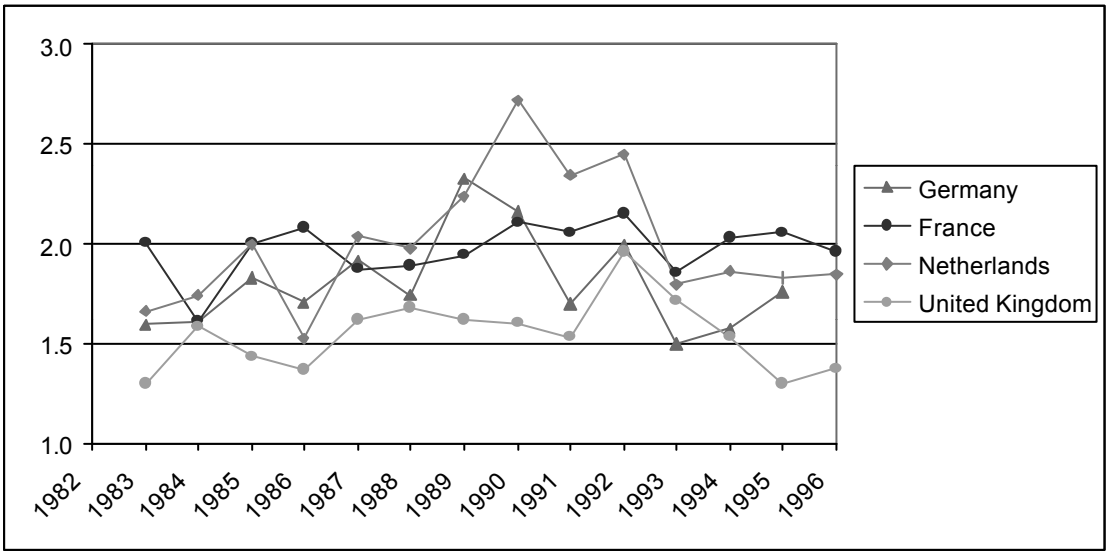
The trends of the gross revenues per hectare of wheat and maize on the one hand and sugar beets on the other hand can be compared by calculating the ratios of 'revenue of beets/revenue of wheta" and of 'revenue of beets/revenue of maize'. The formula for such a ratio is:

$$R_{(c,y)} = \frac{P_{b(c,y)} \times Y_{b(c,y)}}{P_{a(c,y)} \times Y_{a\,(c,y)}}$$

With:
$R_{(c,y)}$= Ratio for given country (c) and year (y)
$P_{b(c,y)}$ = Average revenue per tonne sugar beet
$Y_{b(c,y)}$ = Average yield of sugar beet
$P_{a(c,y)}$ = Average revenue per tonne of alternative crop
$Y_{a\,(c,y)}$ = Average yield of alternative crop

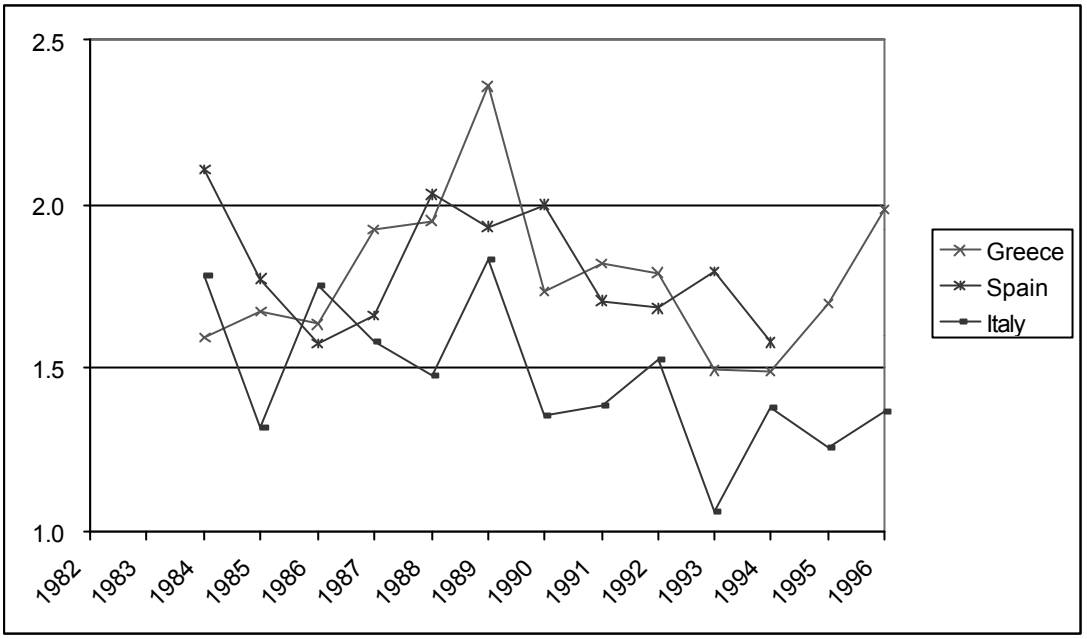
The trends of the gross revenue ratios per Member State are depicted in the figures 9.7 and 9.8. The figures show that the gross revenue per tonne of sugar has improved compared to the gross revenue of wheat during the 1980s. Since the MacSharry reforms, wheat revenues are improving, due to the favourable area subsidies combined with historical high cereal prices (internal price above intervention price, on the basis of which the area subsidy was determined). The results for maize are more balanced; it appears that its gross revenue has improved even slightly compared to that of beet.

Figure 9.7 Ratio of the gross revenues (in current ECUs) per hectare of sugar beets and wheat



Source: Eurostat and own calculations

Figure 9.8 Ratio of the gross revenues (in current ECUs) per hectare of sugar beets and maize grain



Source: Eurostat and own calculations.

These results and conclusions regarding the gross revenues are *grosso modo* also valid for the ratios of gross margins, because the percentage decline of the production costs has been more or less the same for all three crops, as was shown in section 9.4.

On the basis of FADN data, it is possible to calculate gross and net margins of beet, wheat and maize, and to make a direct analysis of the trends of these gross and net margins[10]. The data are presented in the tables 9.7 and 9.8.

[10] See further Annex F for additional data and Annex H for the methodology applied.

Table 9.7 Gross margins of sugar beet, wheat and maize production (ECU/ha, in constant prices of 1996)

	Belgium	Denmark	Germany	Greece	Spain	France	Italy	United Kingdom
Sugar beet								
94-96	1651	1380	1360	2072	1479	1271	1560	849
89-91	1992	1804	1789	2779	1056	1700	1688	935
Wheat								
94-96		539	664	371	317	637	740	682
89-91		558	738	548	252	729	563	535
Maize								
94-96				1476	1319	865	1350	
89-91				2077	792	1005	1199	
Ratio beet: wheat								
94-96		2.56	2.05	5.58	4.67	2.00	2.11	1.24
89-91		3.23	2.42	5.07	4.19	2.33	3.00	1.75
Ratio beet: maize								
94-96				1.40	1.12	1.47	1.16	
89-91				1.34	1.33	1.69	1.41	

Source: FADN. For an explanation of the methodology used, see Annex H.

Table 9.8 Net margins for sugar beet, wheat and maize production (ECU/ha, in constant prices of 1996)

	Belgium	Denmark	Germany	Greece	Spain	France	Italy	United Kingdom
Sugar beet								
94-96	1016	153	403	1242	1287	481	1240	297
89-91	1313	312	618	1776	448	996	1358	451
Wheat								
94-96		-119	259	170	249	257	454	391
89-91		-302	237	319	172	324	286	234
Maize								
94-96				955	1239	394	793	
89-91				1394	521	490	763	
Ratio beet: wheat								
94-96		-1.29	1.56	7.31	5.17	1.87	2.73	0.76
89-91		-1.03	2.61	5.57	2.60	3.07	4.75	1.93
Ratio beet: maize								
94-96				1.30	1.04	1.22	1.56	
89-91				1.27	0.86	2.03	1.78	

Source: FADN. For an explanation of the methodology used, see Annex H.

These data indicate that in most cases beet production has become less attractive in the reference period, as the ratio of gross and net margins of beet vis-à-vis those of wheat and maize grain has reduced in most cases.

As a cross-check, the results were compared with data from national sources. Production costs data were available for 1994-1996, only for the following beet

production regions: France (Marne and Somme, Germany (Saxony and Bavaria), and UK (east Anglia). Prices were derived from Eurostat, and adjusted for area subsidies. The ratios of gross margins beet vis-à-vis those of wheat are presented in the next table.

Table 9.9 Ratio gross margins of beet versus wheat

	Lower Saxony	Bavaria	East Anglia	Marne	Somme
1994	1.21	1.36	1.46	2.00	1.46
1995	1.23	1.63	1.40	2.34	1.78
1996	1.38	1.69		2.12	1.61

Source: Eurostat (prices); EU-DG-VI (area subsidies), national sources (AIGC 1999) and own calculations.

The results of this analysis are comparable to those based on table 9.7, at least for France and the UK. A similar comparison has been made for net margin ratios, but no clear-cut conclusion could be drawn. It indicates that net margin calculations are prone to many potential errors, and therefore, results should be considered with precaution.

Although the attractiveness of sugar beet vis-à-vis other arable crops has apparently decreased during the last decade, the income in absolute terms is still high compared to e.g. cereals. The attractiveness of beet growing is also confirmed by a number of other facts. First, the fact that farmers always fully fulfil their delivery rights indicates that they consider beet as a profitable enterprise (eg. Bureau et al. 1997; Vierling 1997, Renwick, 1998). Second, “beet delivery rights” are considered as valuable assets. When delivery rights are transferred from one farm to another (e.g. in case of discontinuation of a farm) the new owner of the delivery rights has to pay a substantial amount to the former owner (in the Netherlands equivalent to about 3.5 the gross annual production value). Notwithstanding this high price, many farmers are interested in obtaining additional delivery rights. Farmers are also very keen on “not loosing” the delivery rights. If farmers fail to use their delivery rights for a number of consecutive years, they risk a reduction of the delivery rights. In order to avoid that risk, farmers tend to plant more than what is normally necessary to fill the quota (even in case they are not interested in C-beet production).

A study carried out in Britain confirms also the relative profitability of beet growing. Beet area at arable farms accounts for 9-21% of total farm land, whereas beet represents between 16 and 30% of farm gross margin. Thus beets contribute more to the gross margin of the farm than other arable crops. Among experts, the crop is considered as one of the cornerstones of East Anglican agriculture, as it provides a stable and indispensable income for the farmers (Hallam et.al., 1994).

9.6 Conclusion

The gross margin per hectare of beet production has improved relative to the gross margin of wheat production (in the Northern Member States) and maize production (in the Southern Member States) during the 1980s. This was mainly caused by the fact that the price ratios of beet/wheat and beet/maize increased. During the 1990s the trend reversed. The ratio of the gross margins per hectare of beet/wheat and beet/maize declined, mainly due to the decline of the effective gross revenue per tonne of beets and the increased effective gross revenue per tonne of cereals. The latter is caused by the relative attractive world market prices of cereals in the mid-1990s plus the area subsidies for cereals, which more than compensated the decline of the intervention prices of cereals. Nevertheless, beet production is still financially more attractive than growing cereals in terms of gross margins per hectare.

10 Impact of the CMO Sugar on total farm income

10.1 Introduction

The chapter deals with evaluation question 2.3, which reads *"Has the common organisation of the sugar market made a lasting contribution to improving income generated by the farming activity of sugar beet producers?*

Whereas chapter 8 dealt with the impact of the CMO Sugar on the income derived from beet production, this chapter deals with the impact of the CMO Sugar on the total income of farms engaged in beet production. The following indicators[11] were used:

- Family Farm Income
- Farm Net Value Added
- Family Farm Income per Arable Crop Area
- Farm Net Value Added per Arable Crop Area
- Family Farm Income per Family Work Unit
- Farm Net Value Added per Annual Working Unit

The value of these indicators is estimated for both farms *with* beet production and *without* beet production. The first two indicators refer to the total farm income of beet and non-beet farms per farm. The other four indicators link the total farm income and the farm net value added to respectively the number of hectares and the number of work units. As such these indicators can be used to filter out the effect of differences in terms of farm size and labour requirements.

The following judgement criterion will be applied. When the value of the indicators of farms with beet production is higher than those of farms without beet production over a considerable length of time (preferably at least 10 years) it can be concluded that the CMO Sugar has made a lasting contribution to improving the income of beet farmers (because the CMO Sugar makes sugar production financially attractive).

The analysis (comparison) has been carried for arable farms only (FADN farm type I), which is a relatively homogenous group of farms (at the level of the individual Member States). Extensive use is made of the FADN, which appeared to have the most consistent set of data available. Unfortunately, the available data cover the period 1989-1996 only. Therefore the judgement of the aspect of *"lasting"* included in the evaluation question has to be limited to that period.

The chapter is composed as follows. Section 10.2 deals with a static comparison of income indicators, based on average farm results of 1994-1996. In section 10.3, an attempt is made to put the findings in a time perspective, as trends over the last decade are analysed. The conclusions of this chapter are presented in chapter 10.4.

[11] For a glossary on FADN terminology, refer to Annex H.

10.2 Farm income of sugar beet producers versus non beet producers

In table 10.1, the Farm Net Value Added (FNVA) and the Family Farm Income (FFI) of an average arable farm with beet production is compared with the FNVA and the FFI of an average arable farm without sugar beet production. The table indicates that the incomes earned on sugar beet farms are significantly higher than on farms where no sugar beet is grown. The substantial large differences in absolute values across the Member States are probably largely caused by differences in farm size.

Table 10.2 Farm Net Value Added (FNVA) and Family Farm Income (FFI) of arable farms with and without sugar beet production (averages of 1994-1996 in ECUs of 1996)

	Denm.	Germ	Greece	Spain	France	Italy	Austria	Finland	Sweden	UK
Farm Net Value Added										
Without sugar beet area	19,565	27,797	10,338	19,106	42,227	12,059	35,970	20,258	17,977	91,599
With sugar beet area	43,460	66,500	11,554	22,105	72,370	20,029	46,346	26,491	25,846	135,871
Family Farm Income										
Without sugar beet area	2,278	15,421	8,142	15,653	15,653	10,321	28,268	15,104	5,219	59,099
With sugar beet area	10,150	31,575	8,677	19,572	46,449	17,235	37,200	17,635	12,722	85,437

Source: FADN/RICA.
Note: For Austria, Finland and Sweden averages of 1995-1996 only. Only data are provided of those Member States, which have sufficient entries in the FADN database.

In order to filter out the effect of farm size, the FNVA and the FFI can be expressed per hectare of Arable Area (AA) of the farms. Those figures are presented in table 10.3. It is clear that the difference between farms with and without beet production is much smaller in the case of the indicators per hectare than in the case of the total FNVA and FFI. In a number of cases, the FFI per hectare of beet growing farms is even lower than for non-beet growing farms.

Table 10.3 Farm Net Value Added (FNVA) and Family Farm Income (FFI) per hectare (of arable area; AA) of arable farms with and without sugar beet production (averages of 1994-1996 in ECUs of 1996)

	Denm.	Germ	Greece	Spain	France	Italy	Austria	Finland	Sweden	UK
FNVA/hectare AA										
Without sugar beet area	549	794	1,403	413	638	1,212	1,342	575	352	873
With sugar beet area	818	824	1,295	644	821	1,278	1,279	643	567	1,010
FFI/hectare AA										
Without sugar beet area	64	440	1,105	338	427	1,038	1,055	428	102	563
With sugar beet area	191	391	972	570	527	1,100	1,027	428	279	635

Source: FADN/RICA.
Note: For Austria, Finland and Sweden averages of 1995-1996 only. Only data are provided of those Member States, which have sufficient entries in the FADN database.

It is also interesting to express the FNVA and the FFI figures per Annual Work Units (AWU) and the number of Family Work Units (FWU) respectively (see table 10.4). The

table indicates clearly that the FNVA per AWU is significantly higher on beet farms than on non-beet farms. Also the FFI per FWU is higher on beet farms than on farms that do not grow sugar beets.

Table 10.4 Farm Net Value Added (FNVA) per Agricultural Working Unit (AWU) and Family Farm Income (FFI) per Family Working Unit (FWU) on arable farms with and without sugar beet production (averages of 1994-1996 in ECUs of 1996)

	Denm.	Germ.	Greece	Spain	France	Italy	Austria	Finland	Sweden	UK
FNVA/AWU										
Without sugar beet area	26,281	19,113	6,027	20,160	28,904	10,160	23,438	18,902	18,471	42,525
With sugar beet area	43,243	31,924	7,369	23,010	45,919	14,268	29,318	22,994	34,688	50,385
FFI/FWU										
Without sugar beet area	3,534	12,302	5,290	20,459	22,088	9,256	21,085	15,349	5,716	51,805
With sugar beet area	13,143	22,933	6,227	23,746	36,464	13,067	25,470	17,767	19,455	80,361

Source: FADN/RICA.
Note: For Austria, Finland and Sweden averages of 1995-1996 only. Only data are provided of those Member States, which have sufficient entries in the FADN database.

10.3 Development of income indicators over time

Table 10.5 shows to what extent the above mentioned indicators have changed during the period 1989-91 and 1994-96. For all the indicators mentioned in section 10.2 the percentage change has been calculated. The figures for the EC-12 as a whole indicate that the income of non-beet farms has improved more than the income of beet farms during the period under review. At the level of the individual Member States the figures are less consistent[12].

Table 10.5 Changes of the income indicators between 1989-91 and 1994-1996, expressed in percentages of the 1989/1991 indicators (indicators calculated on the basis of income and value added in constant (1996) values)

	Belg.	Denm.	Germ.	Greec	Spain	Franc	Irel.	Italy	Neth.	Port.	UK	EU-12
Farm Net Value Added												
Non beet farm		71%	24%	-25%	112%	25%	9%	21%		-17%	32%	30%
Beet farm	-1%	-5%	53%	-35%	82%	29%		3%	11%		22%	27%
Fam. Farm Income												
Non beet farm		-168%	48%	-30%	168%	35%	38%	20%		-26%	93%	42%
Beet farm	-3%	764%	26%	-37%	173%	31%		3%	16%		59%	31%
Farm Net Value Added/AWU												
Non beet farm		34%	16%	-21%	121%	26%	12%	32%		-14%	56%	32%
Beet farm	4%	1%	14%	-27%	142%	17%		18%	17%		44%	30%
Family Farm Income/FWU												
Non beet farm		-154%	36%	-23%	183%	38%	41%	32%		-25%	119%	46%
Beet farm	-1%	878%	12%	-30%	185%	25%		17%	18%		87%	36%
FFI/AA												
Non beet farm		-153%	31%	-31%	90%	15%	42%	-12%		-8%	109%	17%
Beet farm	-9%	837%	-29%	-33%	106%	7%		-9%	3%		65%	1%
FNVA/AA												
Non beet farm		34%	10%	-27%	50%	7%	13%	-11%		2%	42%	8%
Beet farm	-7%	3%	-14%	-31%	37%	5%		-9%	-1%		27%	-2%

Source: FADN data.

[12] The FADN data of 1989-91 are not entirely comparable with the data of 1994-1996 because the samples of 1989-91 were smaller than the samples of 1994-96. The results should therefore be interpreted with caution. Furthermore, the reference period is rather small, and therefore, general trends are hard to obtain.

10.4 Conclusions

The evidence presented in this chapter indicates that, in general, farms with beet production generate higher incomes than farms without beet production, in terms of total Farm Net Value Added (FNVA) and total Family Farm Income (FFI) per farm, as well as per working unit and (in most cases) per hectare.

This can be (partly) explained by the relatively favourable gross margins of sugar beet production compared to that of the production of other arable crops (see chapter 9). Obviously, the CMO Sugar has had a significant impact on the attractive profitability of beet production, particularly by protecting relatively high beet prices and providing a secured market in the EC. As such the CMO Sugar has greatly contributed to improving the income of beet growers as compared to farmers not engaged in beet production.

Time series of farm income data of a number of Member States over the period 1989-91 to 1994-96 indicate that, on average, the percentage increase of the income of beet farms was lower than the percentage increase of the income of non-beet farms. Thus the income of beet farms deteriorated in relative terms. Although comprehensive farm income data are not available regarding the 1980s, it can be assumed that during that period, the income of beet farms improved relative to non-beet farms, because during the 1980s the ratio of 'gross margin of beet/gross margins alternative crops' increased (see chapter 9).

In view of the fact that the income of beet farms is still higher than the income on non-beet farms, it can be concluded that the CMO Sugar has made a lasting contribution to improving the income of beet farms. However, the aspect of *lasting* has weakened somewhat during the 1990s because the percentage increase of the income of beet farms was less than that of non-beet farms.

11 Impact CMO Sugar on different categories of sugar beet producers

11.1 Introduction

This chapter deals with evaluation question 2.4, which reads *"What impact has the common organisation of the sugar market had on the distribution of income between different categories of sugar beet producers (in terms of size, region, degree of specialisation, etc.)?"* In chapter 10 the conclusion was drawn that, in general, the CMO Sugar had contributed to an improved level of total farm income of beet growers compared to farmers not engaged in beet production. The evaluation question of this chapter is focussed on possible differences of benefits *within* the category of sugar beet producers. It is specifically asked to look at differences according to size, degree of specialisation and region.

In this chapter farm income will be measured in terms of the Farm Net Value Added (FNVA) and Family Farm Income (FFI), both expressed per hectare of Agricultural Area (AA). The degree of specialisation of a beet farm will be measured in terms of the percentage of beet area over total Agricultural Area of that particular farm. The indicator of the farm sizes will be the size of the Agricultural Area (in hectares). The analysis will be focussed mainly on the category of arable farms, as that is a relatively homogenous category of farms. The differentiation per region will be limited to the level of the Member States, because of lack of data at a lower level of aggregation. The analysis is based on data of 1994-1996. The evaluation question does not require specific judgement criteria, because only an analysis of a possible impact is asked for.

It should be noted that the factors region, size of holding and degree of specialisation are linked to some extent. For instance, there appears to be a correlation between size of the holdings and degree of specialisation. Secondly there is also a link between region and size of the holdings. The average size of an arable farm in the UK is ten times larger than that in Italy, which obviously has a significant effect on farmers' income. Therefore, wherever possible, the correlation between income, farm size and degree of specialisation will be specified for every Member State separately.

This chapter is composed as follows. Before answering the evaluation question in a strict sense, first the correlation size-categories of *all arable farms* and incidence of beet production is analysed in section 11.2. Section 11.3 then deals with the analysis of the correlation between farm income, degree of specialisation and *size of the beet farm.* Section 11.4 provides an overview of the income benefits of the sugar beet producers per Member State. Some data on the percentages of all farmers benefiting from the CMO Sugar are presented in section 11.5. Conclusions are summarised in section 11.6.

11.2 Beet production and size of farms

Table 11.1 shows that, within the category of arable farms, beet farms are relatively large compared to non-beet arable farms in the same Member State. The most extreme case is Germany, where beet farms are on average twice the size of an arable farm where no beet is cultivated. Only in the case of Sweden and Spain, beet farms are on average smaller than non-beet farms.

Table 11.1 Agricultural Area of arable farms without and with sugar beet production (in hectares)

	Farm without beet	Farm with beet		Farm without beet	Farm with beet
Denmark	42.8	59.8	Italy	14.5	19.8
Germany	48.9	99.8	Austria	35.1	43.3
Greece	8.3	9.7	Finland	46.4	49.0
Spain	61.3	39.2	Sweden	72.3	51.3
France	83.7	107.3	UK	147.1	170.6

Source: FADN 1994-96 averages.

Table 11.1 shows the percentage of all arable farms involved in beet production per size. It appears that in all Member States the percentage of farms engaged in beet production is relatively high in the larger farm size categories.

From the tables 11.1 and 11.2 the conclusion can be drawn that sugar is particularly grown by the larger arable crop farms.

Table 11.2 Percentages of farms engaged in beet production per size-category

Size of total farm in ha. AA	Austria	Bel.	Denm.	Finland	France	Germ.	Greece	Ireland	Italy	Neth.	Spain	Swe.	UK
<2	0%	1%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%
2-<3	0%	3%	0%	2%	0%	1%	2%	0%	2%	4%	0%	0%	0%
3-<5	0%	6%	10%	1%	0%	1%	3%	0%	3%	7%	0%	0%	1%
5-<10	1%	11%	4%	1%	0%	3%	7%	0%	5%	12%	1%	1%	1%
10-<20	4%	23%	8%	2%	1%	7%	12%	1%	9%	18%	4%	2%	2%
20-<30	12%	34%	13%	4%	2%	12%	13%	2%	11%	22%	6%	5%	3%
30-<50	27%	41%	14%	6%	4%	17%	8%	3%	13%	31%	7%	9%	4%
50-<100	36%	53%	17%	11%	9%	25%	5%	7%	13%	54%	8%	12%	6%
> 100	11%	81%	23%	19%	19%	42%	4%	14%	12%	70%	8%	18%	11%
Total	**5%**	**22%**	**12%**	**4%**	**5%**	**9%**	**3%**	**3%**	**3%**	**18%**	**2%**	**6%**	**4%**

Source: EU Farm Structure Survey of 1997.
Note: Grey cells indicate an overrepresentation of beet farms in the respective size class.

11.3 Farm income, degree of specialisation and farm size

In table 11.3 the value of the two income indicators are presented for various degrees of specialisation. It appears that both the FNVA/AA and the FFI/AA increase slightly with a higher degree of specialisation. Only in the case of Italy the income per hectare appears to be more or less constant, irrespective of the share of beet area over total arable land.

Table 11.3 Farm Net Value Added (FNVA) and Family Farm Income (FFI) per hectare of Agricultural Area (AA) on arable farms with sugar beet production according to degree of specialisation (% sugar beet area of total farm area) (averages of 1994-1996 in ECUs of 1996)

	Denmark	Germany	Greece	Spain	France	Italy	Austria	Sweden	UK
FNVA/hectare AA									
No beet	549	794	1,403	413	638	1,212	1,342	352	873
<10% beet	775	662	957	405	763	1,336	1,160		
10-20% beet	732	819	1,329	653	803	1,205	1,279		937
20-30% beet	883	988	1,364	862	905	1,245	1,465	550	1,029
30–40% beet	977	1,123	1,644	1,156	919	1,218			
>40% beet			1,594	1,251		1,522			
FFI/hectare AA									
No beet	64	440	1,105	338	427	1,038	1,055	102	563
<10% beet	179	227	690	346	497	1,131	941		
10-20% beet	170	385	986	589	519	1,004	1,028		593
20-30% beet	164	579	1,058	795	562	1,084	1,146	288	630
30–40% beet	295	716	1,213	1,060	599	1,068			
>40% beet			1,246	1,062		1,331			

Source: FADN. Arable farms only.
Note: For Austria, Finland and Sweden averages of 1995-1996 only. Only data are provided of those Member States which have sufficient entries in the FADN database.

The FNVA per Agricultural Working Unit (AWU) and the FFI per Family Working Unit (FWU) are not substantially affected by the degree of specialisation (see table 11.4).

Table 11.4 Farm Net Value Added (FNVA) and Family Farm Income (FFI) per work unit on arable farms with sugar beet production according to % sugar beet area of total farm area (averages of 1994-1996 in ECUs of 1996)

% sugar beet	Denmark	Germany	Greece	Spain	France	Italy	Netherl.	Austria	UK
FNVA/AWU									
0%	26,281	19,113	6,027	20,160	28,904	10,160	n/a	23,438	42,525
<=10 %	49,860	32,363	9,094	23,980	47,205	23,380	n/a	28,007	n/a
>10%-<=20%	37,298	30,370	8,086	22,922	44,096	16,657	54,800	30,637	50,490
>20%-<=30%	42,072	30,106	7,000	20,967	47,092	14,475	56,485	29,674	45,989
>30%-<=40%	48,501	34,160	6,709	22,528	50,520	11,895	54,590	n/a	n/a
> 40%	N/a	n/a	5,926	22,027	21,131	11,491	n/a	n/a	n/a
FFI/FWU									
0%	3,534	12,302	5,290	20,459	22,088	9,256	n/a	21,085	51,805
<=10 %	17,324	24,554	7,470	24,183	36,385	22,284	n/a	24,086	n/a
>10%-<=20%	10,413	20,006	6,814	22,406	34,796	14,901	38,526	26,559	77,530
>20%-<=30%	10,470	22,538	6,121	20,912	38,800	13,303	39,933	26,680	72,974
>30%-<=40%	17,952	26,619	5,628	22,757	41,959	10,938	39,088	n/a	n/a
> 40%	n/a	n/a	5,657	26,705	17,678	11,046	n/a	n/a	n/a

Source: FADN.
Note: For Austria, Finland and Sweden averages of 1995-1996 only. Only data are provided of those Member States which have sufficient entries in the FADN database.

Table 11.5 provides figures of the average total size of farms engaged in sugar beet production according to the degree of specialisation. It appears that, in general, farms with a low level of specialisation are relatively large farms, while farms with a high level of specialisation are mostly small farms.

Table 11.5 Size of holding (AA in hectares) by share of arable land under sugar beet (averages of 1994-96)

	Share of arable land under sugar beet (% of AA)				
	<10%	10%-20%	20%-30%	30%-40%	>40%
Austria	41.9	35.6	35.6		
Denmark	79.6	44.5	49.1	51.6	
France	95.3	86.2	87.6	79.5	4.6
Germany	173.1	72.6	49.8	47.0	
Greece	15.0	10.0	7.7	6.6	2.3
Italy	32.8	21.1	16.7	12.5	3.9
Netherlands		50.5	48.0	36.0	
Spain	52.7	34.4	24.3	17.3	13.3
UK		137.0	131.0		

Source: FADN data.
Notes:
- Austria average of 1995-96;
- Only data are provided of those Member States which have sufficient entries in the FADN database.

The following conclusions can be drawn from the tables 11.3 to 11.5:

- Farm incomes per hectare are higher when the degree of specialisation is higher (table 11.3).
- In general small sugar beet farms have a higher level of specialisation than large sugar beet farms (table 11.5).

Thus small beet farms have a higher total farm income per hectare than large beet farms, due to their higher level of specialisation in beet production. In that sense small beet farms have benefited more strongly from the CMO Sugar than large beet farms.

These relationships could not be established for farm income per work unit. Although one would expect a higher labour productivity (and hence higher incomes per unit of labour) at more specialised farms, this does not seem to be the case for sugar beet specialisation. This could be explained by the fact that farms with a high degree of specialisation are relatively small (compared to farms with a low degree of specialisation), and hence other negative scale effects might have counterbalanced the increased labour productivity caused by the specialisation.

11.4 Income distribution according to region

The evaluation question refers also to the impact of the CMO Sugar on the "distribution of income of sugar beet producers" across Member States. Answering that question is difficult because:

- there are no time-series of the development of farm income of beet producers per Member State (see also chapter 10);
- no clear conclusions regarding the impact of the CMO Sugar can be drawn from a comparison of farm incomes of beet growers across Member States, because other economic and physical factors may cause large income differences.

Taking into account these limitations some observations could be made on the basis of the data of the tables 10.2, 10.3 and 10.4. Total net value added per hectare (FNVA/AA; table 10.3) is high in Greece, Italy, Austria and the UK. Per work unit high net added values are recorded in the UK, France, Denmark, Sweden and Germany (FNVA/AWU; table 10.4). The ratio between the highest and the lowest FNVA/AA is 2.3 and between the highest and the lowest FNVA/AWU is 6.8. Because of the absence of time series and the fact that many other factors than the CMO Sugar have an impact on income differences across Member States, no further conclusions can be drawn.

It is also interesting to have a look at differences between the ratios of farm income of beet farms and non-beet farms across the Member States (although the evaluation question does not refer to such a comparison). These ratios, presented in table 11.6, vary from 0.89 to 4.46. High ratios, indicating relative large difference in income of beet farmers versus non- beet farms, are recorded for Denmark, Sweden and France, and to a lesser extent, Germany. Greece, Spain, Austria and Finland have low ratios, which indicates that in those Member States the difference between incomes of beet farms versus non beet farms is relative low. The UK and Italy are somewhat in between.

Table 11.6 Ratio of farm income indicators of beet farms versus non-beet arable farms (Averages of 1994-1996 in ECUs of 1996)

Ratio of selected indicator Beet farm: non-beet farm	Denm.	Germ	Greece	Spain	France	Italy	Austria	Finland	Sweden	UK
FNVA	2.22	2.39	1.12	1.16	1.71	1.66	1.29	1.31	1.44	1.48
FFI	4.46	2.05	1.07	1.25	2.97	1.67	1.32	1.17	2.44	1.45
FNVA/AA	1.49	1.04	0.92	1.56	1.29	1.05	0.95	1.12	1.61	1.16
FFI/AA	2.98	0.89	0.88	1.69	1.23	1.06	0.97	1.00	2.74	1.13
FNVA/AWU	1.65	1.67	1.22	1.14	1.59	1.40	1.25	1.22	1.88	1.18
FFI/FWU	3.72	1.86	1.18	1.16	1.65	1.41	1.21	1.16	3.40	1.55

Source: FADN (see tables 10.3 and 10.4)
Note: For Austria, Finland and Sweden averages of 1995-1996 only. Only data are provided of those Member States, which have sufficient entries in the FADN database.

11.5 Percentage of farmers benefiting from the CMO Sugar

In the context of the evaluation question it is also useful to have a look at the percentage of farmers benefiting from the CMO Sugar per Member State (see table 11.7) and to what extent they could benefit from it in view of the average beet area per farm (see table 11.8).

Table 11.7 shows that the percentages of all farmers in a particular Member State engaged in beet production is relatively high in Belgium, the Netherlands and Denmark (see fourth column). Thus in those Member States a large percentage of the farmers can benefit from the CMO Sugar.

The fifth column of table 11.7 shows that Italy has the highest number of beet farmers (60,000; 23% of all beet farmers in the EC) followed by Germany (19% of all beet farmers) and France (12% of all beet farmers). All the other Member States have less than 10% of the total number of beet farmers in the EC.

Table 11.7 Number of beet farmers per Member State (data from 1997)

	Total number of farms	Farms engaged in sugar beet production	Beet farms as % of total farms in the Member State	Beet farms as % of total beet farms in the EC
Austria	210,110	11,110	5	4
Belgium	67,180	14,760	22	6
Denmark	63,150	7,650	12	3
Finland	91,440	3,440	4	1
France	679,840	32,900	5	12
Germany	534,410	50,350	9	19
Greece	821,390	24,660	3	9
Ireland	147,830	3,740	3	1
Italy	2,315,230	61,950	3	23
Luxembourg	2,980	10	0	0
Netherlands	107,920	18,960	18	7
Portugal	416,690	350	0	0
Spain	1,208,260	23,840	2	9
Sweden	89,580	4,950	6	2
United kingdom	233,150	9,370	4	3
EC-15	6,989,160	268,040	4	100

Source: EU Farm Structure Survey 1997.

Farmers with a large beet area benefit more from the CMO Sugar than farmers with a small beet area. Table 11.8 indicates the average beet area per beet farm for each Member State. It appears that in the UK, France, Sweden, Finland, Denmark and Germany, beet farmers have relatively large beet areas per farm. Thus in those countries the benefits of the CMO Sugar per farm are larger than in the other Member States.

Table 11.8 Average beet area (ha) per beet farm in 15 Member States

Member state	Average beet area per beet farm)
Austria	4.50
Belgium	6.49
Denmark	9.08
Finland	10.39
France	14.48
Germany	9.97
Greece	1.80
Ireland	8.48
Italy	4.60
Luxembourg	1.00
Netherlands	6.02
Portugal	0.69
Spain	7.11
Sweden	12.21
United kingdom	20.90
Eu-15	7.95

Source: Eurostat 1997.

It is also interesting to look at the relative importance of sugar beet production (and thus of the CMO Sugar) for the beet farms per Member State. Table 11.9 shows the share of the total sugar beet area as a percentage of the total Agricultural Area of the beet farms (this is the specialisation indicator). It appears that the degree of specialisation is highest in Finland, Italy, Portugal, Greece, Belgium and the Netherlands. Beet farmers in those Member States are thus relatively more dependent on the CMO Sugar than the beet farmers in the other Member States.

Table 11.9 Beet area as a percentage of total Agricultural Area of all beet farms per Member State

Austria	11%	Italy	22%
Belgium	16%	Luxembourg	2%
Denmark	14%	Netherlands	16%
Finland	24%	Spain	11%
France	13%	Sweden	15%
Germany	9%	Portugal	19%
Greece	18%	United kingdom	14%
Ireland	13%		

Source EU Farm Structure Survey 1997.

11.6 Conclusions

Farm incomes per hectare are higher when the degree of specialisation in beet production is higher. It can be assumed that this positive effect is caused by the relatively high gross margin derived from beet production, which is attributable to the CMO Sugar for a great deal. This relationship could not be established for farm income per work unit.

In general small sugar beet farms have a higher level of specialisation in beet production than large sugar beet farms. Thus the income of small beet farms is more dependent on the CMO Sugar than the income of large beet farms.

The average size of sugar beet farms is higher than the average size of non-beet growing arable farms in most Member States and the incidence of sugar production is larger among the higher size categories of arable farms than the smaller size-categories. Thus on average sugar beet farms are larger than non-beet farms, but within the category of beet farms, the smaller ones are usually more specialised.

Net value added of beet farms per agricultural area and per work unit vary substantially across Member States, up to a factor of 2.3 and 6.8 respectively. Total net value added per hectare is high in Greece, Italy, Austria and the UK. Per work unit high net added values are recorded in the UK, France, Denmark, Sweden and Germany. Because of the absence of time series and the fact that many other factors than the CMO Sugar have an impact on income differences across Member States, no further conclusions can be drawn.

The ratios of farm income of beet farms and non-beet farms across the Member States vary from 0.89 to 4.46. High ratios are recorded for Denmark, Sweden and France, and to a lesser extent, Germany, while Greece, Spain, Austria and Finland have low ratios.

The percentages of all farmers in a particular Member State engaged in beet production is relatively high in Belgium, the Netherlands and Denmark. Thus in those Member States a large percentage of the farmers can benefit from the CMO Sugar.

In the UK, France, Sweden, Finland, Denmark and Germany, beet farmers have relatively large beet areas per farm. Thus in those countries the benefits of the CMO Sugar per farm are larger than in the other Member States.

The degree of specialisation in beet production per farm is highest in Finland, Italy, Portugal, Greece, Belgium and the Netherlands. Beet farmers in those Member States are thus relatively more dependent on the CMO Sugar than the beet farmers in the other Member States.

12 Income from C-beet production

12.1 Introduction

This chapter deals with evaluation question 2.5, which reads: *"Has the production of C-sugar had a favourable impact on the formation of income of sugar beet production?"* This chapter is linked to chapter 7 (sections 7.5 and 7.6), in which the external competitiveness of C-sugar is analysed, and with chapter 14, which analyses the regional allocation of C-sugar production according to its comparative advantage.

It is assumed that farmers aim at covering all the fixed costs of sugar beet growing through the production and sale of quota sugar. Then the production of C-sugar will contribute to the total income derived from sugar beet production when the C-beet price is higher than the variable costs of C-beet production. Thus the indicator used is the gross margin of C-beet production being equal to the C-beet price minus the variable costs of beet production. The judgement criteria is that the value of the gross margin has to be higher than zero. In that case the answer on the evaluation will be affirmative.

It should be noted that an affirmative answer on the evaluation question does not necessarily imply that C-beet production is financially attractive for the farmer. C-beet production will be attractive for the farmer when the gross margin of C-beet production (C-beet price minus variable costs of beet production) is higher than the gross margin of growing an alternative crop (see chapter 9).

The structure of this chapter is as follows. Some general observations of the volume and motives of C-beet production will be presented in section 12.2. Data on C-beet prices and the variable costs of beet production are presented in section 12.3. The gross margins and the profitability of C-beet production are analysed in section 12.4. Conclusions are presented in section 12.5.

12.2 Production of C-beets

As shown in chapter 7, most C-sugar is produced in France and Germany. The level of C-sugar production fluctuates substantially from one year to another, while the pattern of fluctuations of the individual Member States is quite similar. Decreases in C-sugar production have occurred during the years 1982/1983; 1989-1991; 1993/1994 and 1997/1998.

The main explanatory variables accounting for the volume of C-sugar production are weather conditions and world market prices. France is frequently mentioned as the Member State where the influence of the world market price on C-sugar production is most pronounced. C-production in the Netherlands is associated with the mixed price system for a quantity of beets equal to the total of the A and B quotas plus a mark up of 6% (which will become C-quota beets).

A distinction can be made between unintentionally and intentionally produced C-sugar.

Unintentional C-sugar
Farmers are very keen on using the entire volume of their "delivery rights" of beets to be processed into quota sugar. Therefore farmers plant as much hectares of beets as necessary to produce sufficient beets to use all delivery rights even in case of a relatively poor yield. In case the yield turns out to be average or good, the farmer will produce more than his delivery rights; the surplus being 'unintentional' C-Sugar. On average the volume of the unintentional C-sugar production is equal to about 6% of the quota production. That volume is hardly affected by the C-sugar price.

Intentional C-sugar
In some regions of the EC farmers will grow C-sugar intentionally because they expect that the difference between the producer price and the variable costs of C-beet production is higher than what can be earned by growing alternative crops[13]. The remainder of this chapter will be focused on the "intentional" C-beet production only (because the "unintentional" C-beets will be produced anyway, irrespective of the financial revenues).

12.3 Prices and variable production costs of C-beets

12.3.1 Prices of C-beets

Most factories pay the farmers a C-beet price (expressed in white sugar equivalents) equal to 60% of the world market price for white sugar[14]. Thus the C-beet price fluctuates from one year to another along with the world market price. The world market prices of sugar over the period 1981-1999 as well as the C-beet prices are shown in table 12.1 and figure 12.1. It appears that during the 1990s the C-beet price has varied from about 18 to 28 ECU per tonne of beets.

[13] Another motive of farmers for the intentional production of C-sugar could be the improvement of the capacity utilisation of a co-operatively owned sugar factory. In that case the farmers benefit (also) from the improved financial performance of the factory.

[14] Factories with a substantial over-capacity might pay higher prices (i.e. higher than 60% of the world market price) to beet farmers in order to reduce their average production cost and hence to improve their profitability (or to reduce losses).

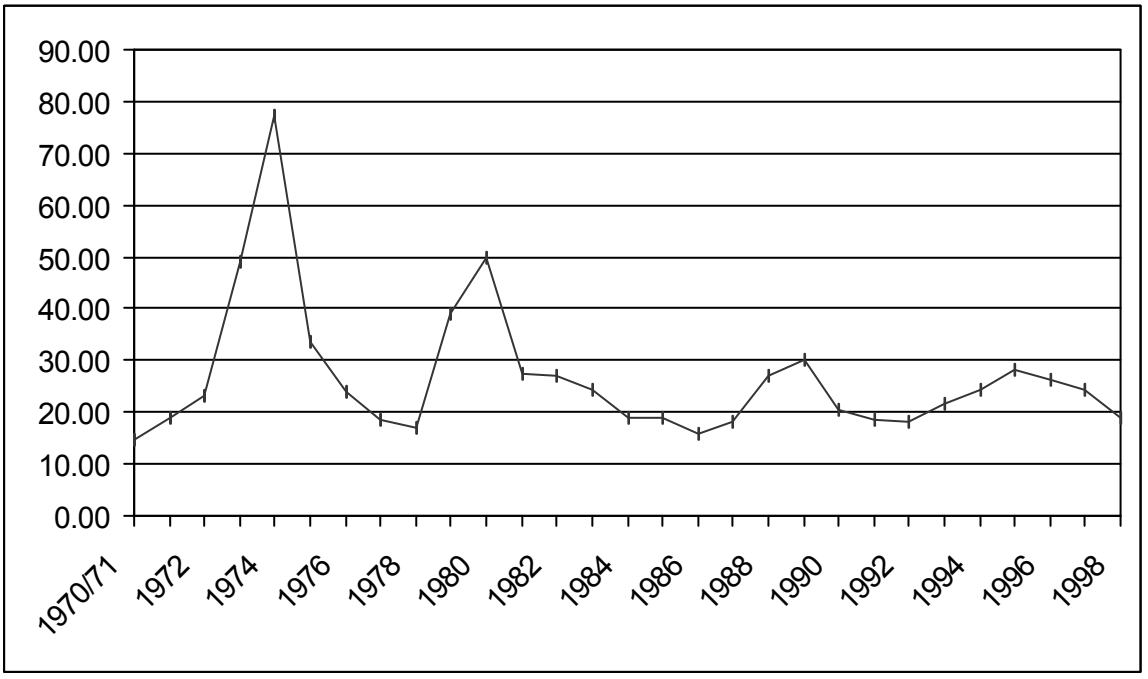
Table 12.1 World market prices of white sugar and C-beet prices

Year	World market price (ECU/tonne w.s.e.)	C-Beet price (ECU per tonne of beets)
1981	286.5	27.51
1982	280.0	26.88
1983	251.9	24.18
1984	198.0	19.01
1985	195.4	18.76
1986	164.5	15.79
1987	187.4	17.99
1988	283.7	27.23
1989	312.9	30.04
1990	211.5	20.30
1991	194.4	18.66
1992	189.5	18.19
1993	227.1	21.81
1994	252.4	24.23
1995	294.2	28.25
1996	272.2	26.13
1997	254.8	24.46
1998	196.5	18.87

Notes:

- World market prices are the FOB prices of the Paris stock market as published by F..O. Licht (1999).
- C-beet prices based on 16% sugar content and 60% of the world market price of white sugar.

Figure 12.1 C-beet prices in ECU per tonne of beets



Source: See figure 12.1.

12.3.2 Variable costs of beet production

Based on the data presented in annex F, the variable costs of beet production are estimated at (reference period 1994-1996):

- 19.4 ECU/tonne in Germany;
- 7.4 ECU/tonne in France (excluding contract work);
- 8.3 ECU/tonne in the Netherlands (excluding contract work);
- 24 ECU/tonne in the UK.

Estimates of the variable costs of beet production can also be derived from a publication of Démazure regarding a study of production costs in some regions of the EC regarding the period 1990-1996 (see table 12.2). Variable costs in the six regions studied were in the range of 12 to 18 ECU/tonne in the period 1990-1996. These results are fairly consistent with those based on the figures of annex F.

Table 12.2 Estimates of sugar beet production costs

Region	Yield (tonne/ha)	Direct cost (ECU/ha)	Contract work And/or costs of own machines (ECU/ha)	Fixed cost (excl. mechanisation) (ECU/ha)	Variable cost (ECU/tonne of beet)
Netherlands	56.3	< 500	650	1350	20
Danish Islands	46.8	< 500	250	700	16
East Anglia UK)	46.6	< 500	250	550	16
Germany	50.5	550	350	700	18
Belgium	59.5	600	250	450	14
France	68.4	600	250	450	12

Sources: Eurostat (yields) and Démazure, L. (1999) (production costs).

Note: Variable costs per tonne (last column) include the "costs of contract work and or own machines per hectare" and part of the direct costs per hectare. The last column is based on the assumption that a farmer does not use own machines but hires contractors to carry out the mechanised activities. A farmer who uses his own machines will have lower variable costs and higher fixed costs.

12.4 Gross margins and profitability of C-beet production

The gross margins of C-beet production can be calculated by subtracting the variable costs from the C-beet price. C-beet prices in the range of 18 to 28 ECU/tonne and variable costs were in the range of 12 to 18 ECU/tonne during the 1990s (see previous section). Thus in most Member States the gross margin of C-beet production was positive during the 1990s and C-beet production contributed to the total income derived from beet production. However in 1998 the gross margin of C-beet price had dropped to close to zero and had possibly become negative in some regions.

However, the decision of a farmer whether or not to grow C-sugar (intentionally) does not depend on the question whether the gross margin from growing C-beets is positive, but whether that gross margin is higher than what can be earned from growing an alternative crop. The gross margins of two alternative crops have been estimated in

chapter 9: about 630 ECU/ha for wheat in the Northern Member States and about 1380 ECU/hectare in the Southern Member States (see table 9.7). In order to get at least the same gross margin from C-beet production, and assuming that the C-beet yield is 55 tonnes/hectare, the gross margin per tonne of C-beet has to be at least about 12 ECU/tonne in case wheat is the alternative crop, and 25 ECU/tonne in case maize is the alternative crop. When the marginal cost of C-beet production is on average 16 ECU/tonne, then the C-beet price has to be at least equal to 28 ECU/tonne when wheat is the alternative crop and 41 ECU/tonne when maize is the alternative crop. In view of the fact that during the 1990s C-beet prices varied from 18 to 28 ECU/tonne (see table 12.1, it can be concluded that, when using rough estimates of EC averages, C-beet production was less attractive than growing wheat or maize.

It is also interesting to have a look at the figures of France, which is the most outstanding C-sugar producer in the EC. The basic data regarding France are:

- gross margin of wheat as the alternative crop: 637 ECU/hectare (see table 9.7);
- beet yield: 68.4 tonnes/hectare (see table 12.2);
- variable costs of C-beet production: 12 ECU/tonne (see 12.2).

These basic data imply that in France the gross margin of C-beets has to be higher than 9.4 ECU/tonne and that the C-beet price has to be higher than 21.4 ECU/tonne, in order to make growing C-beets more attractive than wheat. During the period 1993-1997 C-beet prices were indeed higher than 21.4 ECU/tonne, but not in 1998 (see table 12.1).

12.5 Conclusions

Unintentional C-beet production always contributes to the total income derived from beet production. Unintentional C-beet production is the result of the strategy of a farmer to produce always up to the total of his delivery rights, even in years with a low yield. Any surplus produced on the hectares planted to meet the delivery rights can be considered as an additional income with hardly any additional costs. The volume of this unintentional beet production is on average in the order of 6% of the sugar quotas.

In the case of intentionally produced C-sugar, the C-beet price the gross margin has to be higher than the variable costs of beet production in order to contribute to total beet income of the farmer (Assuming that all fixed costs are covered by the revenues from the production of quota-beets. In most Member States the gross margin of C-beet production was positive during the 1990s and C-beet production contributed thus to the total income derived from beet production. However in 1998 the gross margin of C-beet price had dropped to close to zero and had possibly become negative in some regions.

The decision of a farmer whether or not to grow C-sugar (intentionally) depends on the question whether the gross margin from growing C-beets is higher than what can be earned from growing an alternative crop. When using average EC figures, it appears that during the 1990s gross margins of C-beet production were mostly smaller than the gross margins of wheat or maize production. However, when analysing the figures of a typical C-beet producer like France, it appears that the gross margin of C-beet

production was higher than the gross margin of wheat production in the years 1993 to 1997, but not in 1998 due to the decreased C-beet price caused by the decline of world market prices.

13 Concentration of sugar beet production

13.1 Introduction

This chapter deals with evaluation question 3.1, which *reads "Has the CMO increased the concentration of sugar beet production, in particular in relation to regional distribution, size of holding and degree of specialisation?"* The indicators and judgement criteria for answering this question are presented in table 13.1.

Table 13.1 Indicators and judgement criteria

Dimension of concentration	Indicator	Judgement criteria
Regional concentration	Production levels per region or Member State.	Significant and continuous relative increase of production in some regions or Member States; a decrease in others.
Concentration according to farm size	Average farm size.	Increase of average farm size of beet farms higher than increase of average farm size of all arable farms.
Concentration according to degree of specialisation	Percentage of total arable land used for beet cultivation (per farm).	Increase of the average level of specialisation of beet farms.

This chapter is composed as follows. Section 13.2 deals with the impact of the CMO Sugar on regional concentration of production, section 13.3 with the impact on concentration according to farm size and section 13.4 with the impact on concentration according to degree of specialisation. Final conclusions are presented in section 13.5.

13.2 Effect of the CMO Sugar on regional concentration of beet production

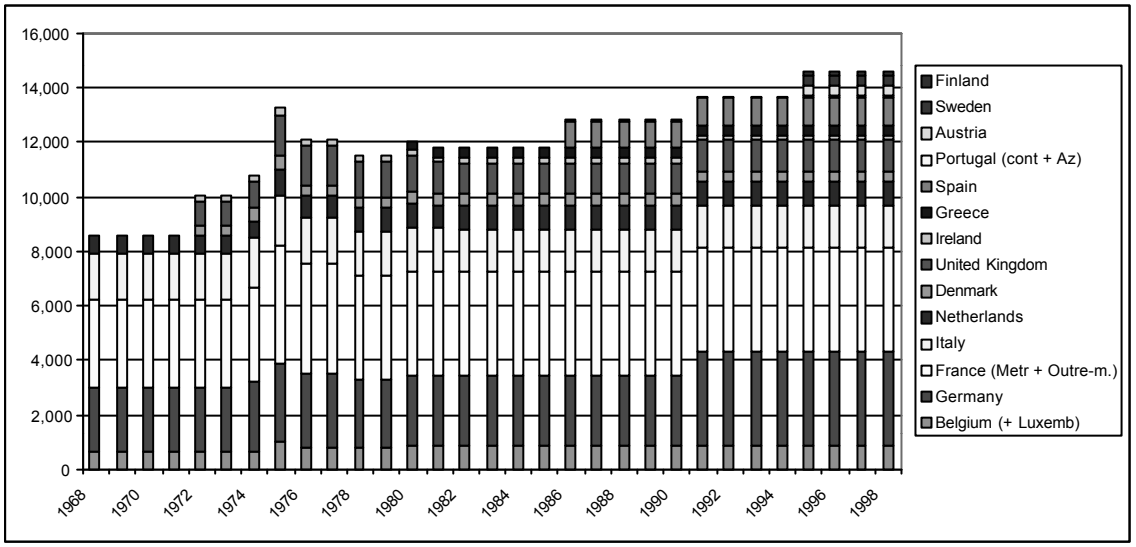
There are four factors related to the CMO Sugar that may have had an impact on regional distribution and concentration of beet production. These factors are:

- The allocation of quota across Member States, factories and the associated system of beet delivery rights;
- Share of A/B quota per member state;
- Regional premiums;
- National aid.

The allocation of quota across Member States, factories and the associated system of beet delivery rights

The CMO Sugar has fixed the levels of A and B quota per Member State. The share and absolute amounts of those quotas have not changed very much over time. Figure 13.1 presents the development of quotas per Member State since 1968. It shows that increases of the total of the quotas were mostly caused by the accession of new Member States. Since 1981, the quotas per Member State have not been increased any more.

Figure 13.1 Development of sugar quota ('000 tonnes, A+B) per member state since 1968



The distribution of the quota across the factories within each Member State is the responsibility of the Member State itself. Generally, also that distribution has hardly been changed; at least not over the last 10 years.

The distribution of quotas (or beet delivery rights) to individual farmers is usually based on historic relations between the factory and the farmers. Generally, the delivery rights of a particular year are equal to an average level of beet production during a certain reference period. Farmers with a more or less stable production have more or less assured delivery rights. Only farmers with a significant decrease of production during more than one year might loose part of their rights. In practice, this happens seldom. The most common reason why delivery rights are transferred is the closure of a particular farm. In some cases, the delivery rights then go back to the factory, which may reallocate them to the other beet farmers. In other cases, the delivery rights are transferred to the farmer who buys the land. Although the CMO Sugar provides the framework for the relations between beet producer and factory, the precise content of the contracts is beyond the sphere of influence of the CMO Sugar.

The share of the B quota in the total of the quota per Member State

The share of the B-quota in the total of the quotas of a Member State determines the average price that farmers receive for their produce[1]. At the time the quotas were fixed, A-quotas were considered to more or less equal to the national sugar consumption, whereas B-quotas were considered as "specialisation quotas". Member States with a perceived comparative advantage for beet production (Germany, Denmark, France and the Netherlands) got a relatively large B-quota (as % of the A-quota). The Southern Member States (apart from Italy) and the UK were allocated B-quota of 10% over A quota. Those shares of B over A quota did not change very much over time. Table 13.2 presents the present shares of B-quota in the total quota per Member State.

Table 13.2 Share of B-quota in total quota (A and B) per Member State

Country	%	Country	%B
Germany	24%	Greece	9%
Denmark	23%	Ireland	9%
France (Metropole+overseas terr.)	21%	United Kingdom	9%
Netherlands	21%	Portugal (continent + Azores)	9%
Austria	19%	Sweden	9%
EU	18%	Finland	9%
Belgium (+ Luxembourg)	18%	Spain	4%
Italy	16%		

Due to the high production levies on B-quota sugar, the average revenue for one tonne of quota sugar (A and B) is lower in Member States with a relatively high B-quota than in Member States with a relatively low B-quota. For example, the average beet revenue in Greece would be 6% higher than in Germany, provided that both Member States produce their full quota of A and B beet[2].

National Aid

Within the context of the CMO Sugar, Italy, Spain and the UK were allowed to provide specific national aid to their sugar sector (see chapter 2). Assuming that 73% of the support has been transferred to the farmer (CIBE, 1989)[3], this has lead to gross beet revenues which were some 30% higher than the minimum set by the CMO Sugar. Although the national aid programmes are being phased out (with the exception of Southern Italy), is has certainly contributed to maintaining and/or expansion of beet production in the regions concerned.

Regional premiums

Regional premiums are in principle only attributed to regions with a sugar deficit (see chapter 2). The objective is to assure that the market premium in the deficit regions

1 For a detailed description of the meaning of A and B quota, refer to Chapter 2.

2 Irrespective of other factors, including national support, regional premiums and the exchange rate effect (difference between green ECUs and financial ECUs).

3 The precise contents of the National Aid arrangements are not fully transparent.

accrues to the farmers. The level of the premium is supposed to be more or less equal to the cost of transport of sugar from the nearest surplus region.

Effects of the four factors

The effects of the four factors can be summarised as follows:

- The original allocation of B-quota favoured regional specialisation. Subsequently, the quota system has fixed the status quo in terms of distribution of beet production across Member States, and to a certain degree also within the Member States (quotas allocated to firms with fixed production locations; delivery rights given to farmers, which are non-transferable);
- differences in A/B quota ratios results in lower gross revenues per tonne for beet production in Member States with a comparative advantage in beet production;
- Regional premiums and national aid programmes provide an additional incentive for beet production in regions, which do not have a comparative advantage in beet production.

Thus, apart from the original allocation of B-quota, the CMO Sugar does not stimulate regional specialisation. In fact it blocks (further) regional specialisation and protects beet production in regions less suited for beet production (e.g. Southern Italy, Spain and Portugal). There is one example of a region (Department) in France where beet production has disappeared.

Counterfactual analysis

A number of studies have been done to assess what would happen if quota were tradable between regions, in order to allow a shift of the quotas to regions with high beet productivity. The objective of most of the studies was to assess the overall economic benefit of such a more efficient allocation of production. Although these studies start from different premises and apply different methodologies, some general conclusions can be drawn from it:

- The main determining factor of the present regional distribution of beet production is the presence of a factory, with attached fixed quota;
- If a farmer has obtained delivery rights, he will fully utilise them, because beet is one of his most profitable enterprises;
- If the quota between factories were tradable, there would be a significant regional shift of beet production; Beet production in France and Southern Germany would most likely increase. The production in Southern Member States would probably cease. Also in the Benelux, beet production might decrease. Some examples of outcomes of studies are listed in table 13.3.

Table 13.3 Results of some studies on the regional impact of a liberalised trade of sugar quotas

Study	Scenario	Outcome
Vierling (1996)	Fully tradable quotas in the EC (between Member States and factories)	Increase of beet area in France and Southern Germany (by 40% of beet volume). Reduction in Italy, England and Ireland (up to 45%).
Mahler (1994)	Tradable quotas among factories in Germany	Concentration of beet production in Southern Germany.
Bureau et. al (1997)	Fully tradable quotas in the EC (between Member States and factories)	Shift form the South of the EC and Benelux towards France, Germany and Denmark. Plus concentration within Member States (50% shift in France).
Genton & Réquillart (1993)	Trade of 30% of quotas	Shift from Italy and Spain to France and Germany.
Renwick & Sturgess (1998)	Tradable delivery contracts within the UK (freely allocated among factories)	Absolute regional production may change by +/- 20%. Regional share in overall beet production changes by 2-4 % per region. (Large beet farmers would expand. Small beet farmers would sell their delivery rights).
Renwick & Sturgess (1998)	Tradable delivery contracts in the UK. Quota for factories remain constant.	No regional shift (by definition). Leasing price varies 50% according to region.

Some additional remarks should be made on these studies. Most of them look at opportunity costs at farm level as the decisive rule for production allocation. Furthermore, the models are static, as they do not take structural changes in the supply chain into account. The total impact of allowing trade in sugar quota will be the result of a complicated dynamic process of substitution between commodities, consequential relative price changes and a response of the industry. However, the studies provide some indications of possible changes of the regional distribution of sugar beet production when trade in sugar quotas will be liberalised.

13.3 Effect of the CMO on concentration according to farm size

The data of table 11.1 revealed that the average size of beet farms is higher than the average size on non-beet farms. Furthermore, table 11.2 shows that the percentage of farms involved in beet production is higher in the large-farm-categories than in the small-farm-categories. Apparently there is a (positive) link between farm size and incidence of beet growing, but it is not clear whether there is a causal relationship with the CMO Sugar. There are also no time series available to evaluate whether the above mentioned link has strengthened or weakened over time.

The sole time series available, and relevant for the issue discussed here, are:

- From 1975 to 1995, the average size of arable farms has increased by some 2.1% per year (see annex F, table F.13).
- From 1990-1997, the average size of farms engaged in sugar beet production has increased by 0.2% per year (see annex F, table F.14).

Because the reference periods are different no conclusions can be drawn.

It has to be concluded that the second indicator mentioned in section 13.1 could not be used because insufficient data are available to evaluate whether the average farm size of beet farms has increased faster or slower than the average farm size of all arable farms.

13.4 Effect of the CMO on concentration according to degree of specialisation

From 1990 to 1997, the average beet area per beet growing farm increased by 1.9% per year (see annex F, table F.18) while the total agricultural area of beet growing farms increased by 2.4% per year (see annex F, table F.14). As a consequence the average level of specialisation[4] has decreased slightly in the EC from 13.1% to 12.6% (see annex F, table F.19). This does not mean that beet production shifted slightly to less specialised farms. What happens is that all beet growing farms become a little bit less specialised because, given the fixed delivery rights and increasing yields per hectare, farmers will use a smaller percentage of their total land for beet cultivation. Thus, as regards this indicator, the CMO Sugar has had a slightly negative impact on the concentration of production in terms of degree of specialisation.

Some more background information on the degree of specialisation is provided in annex K.

13.5 Conclusions

At the general level the CMO Sugar has not contributed, and can not contribute to an increase of the concentration of beet production (e.g. in relation to regional distribution, size of holding and degree of specialisation) because quotas are fixed per Member States and subsequently also more or less fixed per beet processing firm, while beet delivery rights are fixed per farm. These systems prohibit any structural change in production patterns, including concentration.

The original allocation of B-quota favoured regional specialisation. Subsequently, the quota system has fixed the status quo in terms of distribution of beet production across Member States, and to a certain degree also within the Member States.

The price incentive system of the CMO Sugar did not favour regional specialisation; to the contrary. Gross revenues per average tonne of quota beet were highest in regions less suitable for beet production due to a more favourable B/A quota ratio, regional premiums and national aid programmes.

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4 The indicator of the degree of specialisation of a farm is the percentage of total arable land used for beet cultivation.

There is a (positive) link between farm size and incidence of beet growing, but it is not clear whether there is a causal relationship with the CMO Sugar. There are also no time series of data available to evaluate whether that link has strengthened or weakened over time.

The average level of specialisation of beet farms, in terms of percentage of agricultural land for beet cultivation, has decreased slightly in the EC from 13.1% to 12.6% (from 1990-1997). This is caused by the fact that, given the fixed delivery rights and increasing yields per hectare, farmers will use a smaller percentage of their total land for beet cultivation. Thus the CMO Sugar has had a slightly negative impact on the concentration of production in terms of degree of specialisation.

14 Concentration in the sugar manufacturing industry

14.1 Introduction

This chapter deals with evaluation question 3.2 which reads **"***Has the common organisation of the sugar market increased the concentration of manufacture and refining (including the imported raw sugar-refining sector), and how has it affected employment in the sugar sector?*

The impact of the CMO Sugar on concentration of the EC sugar manufacturing and refining industry will be approached in two steps. First, the facts and figures on concentration will be presented, both at the level of combining and enlarging plants (concentration of physical production locations) and at the level of companies (concentration of ownership through mergers and take-overs). Second, it will be analysed which factors have been primarily responsible for the concentration process in the EC sugar industry. Third, the impact of the CMO Sugar is assessed on the basis of logical reasoning and comparison with developments in other developed countries with a similar state of economic development (benchmarking).

Indicators used in measuring concentration in this chapter are:
- the numbers of companies and plants and their average capacity (sections 14.3 and 14.4);
- evolution of the number of plants per capacity category (section 14.5);
- the Herfindahl-Hirschman Index (HHI, see section 14.7).

The content of this chapter is as follows. Section 14.2 starts with a number of theoretical considerations on concentration. Concentration in terms of reduction of number of sugar producing companies and number of sugar processing plants is analysed in the sections 14.3 and 14.4 respectively. The economies of scale, which can be realised when operating larger plants are analysed in section 14.5. In section 14.6 some observations are made on the expansion of sugar processing companies towards Eastern Europe and in the form of diversification of activities. In section 14.7 a comparison is made between the degree of concentration in the sugar sectors in Australia, the USA and the EC. Observations on employment are made in section 14.8. Conclusions are presented in section 14.9.

14.2 Concentration and scale of production

The search for per-unit cost reduction can be regarded as an important driving factor behind the concentration and rationalisation of the sugar manufacturing industry. Reduction of overall costs per unit of output can be accomplished by increasing the capacity per processing plant and benefiting from *economies of scale*. In practice, increase in capacity can be reached in two ways. Companies operating more than one processing plant have the option to close one or more plants and to concentrate

production in the remaining ones (*internal concentration*). Concentration would normally occur up to the point that the higher average per-unit costs of transporting beet from farmer to the plant as a result from the larger distance between the processing plants start to outweigh the per-unit cost reduction reached through the increased economies of scale. Companies operating only one plant can either merge with another company, or try to purchase one or more other existing plants, so as to combine plants and enlarge their scale of production (*external concentration*). The process of combining plants (concentration of production) has been enhanced by the decrease of the costs of transporting beets, which has made it economically attractive to enlarge the catchment area of a particular plant.

Relevant concepts in measuring economies of scale and concentration
The minimum efficient scale (m.e.s.) of production is the smallest output at which average costs are minimised (Besanko et al., 1996:77). The stronger the economies of scale in a given production process, the higher the m.e.s., and the smaller the number of plants which can supply the products for a given volume of demand. In sugar processing potentially large economies of scale exist: processing costs are lower when investment costs can be spread over a larger output. The economies of scale has become even stronger during the last two decades because of the development of high capacity processing equipment. As a consequence the m.e.s. of production has increased and companies have started to increase the capacity of their plants.

Concentration of production will generally occur when the m.e.s. of production increases while supply and/or demand do not increase (Brozen 1982: 56-57). This is exactly what happened in the sugar processing industry. Sometimes regulatory constraints will impede concentration of production (see Brozen, 1982: 118-19). Apparently this has not been the case in the European sugar sector (see sections 14.3 and 14.4).

14.3 Concentration of sugar processing companies

During the last 10 to 15 years a number of large sugar processing companies has emerged, such as Eridania Béghin-Say, Südzucker and Danisco, each operating a large number of sugar plants. In the UK sugar processing and refining was concentrated already for more than 30 years: British Sugar controlling sugar beet processing and Tate & Lyle raw cane sugar refining. Apart from these giants there are still quite a number of medium size and even a few small size (local) sugar processing companies in the EC. Two examples of the latter category are the sugar companies of Erstein (F) and Fontenoy (B), which each own one single plant only.

The trend towards concentration of ownership is illustrated in table 14.1. From 1988/89 to 1998/99, the number of sugar processing and refining companies in the EC-15 decreased from 95 to 64; i.e. a reduction of 33%.

Table 14.1 Number of sugar processing and refining companies in the EC

	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99
A	1	1	1	1	1	1	1	1	1	1	1
B	9	7	11	11	9	7	7	7	5	5	5
DK	2	1	1	1	1	1	1	1	1	1	1
SF	2	2	1	1	1	2	2	2	2	2	2
F	31	31	30	30	30	29	26	26	22	22	22
D	17*	17*	12*	16	14	15	15	15	14	13	13
ELL	1	1	1	1	1	1	1	1	1	1	1
IRL	1	1	1	1	1	1	1	1	1	1	1
ITA	16	14	12	12	12	12	11	10	9	9	10
NL	2	2	2	2	2	2	2	2	2	2	2
P	3	2	2	2	2	2	2	-	-	-	-
E	7	7	6	5	5	4	4	4	4	4	3
S	1	1	1	1	1	1	1	1	1	1	1
UK	2	2	2	2	2	2	2	2	2	2	2
EC-15	95*	89*	87*	86	82	80	76	73	65	64	64

*: without ex-DDR
Austria (A), Finland (SF) and Sweden (S) joined the EC-15 in 1995.
Source: CEFS, Sugar Statistics, p.22.

These figures do not yet illustrate the concentration process in full. Some of the companies listed in table 14.1 are part of the same large holding company or business group. For instance, Südzucker has a controlling interest in Raffinerie Tirlemontoise (B) and in Agrana (A). The group Eridania Béghin-Say comprises Eridania in Italy and Béghin-Say in France. The Danisco Group produces quota sugar in Denmark, Sweden, Germany, and recently also in Finland (previously Cultor). Saint Louis Sucre (previously named Générale Sucrière) has a 20.5% interest in the largest Spanish sugar producer Azucarera Ebro Agricolas.

In 1998, sugar processing in the EC was controlled by 45 business groups, of which two-third were private companies, and one-third co-operatives or companies whose shares were held by the sugar beet suppliers (CIBE-CEFS 1998). The 10 largest groups produce more than 70% of all quota sugar and the 4 largest sugar groups account for almost 50% of EC sugar production. The average sugar production per company per year in the EC-15 increased from 146,495 tonnes in 1988/89 to 256,328 tonnes in 1998/99. Thus it can be concluded that sugar processing in the EC is fairly concentrated in terms of ownership of processing plants. This concentration has increased substantially during the last ten years.

The concentration of ownership is even more striking at the national level. In 8 of the 14 sugar producing EC Member States the entire national sugar quota is produced by one company only (see table 14.2). In another three Member States 62-80% of all sugar is produced by one company. Only in France, Germany and Italy, the largest company controls less than half of the national sugar production.

Table 14.2 Number and capacity of beet processing plants in the EU member states

Member State	Total number of plants	Total capacity of the plants (tonnes of beet per day)	Largest company	Number of plants of the company	Capacity (tonnes of beet per day)	Capacity largest company as % of total capacity
A	3	30,500	Agrana	3	30,500	100%
B	8	83,000	Tirlemont	5	59,000	71%
D	34	312,200	Südzucker	14	129,200	41%
DK	4	39,200	Danisco	4	39,200	100%
E	17	109,800	Az.EbroAgrí.	14	88,100	80%
ELL	5	32,100	HIS	5	32,100	100%
F	41	402,000	Béghin-Say	10	125,500	31%
IRL	2	16,000	Greencore	2	16,000	100%
ITA	23	235,500	Eridania	7	73,000	31%
NL	5	69,000	Cosun	3	43,000	62%
P	1	5,000	DAI	1	5,000	100%
S	4	28,300	Danisco	4	28,300	100%
SF	3	16,000	Danisco	3	16,000	100%
UK	9	67,900	British Sugar	9	67,900	100%

Source: WVZ, Sugar Economy 1997/98.

14.4 Concentration and scale enlargement of sugar processing plants

From 1988/89 to 1998/99, the number of sugar processing plants decreased by 26%, from 208 in 1988/89 to 154 in 1998/99, not taking into account the original number of plants in the former GDR (see table 14.3). The average annual decline of the number of plants was 4%.

Table 14.3 Number of sugar processing plants in the EC

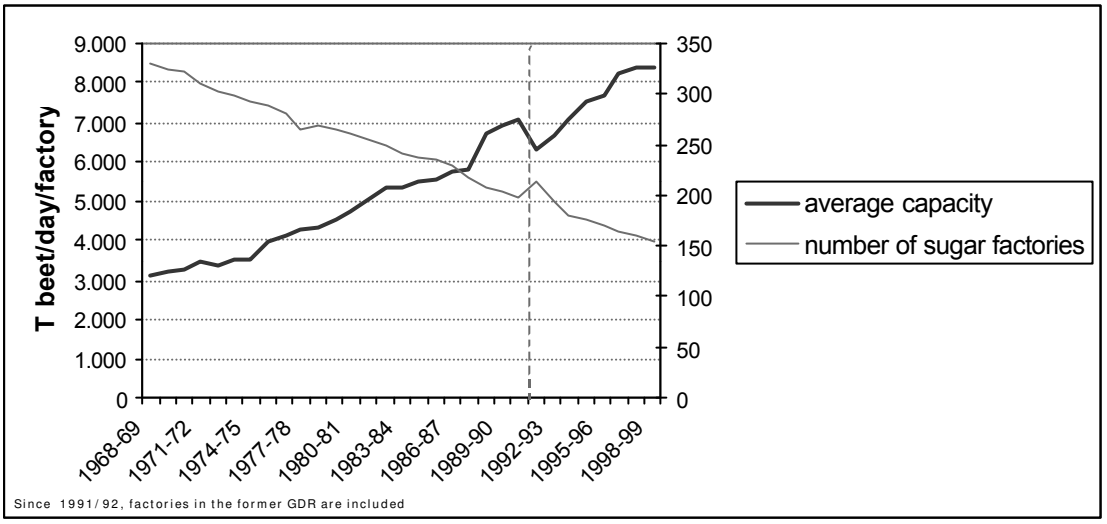
*	1968 -69	1975 -76	1981 -82	1982 -83	1983 -84	1984 -85	1985 -86	1986 -87	1987 -88	1988 -89	1989 -90	1990 -91	1991 -92	1992 -93	1993 -94	1994 -95	1995 -96	1996 -97	1997 -98	1998 -99
A	7	7	6	6	6	6	6	5	5	3	3	3	3	3	3	3	3	3	3	3
B	22	20	15	15	15	15	14	14	14	12	12	11	11	9	9	9	9	8	8	8
D	59*	52*	49*	48*	48*	47*	46*	44*	42*	38*	37*	37*	60	52	43	42	39	36	34	34
DK	7	6	6	6	6	6	6	6	6	6	6	5	5	4	4	4	4	4	4	4
E	36	35	32	30	29	27	25	25	24	24	24	24	24	22	21	21	20	18	17	15
ELL	3	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
F	77	68	57	57	57	56	55	54	54	52	50	50	48	48	46	46	45	45	42	40
IRL	4	4	4	4	4	4	4	4	3	3	2	2	2	2	2	2	2	2	2	2
IT	74	54	47	45	38	37	40	39	33	33	33	31	29	25	24	23	23	23	23	23
NL	12	11	10	10	10	10	10	10	9	8	8	7	7	6	6	6	6	5	5	5
S	7	7	7	7	7	7	7	7	7	7	7	6	6	5	4	4	4	4	4	3
SF	5	4	4	4	4	4	4	4	4	4	4	4	3	3	3	3	3	3	3	3
UK	18	17	13	13	13	13	13	13	13	13	12	12	10	10	10	9	9	9	9	9
EC15	331*	290*	255*	250*	242*	237*	235*	230*	219*	208*	203*	197*	213	194	180	177	172	165	159	154

* excluding plants in the ex-DDR
- Totals include plants in the present EC member states during the years when they were not yet member of the EC.

Source: CEFS, Sugar Statistics, p.20.

The average capacity of the processing plants increased along with the decrease of the number of plants. The average throughput per processing plant increased by 25%, from over 6,700 tonnes of beets per processing plant per day in 1988/89 to 8,400 tonnes of beets per plant per day in 1998/99 (see figure 14.1). The increase of the average throughput was slightly less than the reduction of the number of plants. Consequently, overall sugar production has decreased slightly in the EC.

Figure 14.1 Evolution of the average throughput per processing plant and the number of sugar processing plants in the EC-15 during the period 1968-1998



Source: CEFS, Sugar Statistics, p.20, 26, 27.

In the EC average actual throughput per processing plant is now largest in the Netherlands (10,826 tonnes per day (t/d)) and Austria (10,730 t/d), and smallest in Greece (6,049 t/d) and Finland (5,357 t/d). (See table 14.4).

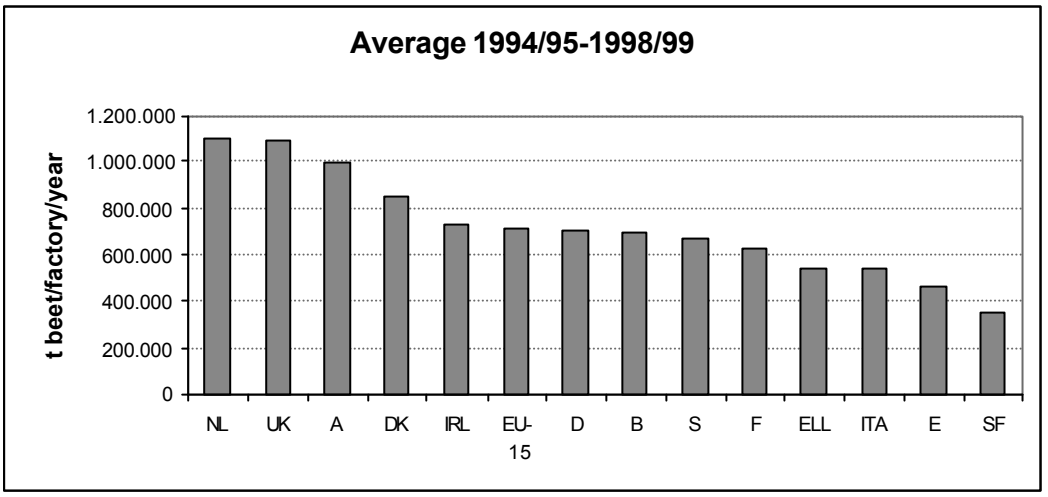
Table 14.4 Average throughput per sugar processing plant (in tonnes of beets per day)

	1968-69	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99
A	4,165	5,723	5,736	5,436	5,935	5,829	6,227	6,736	8,160	5,581	8,475	8,697	9,142	9,627	9,948	10,158	10,143	10,497	10,730
B	2,736	4,841	5,639	5,660	5,530	6,152	6,372	6,407	7,559	7,051	7,619	7,415	8,795	8,904	8,821	8,979	9,717	9,895	8,781
D	2,781	5,090	5,358	5,269	5,570	5,821	6,078	6,810	6,849	7,193	7,251	5,380	6,157	7,270	7,733	8,365	8,669	9,274	9,232
DK	4,757	6,683	7,117	6,783	6,700	6,683	6,778	7,117	7,400	7,467	8,240	8,240	9,125	9,381	9,478	9,143	8,909	9,448	9,658
E	1,689	3,135	3,265	3,421	3,667	3,960	4,000	4,283	4,342	4,342	4,346	4,375	4,723	4,952	5,190	5,400	5,667	6,118	7,000
ELL	2,596	4,741	4,808	4,840	5,300	5,600	5,600	4,033	4,760	5,392	4,919	5,322	5,387	5,320	5,325	6,251	6,347	6,049	6,049
F	2,831	6,807	7,421	7,456	7,804	7,455	7,500	6,167	7,943	8,480	8,460	7,242	6,790	7,167	7,761	7,621	9,289	8,333	8,375
IRL	3,056	3,525	3,825	4,175	4,125	3,950	4,238	6,037	5,548	8,090	7,574	7,784	7,667	7,698	8,172	8,115	8,298	8,410	8,735
ITA	3,011	4,543	4,650	4,937	4,031	5,133	6,157	5,764	6,412	6,733	6,661	6,414	6,560	6,667	7,304	7,043	7,261	8,435	8,000
NL	4,675	7,600	7,900	7,700	8,000	8,000	8,350	8,889	10,188	10,500	11,736	11,738	12,700	12,396	12,500	11,667	13,298	13,200	10,826
S	3,386	4,014	4,186	4,143	4,343	4,357	4,288	4,223	4,349	4,494	4,882	4,967	5,620	6,300	6,525	6,750	6,681	6,998	8,516
SF	1,673	3,257	3,237	3,612	3,748	3,759	3,700	3,414	4,022	4,064	4,137	4,697	4,647	4,913	4,913	5,425	4,698	5,477	5,357
UK	3,406	5,639	6,140	6,154	6,235	6,016	5,850	6,060	5,948	6,118	6,084	6,650	6,864	6,791	7,635	7,722	7,466	7,935	7,915
EU 15	3,135	5,046	5,329	5,353	5,461	5,593	5,780	5,842	6,704	6,950	7,072	6,315	6,630	7,095	7,534	7,659	8,277	8,432	8,400

Note: beets processed per Member State, divided by average campaign length and number of processing plants.
Source: CEFS, Sugar Statistics, p.20, 26

Total throughput per processing plant per campaign is of course influenced by the campaign length. Total throughput per plant per campaign is highest in the Netherlands, the UK and Austria (see table 14.5). The plants in the UK do not have high daily throughputs but their annual throughput is high due to the long duration of the campaign. The average throughput per campaign per processing plant for the entire EC amounts to 709,800 tonnes (average of the last 5 campaigns 1994/95-1998/99).

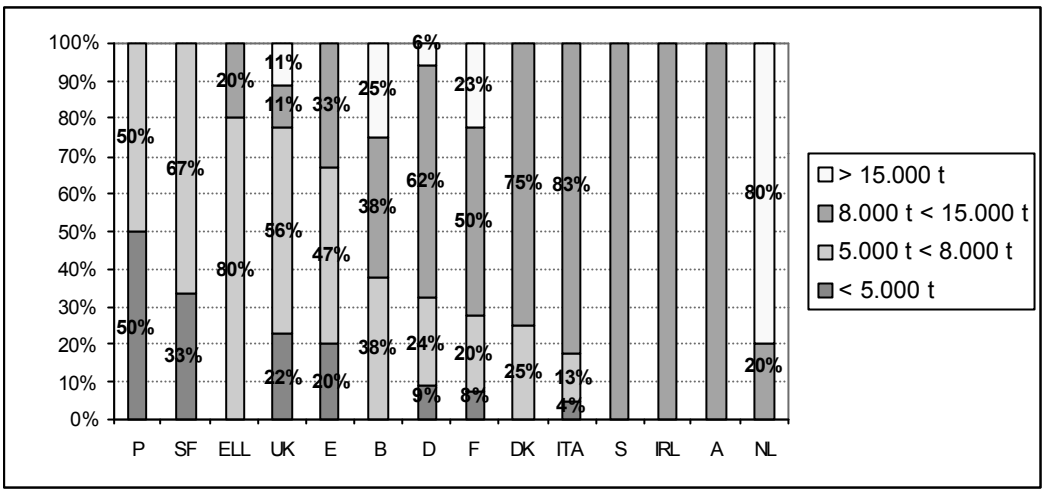
Figure 14.2 Average quantity of beets processed annually per factory



Source: CEFS, Sugar Statistics, p.20, 26, 27.

In some Member States, processing plants of different sizes co-exist. In the UK, Germany and France, there are plants of a throughput of less than 5,000 tonnes of beets per day and also plants with a throughput larger than 15,000 t/d. In other Member States, such as Sweden, Ireland and Austria, all plants are more or less of similar size (see figure 14.3).

Figure 14.3 Distribution of sugar processing plant sizes in the Member States



Source: CEFS, Sugar statistics, p. 25 and Bartens (ed), WVZ: Sugar economy 1997/98.

In the EC there are still 46 small processing plants (throughput less than 7,000 beets per day), namely in Belgium (2), Germany (7), Greece (2), Spain (10), France (11), Italy (2), Portugal (2), Sweden (1), Finland (3) and the UK (6). A number of these small plants are located in areas which are less suitable for beet production. As a consequence the processing plants are faced with a low supply of beets. The fact that these small plants still exist in those regions can be explained by the fixed quotas allocated to those plants and in some cases also by national support programmes (sanctioned by the EC). This is particularly the case for a number of plants in Spain, Portugal, Sweden and Finland. In some cases the small size of a processing plant is explained by the fact that they are located in a relatively isolated area with a limited capacity for beet growing (e.g. Greece). The high number of small processing plants in France is mainly caused by the ownership structure: many of these plants are owned by the beet farmers who are not very much inclined to combine their plant with a bigger own, because in many cases it will lead to sale and finally closure of their plant.

14.5 Size of processing plants and economies of scale

Sugar beet processing is a capital-intensive industry. According to Walkenhorst (1997), construction of a modern sugar processing plant, which will have a life time of 30 to 40 years, costs Euro 150 to 200 millions. As with many capital-intensive industries, sugar processing is characterised by high economies of scale. The larger the processing plant, the lower the costs per tonne of beets processed, mainly due to lower investment costs per unit of output. Investment costs per unit of output of a plant with a capacity of 2,000 tonnes of beets per day are a factor 1.5 higher than those of a plant of 6,000 tonnes of beets per day and twice as high as those of a plant of 10,000 tonnes of beets per day (Render, 1989).

Large processing plants are generally also more automated and thus require less *labour* for producing a certain quantity of sugar than small plants. These economies of scale in labour costs are less pronounced than the scale effects with respect to capital, but they extend beyond plant capacities of 10,000 tonnes of beet throughput per day (Render, 1989).

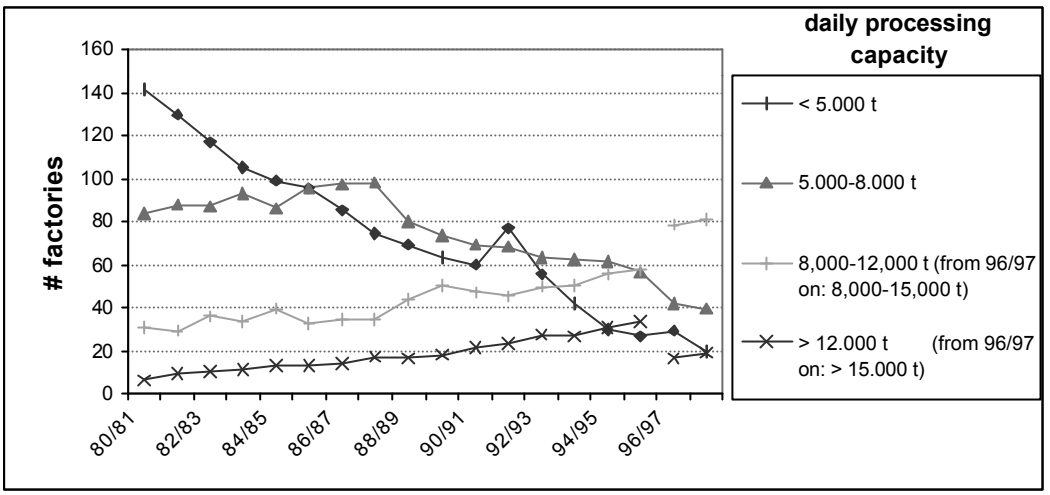
The expenses for *energy* (heating) and *chemicals* (for processing) are not subject to economies of scale and are more or less independent of plant size.

According to Walkenhorst (1997) very little further reduction of investment costs per unit of output can be realised for processing plants above 10,000 tonnes of beets per day. Mahler (1994) estimates that the optimal plant capacity from a processing cost-minimisation perspective is approximately 20,000 tonnes of beets per day. However, Mahler's estimate applies only to regions with a high density of beet production near to the processing plant, because it does not take into account the beet transportation costs. In the case of a low density of beet production, beet transportation costs will decrease the optimal size of a factory, because the beets will have to be transported over longer distances. The optimal size of a plant will be a compromise between the benefits of decreasing processing costs and increasing beet transportation costs as the plant size increases.

According to most industry specialists (Render, 1989, Walkenhorst, 1997), the scale economies of beet processing dominate the diseconomies of scale of beet transportation for plants with capacities of up to 10,000 tonnes of beets per day. Bigger plants can realise only small additional cost savings and the expenses for transporting the sugar beets from ever more distant growing locations to the processing plants ultimately outweigh the additional reductions in processing costs (Walkenhorst, 1997). According to Erskine, A. and Pugh, L. (1990), the optimum efficient size of a beet-processing plant is one that processes between 10,000 and 15,000 tonnes of beets per day.

Statistics indicate that in 1998/99, already 12% of the sugar plants had a daily capacity of at least 15,000 tonnes of beet. The number of plants with a capacity of less than 8,000 tonnes per day is decreasing rapidly (see figure 14.4).

Figure 14.4 Evolution of the number of plants by size category



Source: CEFS, Sugar Statistics, pp. 24-25.

The technical capacity of a processing plant is not only determined by economy of scale considerations and the beet production in a given area, but also by the possible length of the campaign. In most Member States the campaign duration varies from 3 to 4 months. However, in the UK campaign duration is much longer, which implies that the technical capacity of the plants in terms of tonnes of beets per day is relatively low for a given total production per campaign.

The optimal size of a beet processing plant has increased over the last twenty years due to technological developments. Quite a number of beet processing companies were too small to take advantage of those developments within their own structure. A company that operates only one plant can not increase its plant to the optimum size of 10,000 to 15,000 tonnes of beet per day because it can not increase beet supply (fixed quota). Also companies operating two plants could often not combine the two plants because either the distance between the two was too long or the combined capacities of the two was just too large for one factory. Only the bigger companies had the possibility to rationalise production within their own structure by combining processing plants.

Initially the diversity of ownership of the processing plants was an obstacle for rationalisation, concentration and scale enlargement of beet processing. But later on, the need for rationalisation and concentration of plants became a driving force for mergers of companies, take over of plants and structural alliances of companies. When rationalisation within a company had reached its limits, the merging of companies offered new rationalisation possibilities. In Germany for instance, Zuckerverbund Nord and Zuckeraktiengesellschaft Uelzen-Braunschweig merged and formed a new company called Nordzucker. After the merger, two plants were closed. Likewise, Danisco bought 8 plants in the former GDR, expanded the capacity of one plant (Anklam) from 2,800 to 7,500 tonnes of beets per day and closed the other 7 plants.

Particularly in France, Italy and Germany there are still options for further concentration and rationalisation in order to reap the full benefits of economies of scale. Whether or not these potentials will be exploited depends on the willingness and possibilities of the various company owners to merge their activities. Most likely this will not be easy because the most straightforward mergers and acquisitions have already been realised. Furthermore, mergers and acquisitions are monitored closely nowadays by authorities responsible for competition policy.

14.6 External expansion and diversification

European sugar companies cannot expand their sugar processing business in the EC because EC quotas are fixed. Options for improving the rate of return were mainly limited to reduction of costs (through concentration and rationalisation) because the input prices (beet prices) are more or less fixed, while the negotiation margin regarding the output (sugar) prices is limited. Furthermore, the medium- to long-term prospects of sugar processing in the EC is uncertain in the context of (future) WTO negotiations. These circumstances were the driving forces for a number of European sugar processing companies:

- to expand their business to Eastern Europe; and/or
- to diversify their business to non-sugar processing activities.

Some West-European companies have bought sugar processing companies or plants in Eastern Europe. For instance Agrana, Eridania Béghin-Say and Eastern Sugar control now the whole Hungarian sugar sector. EC sugar processing companies have also bought major interests in sugar plants in the Czech Republic, Poland, Slovakia, Romania and Lithuania.

These acquisitions were based on the expectation that the sugar processing plants in Eastern Europe can be turned into profitable businesses by rationalising their production processes on the basis of the West-European experience. Moreover, profitability of these plants will improve (further) once the East European countries have joined the EC, because then these plants can operate under the conditions of the CMO Sugar. To reap this potential future benefits it is important to acquire a stakehold in these countries timely.

A few sugar processing companies have diversified their business through mergers and acquisitions. The most notable examples are the Italian/French company Eridania Béghin-Say, the two Dutch companies Cosun and CSM, the German Company Südzucker and the Danish company Danisco. Most of the diversified sugar companies have not moved too far away from their core competence as far as markets and process technology are concerned. Most acquisitions were related to the food industry and agribusiness. Some companies have embarked on greater vertical integration, and invested particularly in food industries that use sugar as a major input, such as ice cream production and bakeries. Furthermore, there were also a few significant investments in

the paper and packaging industry because of the similarity of the production process (F.O. Licht, 1998).

It is remarkable that sugar processing companies have not been bought by other (holding) companies. That is particularly remarkable in the case of the sugar using food industry. It could have been expected that the sugar using industries would be interested in backward integration, in order to secure and control sugar supply and to reap the benefits (profits) of sugar processing. The Italian company Eridania is probably the only example of a company originally not involved in sugar processing that became involved in the sugar sector by purchasing sugar plants in Italy and later in France (through the purchase of Béghin-Say).

14.7 Concentration in the Australian, US and EC sugar industry

Concentration of sugar production is not a unique feature of the EC sugar industry. Two countries that faced a similar process of significant change are Australia and the USA. In Australia three large joint venture companies have bought most of the sugar cane mills. These companies are Sugar Australia (a joint venture of CSR and Mackay Refined Sugars), Harwood Manildra (a joint venture of N.S.W. Sugar Milling Cooperative and the Manildra group of companies), and Bundaberg, a subsidiary of Tate & Lyle.

The Herfindahl-Hirschman Index (HHI) of the Australian sugar industry is larger than 4,400, which indicates that the Australian sugar industry is very concentrated. The HHI is calculated by summing the squares of the market shares of all firms in the industry. A HHI below 1,000 is not considered a concentrated market. If the industry has a HHI between 1,000 and 1,800, there is some degree of concentration. Industries with a HHI larger than 1,800 indicate that a few firms dominate the market.

Another example is the beet processing industry in the USA. Over the last ten years, the average capacity of the beet processing plants increased from 4,500 to over 6,000 tonnes of beets per day. The 1992 Census of Manufacturing Report indicated a HHI index of 1,476 for beet sugar manufacturing. The HHI of the US cane sugar industry amounts to 2,125, which means that the cane sugar industry is more concentrated than the beet sugar industry in the USA.

At the Member State level, the concentration of the sugar processing industry is very high with a HHI of 10,000 in eight Members States, a HHI of well over 3,500 in three other member states, and a HHI in the range of 1,500 to 2,500 for France, Italy and Germany. However, when the EC market is regarded as one market, and the HHI is based the share of individual companies in the total EC market, the HHI is modest in the range of 700 to 800 (depending on whether share in quota or total production is taken as a basis).

14.8 Concentration and impact on employment

A general phenomenon of scale enlargement and concentration of production is that the labour intensity of the production process decreases. Given the fact that total sugar production has not increased, it can be assumed that total employment in the sugar sector has decreased due to the process of concentration. It is likely that at the same time the average wage level in the sugar processing sector has increased, because generally, in more capital intensive industries, more higher skilled and thus better paid workers have to be employed (Brozen 1982: 110).

Direct employment in the European sugar processing industry amounts to approximately 44,000 full time equivalents, which is about 2% of the employment in the European food industry. About a third of the 44,000 full time equivalents refer to seasonal workers (4 months per year). Furthermore, sugar processing generates (directly and indirectly) a substantial amount of employment in related services and industries, such as transport, harbour activities, cauldron making, electricity, maintenance, informatics and automation, etc.

Industry sources mention that total direct employment in the European sugar industry declined by about 12% over the last 3 years, most likely partly as a direct consequence of the process of concentration.

No more quantitative information on employment in the sugar sector is available because the industry classifies that information as highly confidential. Also Eurostat does not disclose this kind of information when the total number of firms in a particular sector is three or less, which is the case with the sugar industry in most countries.

14.9 Conclusions

A major process of concentration has taken place, and is still taking place, in the European sugar manufacturing industry. In ten years time the number of companies declined from 95 to 64 and the number of processing plants from 208 to 154. At the same time the average daily capacity of the plants has been increased by about 25%. In 8 Member States sugar manufacturing is taken care off by one company only. In three other Member States one company controls respectively 62%, 71% and 80% of the sugar production, while in only three Members States (Germany, France and Italy) the biggest company does not have a majority share of the market (respectively 41%, 31% and 31%). Only in the last mentioned three countries some further concentration of production seems to be possible.

Technical change and a search for decreasing overall costs by the sugar processing industry were the main *general* driving forces of the process of concentration. As explained in sections 14.2 and 14.5, technical change and the construction of larger processing plants have enabled a reduction of capital (investment) costs per unit of output. The economies of scale of processing at a larger scale are much higher than the

increase in average beet transport costs to collect beets from longer distances. Thus the minimum efficient scale of processing has increased substantially over the last 10 to 20 years. Because of fixed production quotas, the only option for the companies to obtain the advantage of lower production costs of large processing plants was to combine plants. The technical developments were neither a result of the CMO Sugar nor unique to the EC (see section 14.7); only the fixed production quotas were a direct consequence of the CMO Sugar.

Another (indirect) influence of the CMO Sugar on the process of concentration has been the fact that input prices (beet) and output prices (sugar) were more or less fixed. As a result companies could neither improve their rate of return by improving the price margin nor by expansion of production. The only way to improve financial performance was by reducing the processing costs. Thus the CMO Sugar might have induced companies to put extra emphasis on concentration of production in order to reduce the processing costs.

The CMO Sugar has also facilitated concentration by assuring stability in terms of input and output prices and volume (fixed quota, little competition on the input and output markets, no competition from imported sugar, limited competition from isoglucose and inulin syrup). The companies were more or less assured of a certain cash-flow and profit, which made it easy to take a decision on substantial investments in concentration of the production. On the other hand, it could be argued that the companies would have opted also (and may be even quicker) for concentration under harsher market conditions, because concentration of production is often a defensive strategy when profitability declines and markets can not be expanded. That might be true, but it does not imply that the guaranteed markets of the sugar companies have not stimulated the concentration process in the sugar sector.

However, concentration has not occurred everywhere. There are still 46 small processing plants (with an average throughput of less than 7,000 beets per day) in the EC. As far as these small plants are located in regions less suitable for sugar production, their continued existence can be explained by the fixed quotas allocated to them, and in some cases also by national support programmes (sanctioned by the CMO Sugar). This is particularly the case for a number of plants in Spain, Portugal, Sweden and Finland. In these cases, the CMO Sugar impedes further concentration of processing capacity. In other cases the small size of some processing plants is explained by the fact that they are located in a relatively isolated area with a limited capacity for beet growing (e.g., Greece), while the high number of small processing plants in France is mainly caused by ownership structures rather than the CMO Sugar.

Enlargement of the average scale of production has generally had a negative impact on labour intensity (more use of labour-saving technology!) and employment. Decreases in direct employment in the EC sugar processing industry (12% in the last 3 years) can only be ascribed to the CMO Sugar in as far as the latter has speeded up the process of concentration and scale enlargement. The exact impact could not be quantified.

15 Distribution of production between Member States and specialisation

15.1 Introduction

This chapter deals with evaluation question 3.3, which reads *"Has the common organisation of the sugar market led to an adequate distribution of production between Member States, without damaging the principle of specialisation?*

Adequate distribution could be defined in two ways:

- *A geographical distribution of production corresponding with the geographical distribution of consumption*. The indicator to be used to measure this type of 'adequate distribution' is the production/consumption ratio (which is the self sufficiency ratio)", and the judgement criterion can be either 'equal self sufficiency ratios for all Member States' or 'a minimum self sufficiency ratio of 100% for all Member States. It should be noted that this definition of 'adequate distribution' is not based on economic considerations, but rather on political and/or strategic considerations.
- *A geographic distribution of sugar production across Member States, which corresponds as much as possible with the comparative advantages of the regions for producing sugar*. This economic definition of adequate distribution coincides with the concept of regional specialisation, which means that a country (or region) should produce and export those goods in which it has a comparative advantage. Thus according to this definition, there is no contradiction between 'adequate distribution' and 'specialisation', as is suggested by the wording of the evaluation question. In this case the indicator should be the correlation between sugar yield per hectare (indicator of comparative advantage) and sugar production per Member State; or if possible at the more detailed level of regions. The judgement criterion will be: the higher the correlation, the more adequate the distribution of production.

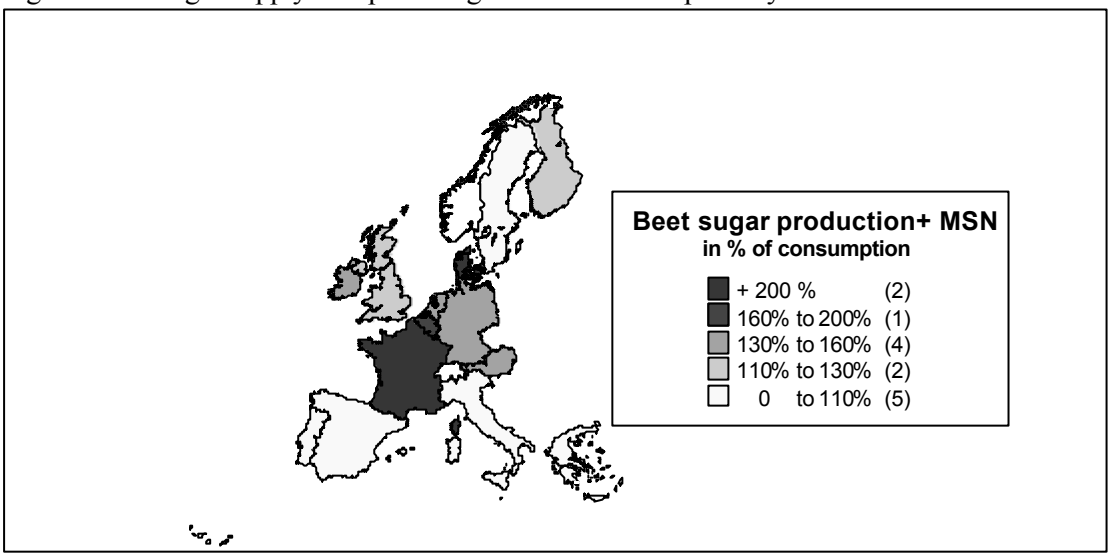
An interesting combination of both definitions could be made by defining 'adequate distribution' as the distribution that provides 100% self sufficiency for all Member States, while the surplus production per Member State is strongly correlated with the comparative advantage of Member States to produce sugar.

The degree of 'adequateness' on the basis of the self sufficiency ratios is analysed in section 15.2, and on the basis of comparative advantages in section (yields) in section 15.3. Adequateness on the basis of a combination of both definitions is analysed in section 15.4 The impact of the CMO Sugar on the regional distribution of production and specialisation is reviewed in more detail in section 15.5. Conclusions are presented in section 15.6.

15.2 Adequate distribution and self sufficiency

The results of a comparison of sugar supply and consumption per Member State are presented in figure 15.1 (see also table 4.3). The figure refers to the period 1995/96 to 1998/99[5]. The sugar supply includes both the beet sugar produced in the Member State concerned and the preferential import of (raw) sugar (see chapters 2 and 4).

Figure 15.1 Sugar supply as a percentage of total consumption by Member State



Source: DG Agriculture, sugar balances (average 1995/96-1998/99).

Figure 15.1 shows that in France and Denmark sugar supply was more than twice the sugar consumption. In Belgium, sugar production equalled 179% of consumption. In the Netherlands, Ireland, Germany and Austria, the supply of sugar was 130 to 160% of average consumption. In the United Kingdom and Finland, sugar production was relatively low, but still exceeded consumption by more than 10%. Finally, sugar production exceeded consumption by less than 10 % (Italy, Sweden) or was slightly lower than consumption (Portugal, Spain and Greece)[6].

When the judgement criterion is that each Member State should at least reach a self-sufficiency ratio of 100%, the distribution of production can be called (nearly) adequate. When the judgement criterion is 'equality of self-sufficiency ratios' the geographical distribution of sugar supply is quite inadequate because some Member States hardly reach the consumption level, while others have a large surplus.

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5 More detailed information on sugar production and consumption per Member State have already been presented in chapter 4.

6 See also chapter 4, table 4.4.

15.3 Adequate distribution and comparative advantages

From a point of view of economic efficiency and optimal use of scarce resources, the optimal regional distribution of sugar production within the EC would be one that reflects comparative advantages in sugar production. If it is assumed that no major differences in beet processing costs exist across regions (Member States), the comparative advantage will be determined by the aptness of regions (Member States) to produce sugar beets at relatively low costs per unit of output and per hectare. Specialisation would then be the result of factors like the natural aptitude for growing beets (dependent on soil content, availability of water, precipitation, sunshine, temperature), resulting beet and sugar yields, labour productivity and the overall beet production costs.

Because of insufficient data on beet production costs across Member States and regions (see also chapters 8 and 9), and because the strongest determining factor of comparative advantage is yields, the following analysis will focus on beet and sugar yields as the indicator for comparative advantage in beet (and sugar) production. The average beet and sugar yields and sugar production per Member State over the period 1995/96-1998/99 are presented in table 15.1. France is the absolute front-runner in terms of sugar yield per hectare followed by Belgium, Austria, the Netherlands and the UK. All other Member States have sugar yield per hectare below the EC average. Finland has the lowest yield per hectare (42% of average yield in France), followed by Italy, Ireland, Greece and Sweden.

Comparing the sugar yields per hectare and the sugar production reveals that 47% of the quota production and 50% of the total sugar production is produced in Member States with a sugar yield per hectare above the EC average. These figures at Member State level do not point at a distribution of production strongly influenced by yield levels.

Table 15.1 Beet and sugar yields per hectare and sugar production in the Member States (in tonnes per hectare, averages of 1995/96-1998/99)

	Beet yields per ha	Sugar contents of beet	Sugar yields per ha	Quota sugar production	Total sugar production
Austria	**60,83**	**17,08%**	**8,93**	390	477
Belg/Lux	**59,25**	16,78%	**8,97**	826	913
Denmark	47,40	**17,25%**	7,48	425	501
Finland	31,55	16,65%	4,33	143	152
France	**59,10**	**18,10%**	**10,32**	3319	4349
Germany	51,40	**17,43%**	7,86	3449	4024
Greece	**57,55**	14,38%	6,48	269	280
Ireland	42,70	16,07%	6,46	200	218
Italy	45,58	14,78%	5,93	1516	1566
Netherlands	**55,25**	15,86%	**8,44**	872	967
Spain	52,03	16,64%	7,31	1000	1151
Sweden	43,13	**17,42%**	6,62	367	387
UK	52,98	**17,26%**	**8,43**	1144	1429
EC-14	53,15	16,97%	8,08	13,920	16,414

Sources: - columns 2 and 3: CEFS, Sugar statistics 1999, pp.5 and 6;
- column 4: DG Agriculture, Final production tables;
- columns 5 and 6: Eurostat (see a lso table 4.1 of this document).

Notes: - Figures above the EC average are shown in bold.
- Portugal not included.
- France excluding overseas territories.
- Sugar yield is composed of beet yield, sugar content and extraction rate.

The analysis of the correlation between yield levels and production can be done also at the more detailed level of the 74 agricultural regions of the EC where beet is grown. Detailed data are presented in annex K. Regional beet yield levels are summarised in table 15.2. It appears that substantial differences in beet yields exist across beet producing regions in the EC. In the best performing regions, yields are twice as high as in the least performing regions. The highest yields can be found in the north of France as well as Belgium. Medium-high performers (between 60-70 tonnes per hectare) include selected regions in Greece (!), the Netherlands, Italy, Spain, Germany and Austria. The category of medium-range performers (between 45-60 tonnes per hectare) include Austria, Denmark, Germany, Italy, the Netherlands, and the UK. Low-yield regions (between 35-45 tonnes per hectare) include Finland, Ireland, Portugal, Sweden, mid and Southern Italy, as well as some regions in Germany and Spain. Yields lower than 35 tonnes per hectare are found in certain German and Italian regions.

Table 15.2 Beet yields in tonnes per hectare in various regions in the EC (1997 figures)

Beet yield per ha	Regions
More than 75	Basse-Normandie, Haute-Normandie, Centre, Champagne-Ardenne, Nord-Pas-de-Calais, Pays-de-la-Loire, Bretagne, Poitou-Charentes, Île-de-France
70-75	Alsace, Picardie, France
65-70	Région Wallone, Bourgogne, Vlaams gewest en Brussel, Auvergne
60-65	Anatoliki Makedonia kai Thraki, Oost-Nederland, Friuli-Venezia Giulia, Franche-Comté, Castilla-León, Bolzano-Bozen, Trento, West-Nederland, Bayern, Westösterreich, Veneto
55-60	Thessalia, Pais Vasco, Elláda, Österreich, Ostösterreich, Nederland, Campania, Nordrhein-Westfalen, United Kingdom, Piemonte, Valle d'Aosta, Liguria, Castilla-La Mancha, Rhône-Alpes, Lombardia, España, Kentriki Makedonia, Zuid-Nederland, Ipeiros, Sterea Ellada
50-55	La Rioja, Noord-Nederland, Hamburg-Bremen-Berlin, Niedersachsen, Lorraine, Hessen, Baden-Württemberg, Rheinland-Pfalz, Madrid, Südösterreich, Deutschland, Aragón, Schleswig-Holstein
45-50	Danmark, Andalucía, Dytiki Makedonia, Umbria, Toscana, Italia, Lazio, Extremadura
40-45	Emilia Romagna, Sydsverige, Sverige, Ireland, Portugal, Navarra, Sardegna, Molise
35-40	Basilicata, Sachsen, Mecklenburg-Vorpommern, Suomi/Finland, Puglia, Murcia, Marche, Brandenburg
Less than 35	Sachsen-Anhalt, Thüringen, Abruzzi, Calabria

Source: Eurostat.

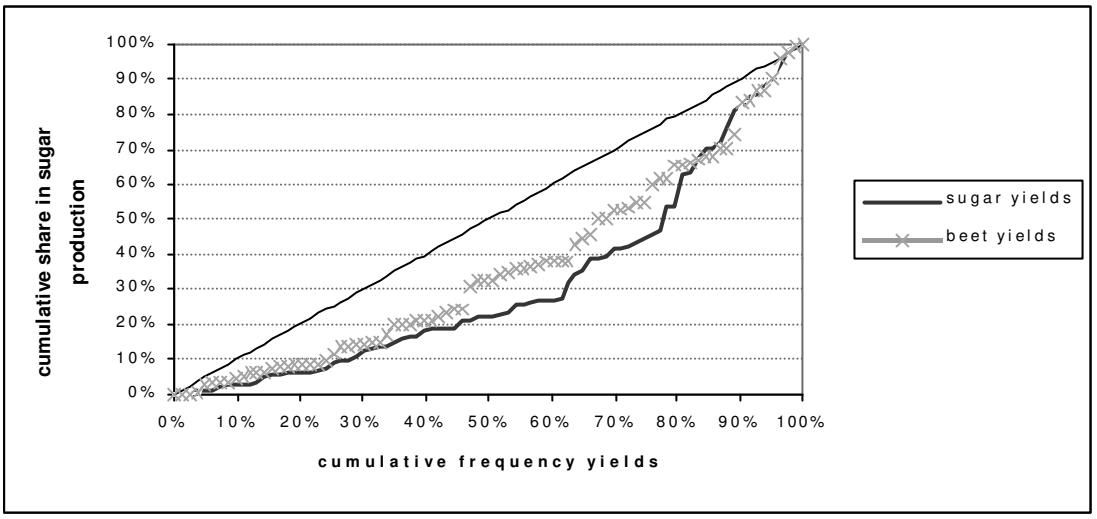
Table L.3 (see annex L) provides data on yields and sugar production per region. Analysis of these data reveal that 69% of the total sugar production originates from regions which have a sugar yield per hectare above the EC average. Thus this analysis of regional level reveals a stronger relationship between yield levels and sugar production than the analysis at Member State level.

The relationship between yields and sugar production can be analysed in more detail on the basis of the Lorenz curve (see figure 15.2). The horizontal axis shows the cumulative percentage of the number of regions ranked according to increasing yield levels. The vertical axis shows the cumulative share of the regions, ranked according to beet yields or sugar yields on the horizontal axis, in the total EC *sugar* production. If the curve would be on the diagonal, all regions would contribute equally to production. However the graph shows that both curves are situated below the diagonal, which means that the regions with relatively low yields have a relatively low share in the total production. The 50% of the regions with the lowest *sugar* yields produce only about 22% of the entire sugar production, while the other 78% is produced by the 50% of regions with the highest yields. The 50% of the regions with the lowest *beet* yields produce about 32% of the entire sugar production, while the other 68% is produced by the 50% of the regions with the highest beet yields.

The difference between a perfect equal distribution (the diagonal) and a perfect unequal distribution (one region producing all the sugar) can be quantified by the Gini coefficient. The Gini coefficient is equal to twice the area between the curve and the

diagonal, and varies between 0 (total equality: each region contributing equally to production) and 1 (maximum inequality: 1 region responsible for 100 % of production). The Gini-coefficient of the Lorenz curve for sugar yields is 0.37 and for beet yields 0.29 These levels of the Gini-coefficient are usually qualified as 'modest concentration'. Thus the sugar production is modestly concentrated in regions with relatively high yields. This outcome is not really surprising because of the rigidity of the quota system (see section 15.5).

Figure 15.2 Share of high yield regions in total sugar production



Source: Basic data from Eurostat Eurofarm survey 1997

15.4 Adequate distribution, self sufficiency and comparative advantages

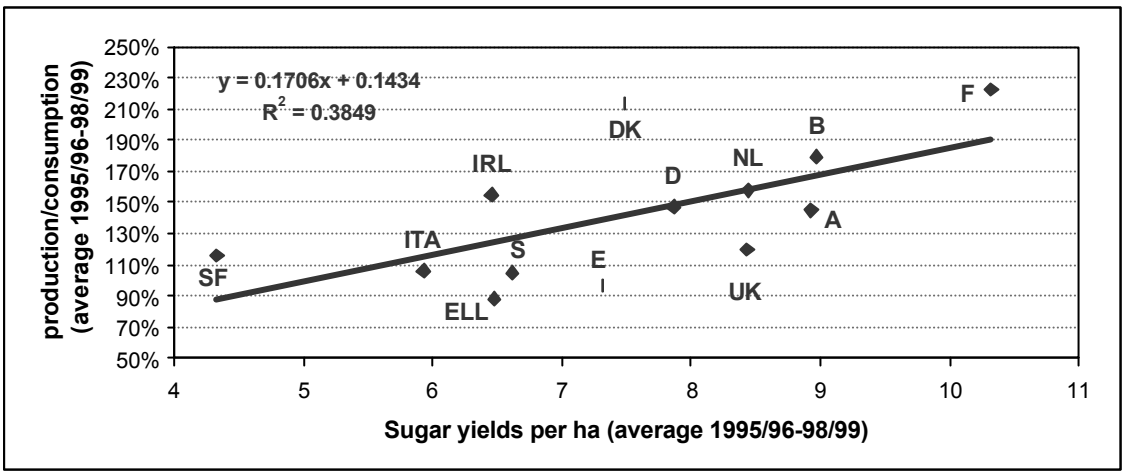
In figure 15.3, an analysis is made of the relationship between the supply/consumption ratios and the average sugar yield per hectare of each Member State. There appears to be a positive correlation (of 38%) between the two indicators[7]. Thus, to some extent, higher sugar yields per hectare correspond with a higher supply/consumption ratio, and thus, in most Member States, a higher sugar surplus. This points at a certain degree of regional specialisation in the EC. Most Member States with a comparative advantage (in terms of sugar yields) have a relatively high surplus production.

In section 15.2 it was already concluded that the distribution of sugar production is adequate from the point of view that almost all Member States have a self sufficiency of at least 100%. On the basis of the above mentioned correlation it can be added that the

[7] For sugar yields per hectare used, see table 15.2. The correlation coefficient used is the Pearson product moment correlation coefficient, which is a dimensionless index that ranges from -1.0 to 1.0 inclusive and reflects the extent of a linear relationship between two data series. The variance explained is equal to $R^2=(0.62)^2$ = 38,5%. The F statistic of the estimated linear trendline is equal to F = 6.882, with p = 0.023686 < 0.05 which implies that the coefficient is statistically significant.

surplus production is distributed reasonably adequate according to the comparative advantage for sugar production of the Member States.

Figure 15.3 Correlation between the sugar yields per hectare and the supply/consumption ratio per Member State



Source: DG Agriculture. Final annual production tables and sugar balances.

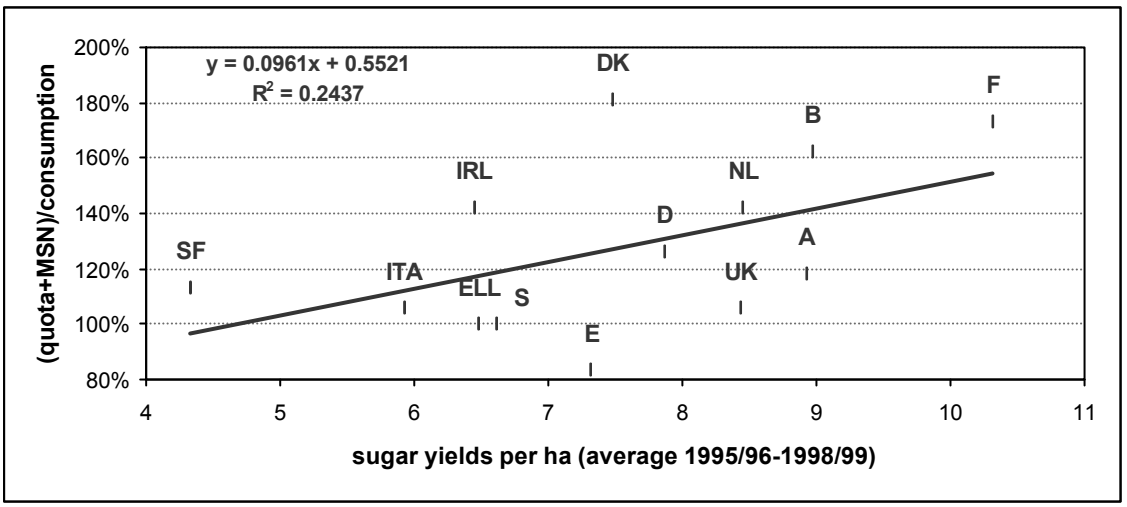
15.5 Impact of the CMO Sugar on distribution of production and specialisation

15.5.1 Quota sugar

In this section, the impact of the CMO Sugar on the distribution of production of quota sugar in the EC is analysed. Figure 15.4 shows that there is a positive correlation of 24% between sugar yields on the one hand and 'quota production plus (preferential imports) as percentage of production' on the other hand[8]. Thus, to some extent, Member States with a relatively high sugar yield per hectare have been allocated with a relatively high quota (as % of their national sugar consumption).

[8] Figure 15.4 is almost identical to figure 15.3 because most Member States produce each year their entire quota.

Figure 15.4 Quotas, MSN quantities and sugar yields



Source: DG Agriculture Final production tables and sugar balances.

Originally the A-quotas were fixed mainly on the basis of historical production figures. The historical production figures were already the result of a certain degree of regional specialisation, based on comparative advantages (notably high yields). Furthermore Member States with a relatively high yields were allocated relatively high B-quotas on top of the A-quotas[9]. As such the CMO Sugar preserved the level of specialisation existing in 1981[10]. At the same time, the CMO Sugar prevented further specialisation because the quotas have not been changed since then. Thus sugar beet production could not be replaced from Member States with a low sugar yield to Member States with a high sugar yield. Further specialisation at the level of individual Member States was only possible through the production of more C-sugar (see section 15.5.2).

The share of the B-quota in the total of the A- and B-quotas by Member State is shown in table 15.3. The first column of table 15.3 lists those Member States, which have a share of B quota smaller than the EC average. These Member States, except the UK, have a sugar yield lower than the average (see table 15.1). By way of exception, the UK got a low overall quota (measured as percentage of national consumption) as well as a low B/A ratio, because a substantial portion of its national sugar consumption needs was - and is - met by preferential imports.

Three of the Member States with a relatively low B-quota (Portugal, Finland and Greece) did not even produce their full quota in most years (see also table 4.2). However, three other Member States with a relatively low B-quota (Sweden, Ireland

9 B-quotas were also called 'specialisation quotas', because the Member Countries with comparative advantages got relatively the highest B-quotas in order to allow them to specialise in beet production. However, no further specialisation beyond the quotas once allocated was possible because quotas have not been changed any more after 1981.

10 Since 1981 the allocation of quotas hasn't changed, except for quota allocated to new Member States and the increase of the quota allocated to Portugal by 10,000 t in 1996.

and Spain) produced on average respectively 8%, 10% and 15% more than their allotted quota (see table 4.2).

The second column of table 15.3 lists those Member States with a relatively high B-quota. All mentioned Member States also show relatively high sugar yields per hectare (see table 15.2).

Table 15.3 The share of B quota in the total of A and B quotas per Member State

Member State	B quota/total quota	Member State	B quota/total quota
Spain	4,0%	Italy	15,8%
Portugal	8,6%	Belgium	17,7%
Finland	9,1%	Austria	18,9%
Sweden	9,1%	Netherlands	20,9%
Ireland	9,1%	Denmark	22,8%
Greece	9,1%	France	22,9%
UK	9,1%	Germany	23,5%

Source: Council Regulation N° 2038/1999, Art. 27.

In Member States with a sugar deficit or a relatively narrow gap between supply and demand, regional premiums are added to the intervention price (2.31% for Finland, Ireland, Portugal and the UK, and 2.67% in Spain; see section 2.3.1). These regional premiums are entirely transferred to the farmers, and included in the basic beet price. The objective of these regional premiums is to assure that farmers benefit from (part of) the market premium in those sugar deficit Member States. It is assumed that the market premium will be at least equal to the transport costs between the deficit region and the nearest sugar surplus region. The regional premiums are therefore fixed at the level of those transport costs.

Regional premium therefore act as an incentive for beet production. Through the regional premiums, the CMO Sugar promotes beet production in those regions with a relatively low sugar yield per hectare. Thus the regional premium system has had a negative impact on specialisation on the basis of comparative advantages. It should be added that the impact of the regional premiums on the volume of beet production has been limited most probably, in view of the small percentage of the regional premium.

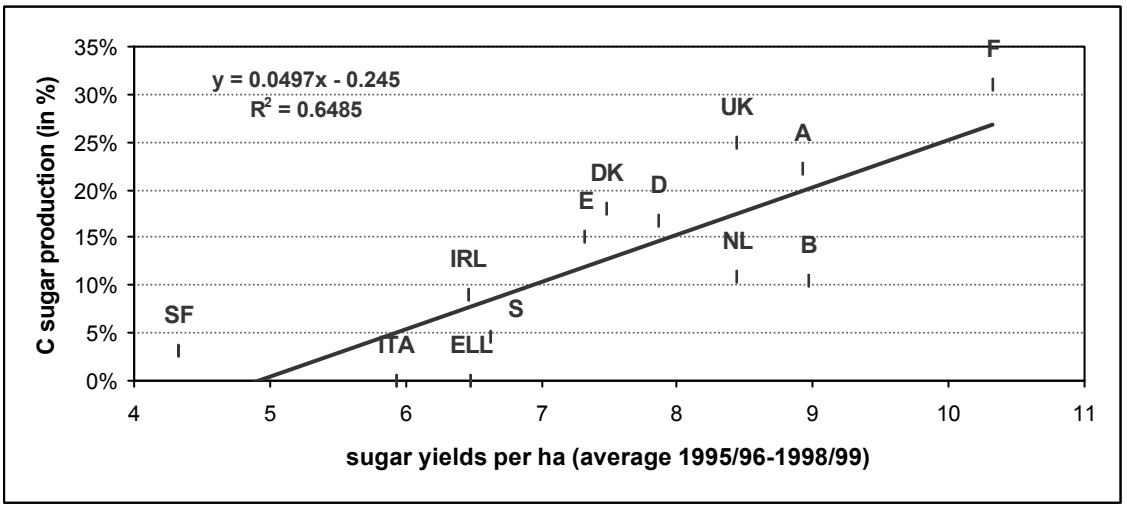
The CMO Sugar has allowed substantial national support programmes in Italy and Spain (see section 2.3.11) which have stimulated production in both countries. As was shown in table 15.1, both Italy and Spain have relatively low beet yields and sugar yields per hectare, and are - except for a few regions in Italy (see table 15.2) - not the most optimal locations for sugar beet (and sugar) production. It could therefore be concluded that national support programmes contradict with the notion of specialisation on the basis of comparative advantages.

15.5.2 C-sugar

Like with the relationship between quota sugar production and preferential imports on the one hand and sugar yields on the other, there exists also a positive correlation between the volume of C-sugar production (the amount of sugar production exceeding quota levels) and the average sugar yield per hectare per Member State. Member States that have a comparative advantage in sugar production (within the EC) tend to produce more C-sugar than Member States that do not have such a comparative advantage.

Whether or not Member States have also a comparative advantage compared to non-EC competitors is a different question. In chapter 7 it has been shown that the Member States do not have a comparative advantage in C-sugar production compared to the major international competitors. However, due to price differentiation, some Member States can produce C-sugar profitably assuming that the C-beet price has to cover the variable costs only, while the fixed costs are entirely covered through the sale of quota sugar.

Figure15.5 Sugar yields and the volume of C-sugar production



Source: DG Agriculture, Final annual production tables and sugar balances.

15.6 Conclusions

The distribution of sugar production in the EC is *adequate* if the objective was that each Member State should at least reach a self-sufficiency ratio of 100%. Only three Member States (Portugal, Spain and Greece) have a self-sufficiency ration slightly less than 100%, while the ratios of Sweden and Finland are close to 100%. The ratios of the other Member States are substantially higher than 100% (up to 200%).

The distribution of sugar production in the EC is *not adequate* if the objective was to concentrate sugar production in the Member States with the strongest comparative advantage for sugar production (measured in terms of beet and sugar yield per hectare).

Only 47% of the quota production and 50% of the total sugar production is produced in Member States having sugar yield per hectare above the EC average.

The distribution of sugar production in the EC was *modestly adequate* if the objective was to concentrate sugar production in regions with the strongest comparative advantage for sugar production. About 69% of the total sugar production originates from regions which have a sugar yield per hectare above the EC average.

The distribution of sugar production is *adequate* if the objective was to reach a self sufficiency of 100% in all Member States and that the surplus production should be distributed as much as possible on the basis of comparative advantages. There appears to be a positive correlation (of 62%) between the sugar yield per hectare and the self-sufficiency ratio of Member States. Thus Member States with high yields have relatively high levels of surplus production.

The relatively high sugar surplus of Member States with relatively high yields consists of (i) surplus quota production and (ii) C-sugar production. The relatively high surplus quota production is caused by the CMO Sugar because:

(i) originally the level of A-quotas was based on historical production figures, which were already the result of a certain degree of regional specialisation based on comparative advantages;

(ii) Member States with high yields got a relatively high B-quota on top of the A-quota.

Thus the CMO Sugar has preserved the level of specialisation existing at the time the quotas were fixed (during the 1970s). At the same time, the CMO Sugar prevented further specialisation as far as quota sugar was concerned, because the quotas have not been changed since 1981. Further specialisation at the level of individual Member States was only possible through the production of more C-sugar. Such a specialisation has indeed materialised because there exists a positive correlation between the volume of C-sugar production and the average sugar yield per hectare per Member State. Thus Member States having a comparative advantage in sugar production (within the EC) tend to produce more C-sugar than Member States that do not have such a comparative advantage.

16 Budgetary impact of the CMO Sugar

16.1 Introduction

This chapter deals with evaluation question 4.2, which reads: *"How has the system of own resources applied in the sugar sector affected the Community budget, and especially as concerns the search for budgetary neutrality in the sector?"*

This evaluation question refers to the following two aspects of the CMO Sugar:

- The payment of *export refunds* for each tonne of quota sugar exported (pure or incorporated in food and drinks) and of *production refunds* paid for each tonne of quota sugar used by the chemical and pharmaceutical industry. EC council regulation 2038/1999 stipulates that the costs of these export refunds and production refunds (except the production refunds of 60,000 tonnes of sugar) should be covered by the receipts of the production levies (see articles 33-36) to be paid by the sugar beet processors and producers for each tonne of quota sugar produced.
- The Storage Cost Equalisation Scheme, which consists of a *storage levy* paid for each tonne of sugar produced, and *storage costs refunds* paid by the CEC for the average quantity of sugar stored. The receipts of the storage levies are supposed to cover the costs of the storage costs refunds.

The question will be answered by making a financial analysis of the budgetary costs and revenues of the EC emanating from the CMO Sugar. The judgement criterion is 'budget neutrality', which means that costs should be equal to revenues, excluding those costs which have officially been excluding from the budget neutrality principle.

The principle that the costs of the export and production refunds should be covered by the receipts of the production levies is often referred to as the *self financing principle,* both in community legislation (see Council Regulation 2038/1999) and literature. This wording has however been criticised, because it suggests that the sugar producers and the sugar beet growers bear the burden of the levies, although finally the sugar users and consumers pay the bill of the levies and thus of the export and production refunds, because the levies are incorporated in the sales prices of the sugar. That is why the CEC now prefers to use the word *own resources,* which refers to the own resources of the CEC. Although it is true that, in strict budgetary terms, the CEC is using its own resources to pay for the refunds, the word *own resources system*, ignores the income aspect of the system (through levies), the search for budget neutrality and "the principle of full responsibility on the part of the producers to pay for the losses incurred in each marketing year due to the disposal of that part of Community production under quota which is surplus to the Community's internal consumption …" (Council regulation 2038/1999 consideration 14). Therefore, it is preferred to use as much as possible the expression *budget neutral financing system* in this report.

The above cited phrase from the EC regulation makes clear that the financial responsibility refers only to the costs of exporting the surplus of quota sugar. This

implies that a number of other costs (see section 16.2) will not be part of the budget neutral financing system and will be a net burden to the EC budget.

The costs of all interventions regarding the sugar sector are financed by the resources of the European Agricultural Guidance and Guarantee Fund (EAGGF), while all the levy receipts are entered on the revenue side of the EC budget. The collection and administration costs of the member states have been fixed at 10% of the levies, which is deducted from the levies transferred by the Member States to the CEC. These 10% deductions are booked as a negative income on chapter 19 of the CEC budget.

In section 16.2 of this document, the expenditures and receipts of all interventions regarding the sugar sector, except those in relation to the Storage Costs Equalisation Scheme (SCES), are analysed. The expenditures and receipts of the SCES are covered separately in section 16.3. The impact of the CMO Sugar on the EAGGF and the EC Budget is analysed in section 16.4. Section 16.5 deals with the budgetary impact of preferential sugar imports. Conclusions are presented in section 16.6.

16.2 Expenditures and receipts of sugar interventions (excluding the Storage Costs Equalisation Scheme)

An overview of the expenditures and receipts in relation to the CMO Sugar (except the SCES and expenditures and receipts in relation to Non-Annex I products) is presented in table 16.1 (see next page). Export refunds and import duties in relation to the export, respectively import of sugar incorporated in Non-Annex I products are presented separately in table 16.2, because data are available for the years 1995/96 to 1998/99 only.

Table 16.2 Export refunds and import duties regarding sugar contained in Non-Annex I products

(1)	(2) Export in tonnes w.s.e.	(3) Import in tonnes w.s.e.	(4) Export refunds (millions of ECUs)	(5) Import duties (millions of ECUs)	(6) Deficit (millions of ECUs)
1995/96	854,204	381,735	381	218	163
1996/97	856,668	426,553	426	239	187
1997/98	834,025	468,314	468	259	209
1998/99	745,520	490,763	490	324	166
Average 95/96-97/98	848,299	425,534	425	239	186

Source: Figures of columns 2 and 3 provided by DG agriculture.
Notes:

- Column 4 calculated by multiplying the figures of column 2 and the export refund per tonne as provided by DG Agriculture;
- Column 5 calculated by multiplying the figures of column 3 with the import duty level of 572, 561, 554 and 661 ECU/t for the four respective years.

Table 16.1 Expenditures and receipts CMO Sugar 1981-1998 (in millions of ECUs)
Excluding storage costs equalisation scheme and excluding export refunds and import duties on sugar contained in Non-Annex I products

(1) Year	(2) Export Refunds Sugar + Isoglucose	(3) Production Refunds	(4) Aid Transport Raw sugar From DOM	(5) Other Inter-Ventions	(6) Total Expen-Ditures	(7) Total Production Levies (90%)	(8) Not covered Expenditures	(9) B-levy (%)	(10 Additional levy (%)
Budg.ch.	110	1112	1113	1119+119					
1981/82	744	2	6	0	752			30.0	0
1982/83	758	2	5	0	766			37.5	0
1983/84	1190	3	9	0	1201			37.5	0
1984/85	1353	4	8	1	1396			37.5	0
1985/86	1238	5	11	1	1256			37.5	0
Total 81/82-85/86					5371	2168	3203		
1986/87	1516	33	15	5	1569	724	845	37.5	38.9
1987/88	1566	63	21	2	1652	607	1045	37.5	17.6
1988/89	1451	69	15	21	1557	667	890	37.5	27
1989/90	926	43	11	25	1006	364	642	22.9	0
1990/91	1251	50	21	32	1354	571	783	37.5	2.4
1991/92	1306	63	22	51	1441	469	972	30.4	0
1992/93	1531	72	17	67	1687	528	1159	35.1	0
1993/94	1377	74	18	42	1511	632	879	37.5	14.2
1994/95	1312	70	15	35	1432	694	738	37.5	5.6
1995/96	1230	81	15	24	1350	615	735	33.2	0
1996/97	1116	82	14	34	1246	670	576	36.5	0
1997/98	1266	105	13	44	1427	699	728	36.9	0
Av.95/96-97/98	1204	89	14	34	1341	661	680		
Budget 1998/99	1412	110	12	41	1575	813	762	37,5	16.5

Notes and sources:
1. Source columns 2 to 5: Depenses dans le secteur du sucre, DGVI-G-1, 3-3-1999.
2. Column 2 does not include export refunds of non-annex I products, which are booked under chapter 20.
3. Source columns 8, 11 and 12: calculations from DG.VI.C and annual Commission Regulations as regards fixing the levies.
4. Column 8 does not include production levies paid for isoglucose and inulin, which varied from 7.7 to 9.3 million Ecus per year in recent years.
5. Production levies (columns 8, 11 and 12) refer to the production year, which runs officially from 1/7 till 30/6.
6. Expenditure figures of 1981/82 till 1985/1986 are in fact the expenditures of the calendar years 1982 till 1986.
7. Expenditure figures of 1986/87 are in fact the expenditures from 1/1/87 till 30/10/87.
8. Expenditure figures of 1987/88 are in fact the expenditures from 1/11/87 till 14/10/88.
9. Expenditure figures of the years 1988/89 till 1998/99 refer to the periods 15/10 till 14/10.
10. The expenditures are always charged to the EU budget of the second mentioned calendar year.
11. Column 5 concerns mainly special aid for the raw cane sugar refining industry and, until 1995/96, special aid for Spain.
12. Column 8: Total production levies = basic levy plus B levy plus additional levy. The CEC receives only 90% of the levies; 10% is retained by the Member States to cover administration costs.
13. Column 9: B-levy expressed a percentage of the B-sugar production x intervention price.
14. Column 10: Additional levy expressed as a percentage of the total of the basic levies and the B-levies
15. Basic levy is 2% of the A and B sugar production x intervention price.
16. This table does not include export refunds for sugar food aid and humanitarian aid (in recent year 2 to 3 million Euros per year.
17. This table does not include import duties for the importation of melasse.
18. This table does not include negative or positive balances of the system of Monetary Compensation Amounts (in force from 1984 till 1 February 1995). According to CEC staff these balances were not large; maximum 20 to 30 million Ecus per year for sugar.

Column 8 of table 16.1 shows the budgetary deficit of the CMO Sugar (excluding the SCES and Non-Annex I products). That budgetary deficit has been quite stable since 1993/94. Adding the average figures of the years 1995/96-1997/98 of column 8 of table 16.1 and column 6 of table 16.2 results in a total average budgetary deficit of the CMO Sugar (excluding the SCES) of 866 million ECUs per year.

That deficit is caused by the fact that the levies are set at such a level that they cover only the costs of the export refunds and production refunds of disposing of the surplus quota sugar produced in the EC (excluding production refunds for 60,000 tonnes of sugar used by the chemical and pharmaceutical industry). This means that the following costs are not covered:

- the export refunds for exporting a quantity of sugar of about 1.6 million tonnes, being the sum of:
  - 1,294,700 tonnes of raw cane sugar imported from the ACP countries;
  - 10,000 tonnes of sugar imported from India;
  - on average about 200,000 tonnes of Special Preferential Sugar imported from ACP countries;
  - 82,000 tonnes "Most Favoured Nations" (MFN) sugar mainly imported from Brasilia and Cuba;
- the production refunds of 60,000 tonnes of sugar used by the chemical and pharmaceutical industry;
- special aid for the raw cane sugar refineries in the UK, France, Portugal and Finland, and for the sugar industry in Spain (until 1996/97);
- special aid for reimbursing the costs of transporting raw cane sugar from the French overseas territories to Europe;
- the 10% of the levies retained by the Member States to cover the costs of collection and administration.

In table 16.3 an estimate is made of the origin of the deficits. The estimates explain roughly 96% of the actual deficits. The table shows that about 83% of the estimated budgetary deficit is explained by the export refunds for exporting the equivalent quantity of the preferential sugar imports (PS, SPS and MFN sugar), while about 8.8% is explained by the compensation of the administrative costs of the Member States, 4.1% by the special aid for the refineries, 2.5% by the production refunds for 60,000 tonnes of sugar for the chemical and pharmaceutical industry, and 1.8% by the aid for financing the transport costs of raw sugar from the French overseas territories to Europe.

Table 16.3 Origin of the budgetary deficit causedby the CMO Sugar

Year	Export Refunds Preferent. Imports	Production Refunds 60,000 Tonnes	Aid Transport raw sugar from DOM	Other inter-Ventions	10% Adminstr. Costs	Total Estimated Deficit	Actual Deficit	Estimated As % of Act. Deficit
1995/96	694	21	15	24	68	822	898	92
1996/97	688	21	14	34	74	831	763	109
1997/98	683	21	13	44	78	839	937	90
Av.93/94-97/98	688 82,8%	21 2,5%	14 1,8%	34 4,1	73 8.8%	831 100,0%	866	96
Budget 1998/99	794	25	12	41	90	962	928	104

Notes:
1. Export refunds for the equivalent quantity of the preferential imports are calculated on the basis of an average quantity of 1.6 million tonnes and an average export refund of respectively 430, 430, 434, 430, 427 and 496 ECU/t for the years 1993/94 to 1998/99. The total average quantity is based on 1.3 million tonnes of ACP sugar, 0.2 million tonnes of SPS sugar and 0.1 million tonnes of sugar from India, Cuba and Brasilia.
2. Production refunds are based on 60,000 tonnes multiplied by the export refunds minus 85 Ecu/t.
3. DOM = Départements Outre Mer = French overseas territories.

The amount of the budgetary deficit is largely determined by the level of the world market price of sugar, because the latter determines the level of the export refunds and the production refunds. The lower the world market price, the higher these refunds. The quantities of sugar, which cause these budgetary deficits, are more or less fixed. Only the quantity of SPS fluctuates from one year to another, mainly in relation to the quantity of raw sugar produced in the French overseas territories.

Before the end of each marketing year, the CEC makes an analysis of total production and use of quota sugar, isoglucose and inulin in the EC. The surplus of quota production minus use is in principle eligible for export refunds and production refunds (excluding 60,000 tonnes). This surplus is multiplied by the average export and production refund awarded during the marketing season. The product of this calculation is the total amount, which has to be collected through the production levies. Subsequently the B-levy and (if necessary) the additional levy are fixed at such a level that the indicated amount will be collected. The imposed B-levies (maximum 37.5%) and additional levies are shown in the columns 9 and 10 of table 16.1.

Whether or not the *actual* receipts and expenditures really balance after the closure of a season cannot be verified easily, because:
- Refunds, which are subject to the budget neutrality principle and others which are not, are booked on the same account;
- import duties and export refunds of sugar incorporated in Non-Annex I products are mixed with those of other ingredients (milk, cereals, etc.);
- expenditure and receipts related to a particular season are spread over about two years.

A specific financial audit will be needed in order to check whether the books really balance.

16.3 The Storage Costs Equalisation Scheme

16.3.1 Description and analysis

The seasonal character of sugar production implies that sugar has to be stored for some time in order to get a regular supply on the market. As a consequence sugar will become more expensive as the marketing season advances because of increasing storage costs. In order to reduce or even avoid these price increases, the Storage Costs Equalisation Scheme (SCES) has been put in place. Basically the SCES implies that sugar producers have to pay a storage levy for each tonne of white sugar produced (except for sugar sold to intervention agencies) and get a storage costs refund for each tonne of sugar stored.

The system does not apply to C-sugar, unless the C-sugar has been designed to be carried forward to the next season (and will then become quota sugar). White sugar produced from raw cane sugar from ACP countries and India is also not part of the scheme (since 1985), because cane sugar does not require long storage periods due to the regular supply throughout the year.

Storage costs refunds are calculated monthly on (i) the basis of the average quantity stored during that month, (ii) the interest costs of the funds tied up in storing the sugar and (iii) a nominal amount per tonne for fixed costs. Only sugar stored in approved warehouses by sugar beet processors and specialised sugar traders is eligible for storage refunds.

In principle the system should be budget neutral, which means that levies should balance with refunds. However, it has been agreed that Member States may retain 10% of the storage levies as a compensation for the administration costs. This 10% is not included in the budget neutrality calculation and is thus financed by the EC. The financial data of the SCES are presented in table 16.4.

Another factor that could have impeded budget neutrality is the fact that the budget neutrality calculations were based on Agricultural ECUs. Distortions in the various agricultural exchange rates (compared to the market rates) could have caused differences between the calculations and actual receipts and expenditures. In any case discrepancies will have been small after the first of February 1995 when the agricultural exchange rates were aligned with the market rates.

Table 16.4 Storage costs equalisation scheme, refunds and levies 1981-1999
(Columns 2 and 3 in Agricultural ECUs; columns 4 to 6 in millions of Agricultural ECUs)

(1) Year	(2) Levy per tonne Produced	(3) Refund per tonne per month	(4) Storage levies	(5) Storage cost refunds (ch.1110)	(5) Annual Balance	(6) Cumulative Balance	(7) Average Stocking period in months
1981/82	35,5	5,8	407,4	433,0	25,6-	30,0-	6,5
1982/83	42,5	6,3	478,7	540,7	62,0-	92,0-	7,6
1983/84	42,5	5,7	449,0	465,6	16,6-	108,7-	7,7
1984/85	42,5	5,3	482,8	407,8	75,0	33,6-	6,8
1985/86	42,5	5,3	476,4	435,7	40,7	7,1	7,3
1986/87	40,0	5,3	499,3	486,2	13,1	20,2	7,4
1987/88	40,0	4,9	515,1	414,8	100,3	120,5	6,6
1988/89	35,0	4,9	446,4	387,5	58,9	179,4	6,2
1989/90	30,0	4,8	369,7	349,1	20,6	200,0	5,9
1990/91	25,0	5,2	326,9	401,5	74,6-	125,4	5,9
1991/92	25,0	5,2	328,0	428,6	100,6-	24,8	6,3
1992/93	25,0	5,2	363,6	441,6	78,0-	53,2-	5,8
1993/94	35,0	5,2	422,3	443,3	21,0-	89,6-	7,1
1994/95	36,2	4,8	498,2	399,1	99,1	9,5	6,0
1995/96	36,2	4,5	503,1	358,5	144,6	154,1	5,7
1996/97	25,0	4,2	351,6	357,7	6,1-	148,1	6,1
1997/98	20,0	3,8	288,2	345,9	57,6-	90,4	6,3
1998/99	20,0	3,8	286,0	349,6	63,6-	26,8	6,4
Average 93/94-98/99	28,7	4,4	391,6	375,7			6,3
Forecast 1999/00	20,0	3,3	288,0	314,8	26,8-	-	6,6

Source: Data from DG Agriculture, Units A4 and C3.

Notes:

1. Until 1993/94, all amounts expressed in agricultural ECUs. In order to convert the agricultural ECUs into financial ECUs the amounts have to be multiplied by the switch-over factor (see table 2.1). From 1994/95 onwards all amounts are expressed in financial ECUs.
2. The cumulative balance at the end of 1993/94 has been multiplied with a factor of 1.207509 in order to change from agricultural ECUs to budget ECUs.

The data of table 16.4 indicate that:

- The annual total of the storage costs refunds have decreased from about 440 million (agricultural) ECUs per year in the early nineties to about 340 million ECUs in recent years. This decline is mainly the result of the decreased interest rate. As a result the levy per tonne could be decreased from 36.2 to 20 ECU/tonne and the refund from 5.2 to 3.3 ECU/tonne-month.
- Over the years there has been quite some fluctuation in the annual and cumulative balances but the principle of budget neutrality was well retained in general, apart from the 10% administration costs funded by the EC. In 1998/99 the cumulative balance was small and the budget of 1999/2000 is based on reaching a cumulative balance of zero.

The actual (minimum) value of one tonne of quota sugar right after processing is presently equal 611.9 Euros per tonne (the intervention price of 631.9 Euros minus the storage levy of 20 Euros; disregarding the production levies). Assuming a maximum storage period of 10 months, the value of one tonne of sugar will be 611.9 plus 10 times

3.3 is 644.9 Euros per tonne. Thus, in absence of the SCES, the sugar prices would vary roughly from about 610 Euros per tonne at harvest time to about 645 Euro per tonne at the end of the marketing season as a consequence of the storage costs (assuming that the storage refunds are more or less equal to the actual storage costs, and disregarding the production levies). This is a price increases of 5.7% during the season.

16.3.2 Evaluation

If the storage refunds are a correct reflection of the actual storage cost, then the SCES does not create specific advantages or disadvantages for specific (categories) of processors (no discrimination). Each processor gets the storage costs reimbursed and pays the same storage levy per tonne produced. However, there will be a problem in case the storage refund per tonne is higher than the actual storage costs per tonne. Then the processors who have a long average storage time benefit more from the implicit subsidy than those with a short average storage time.

The fact that C-sugar carried forward to the next season (and then becoming quota sugar) qualifies also for storage costs refunds is not logic in view of the objectives of the CMO Sugar in general and the SCES in particular. The main argument against this arrangement is that there is no need, in view of stabilising markets and/or securing sufficient supply, to carry C-sugar forward to the next season. Quota production in the EC is always more than total consumption. Moreover, the undesirable consequence of this arrangement is that all sugar producers are subsidising the storage costs of those processors or traders who prefer not to sell all their C-sugar on the world market, but to carry forward part of the C-sugar to the next season (with storage costs covered by the refunds). The existence of this alternative might stimulate C-sugar production and might cause a higher storage levy imposed on quota sugar production.

Doubts can be raised about the (continued) justification of the SCES. The benefits are meagre and do possibly not justify the costs. The costs of the scheme consists of:

- Administration costs of the Member States, which are valued at 10% of the storage levies, equal to about 0.3% of the intervention price;
- Administration costs of the sugar processors (not valued);
- Administration costs of the CEC (not valued).

The benefits (or the lack of them) can best be identified by considering what would happen in case the SCES would be abolished. Sugar processors will then integrate the storage costs in their sales prices. At the start of the season, sales prices will be lower than presently, because no storage levies or storage costs have to be paid for. During the season prices will increase gradually, up to a total of about 6%, to make up for the increased storage costs. However, most likely the sugar processors will equalise the storage costs in many cases by selling at an average annual selling price in which the storage costs are incorporated. That will particularly be the case when selling sugar to the food and drinks industry, which is usually supplied on the basis of annual supply contracts, with numerous deliveries throughout the year.

In case the processors will not sell for an average price but for an increasing price as the season advances, then most likely the food and drink industries will equalise the variation of the sugar price in the cost price calculations of their final products. It is very unlikely that the price of their final products will vary according to the price variations of sugar throughout the season. Thus it is very unlikely that the final consumers will be confronted with price variations caused by variations of the sugar price due to storage costs.

Only in case of sugar sold for direct consumption, the final consumer might be confronted with a modest price rise during the year due to the storage costs. However, it is possible that also the (large) retailers will prefer to sell at a standard average price. They have the opportunity:

- either to equalise the variation in their purchase price of sugar;
- or to arrange a supply contract with a processor based on an average price throughout the season,
- or to buy the sugar cheaply at processing time, store the sugar and set an average sales price in which the storage costs are incorporated.

Most likely sugar beet and sugar cane prices will not be affected by the possible abolishment of the SCES, because the sugar storage costs are already incorporated in the present beet and cane prices, while the variation of the storage costs throughout the year is a matter of price setting between the processors and the users/consumers of sugar.

In summary, it is difficult to identify a purpose and to justify the SCES in the present circumstances. It seems that this element of public sector involvement in a commercial activity can be abolished without real harm for the sector and the stakeholders concerned. The commercial entities will take care of incorporating the storage costs in their prices. Most likely that will not result in any destabilisation of the sugar markets.

In case the SCES would be abolished, a new financing arrangement has to be made for the minimum stock requirement. Commercial entities should be compensated for additional storage costs when they are required to keep minimum stocks higher than the stocks they would keep on the basis of commercial considerations. (Minimum stocks are discussed in more detail in section 4.5.4).

The objective and purpose of the SCES are described in consideration 3 of the Council Regulation 2038/1999. It is stated that a compensation scheme for storage costs could serve the purpose of stabilising the sugar markets, which in turn is important “to ensure that the necessary guarantees in respect of employment and standards of living are maintained for Community growers of sugar beet and sugar cane”. If the purpose of “stabilising the sugar markets” is to arrive at a constant price throughout the year, then the SCES is a useful instrument to achieve that objective. However, if the purpose of “stabilising the sugar markets” is to get a market without large fluctuations in supply,

demand and prices, then the SCES is a superfluous instrument because the other instruments of the CMO Sugar have already made the sugar markets stable.

A final remark with reference to the above mentioned objective of the SCES is that the SCES has no influence on "guaranteeing employment and standards of living of the sugar beet and cane growers", because the SCES hardly influences the sugar beet and sugar cane prices.

16.4 Impact of the CMO Sugar on the EAGGF and the overall EC budget

Figures regarding the total EC expenditures, EAGGF expenditures and CMO Sugar expenditures are presented in table 16.5. Column (5) of that table shows that the gross expenditures of the CMO Sugar (excl. Non Annex I products) have decreased from about 8% of the EAGGF budget in the late eighties to on average 4.3% in recent years. When the export refunds for sugar incorporated in Non-Annex I products (see table 16.2) are taken into account the total gross expenditures were on average about 5.4% of the EAGGF expenditures during 1996-1998. It should be noted these gross CMO Sugar costs do not take into account the receipts of production and storage levies and import duties.

Receipts of levies and duties are not booked as income of the EAGGF but enter into the general revenue chapters of the EC budget. In order to evaluate the overall impact of the CMO Sugar on the EC budget, the net costs of the CMO Sugar (column 8) have to be compared with the total EC expenditure (column 2). It appears that these net costs (excluding Non-Annex I products) have declined from about 2.4% of total EC expenditures about 10 years ago to on average 0.9% in recent years (see column 9). When the export refunds and import duties for sugar incorporated in Non-Annex I products (see column 10 and table 16.2) are taken into account the total net costs were on average about 1.1% of the EAGGF expenditures during 1996-1998. About 80% of these net costs originate from the export refunds of exporting a quantity of sugar equivalent to the preferential imports of sugar (PS, SPS and MFN sugar; see also table 16.3).

Table 16.5 Total expenditures of the EC, the EAGGF and the CMO Sugar (in millions of ECUs)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Year	Total expendit. EC	Total expend. EAGGF Guar.Sect	Total expendit EAGGF Sugar (excl. Non Annex I)	(4)/(3)	Net costs refunds (excl. non-annex I)	Net costs SCES	Net costs CMO Sugar (excl. non-annex I)	(8)/(2)	Deficit sugar in non-Annex I products
1987	36,235	22,950	2,035	8.9%	845	55	900	2.5%	n.a.
1988	42,495	26,400	2,082	7.9%	1045	59	1104	2.6%	n.a.
1989	42,284	24,407	1,980	7.1%	890	51	941	2.2%	n.a.
1990	45,608	25,069	1,388	5.5%	642	42	684	1.5%	n.a.
1991	55,016	31,563	1,815	5.8%	783	37	820	1.5%	n.a.
1992	60,844	31,276	1,937	6.2%	972	38	1010	1.7%	n.a.
1993	66,733	34,748	2,188	6.3%	1159	43	1202	1.8%	n.a.
1994	61,479	33,411	2,062	6.2%	879	51	930	1.5%	n.a.
1995	68,409	34,503	1,831	5.3%	738	50	788	1.2%	n.a.
1996	78,605	39,108	1,711	4.4%	735	50	785	1.0%	163
1997	81,492	40,675	1,608	4.0%	576	35	611	0.7%	187
1998	82,799	38,748	1,777	4.6%	728	29	757	0.9%	209
Av. 1996/98	80,965	39,510	1,699	4.3%	681	38	718	0.9%	186
Budget 1999	87,214	40,440	1,937	4.8%	762	29	791	0.9%	166

Notes:
1. Source column 2: The Community Budget: facts in figures, 1999 edition, pp 30-31.
2. Source column 3: Document d'information sur l'evolution des depenses du FEOGA-Garantie depuis 1993, 3 mars 1999.
3. Column 3 includes the Guarantee Section of the EAGGF only. The Guidance Section is usually booked under "structural funds" nowadays.
3. Column 4 includes storage costs refunds, but excludes export refunds for non-annex I products. Figures taken from "document d'information depenses FEOGA", expenditure category 11.
4. Column 6 copied from table 16.1, column 8.
5. Column 7: 10% of column 4 of table 16.4 (storage levies) multiplied by the switch over factor (in order to covert from agricultural to financial ECUs).
6. Column 10 copied from table 16.2, column 6.
7. Expenditures of EAGGF and the levies of 1987 cover the period 1/1/87 till 30/10/87 only.
8. Expenditures of EAGGF and the levies of 1988 cover the period 1/11/87 till 14/10/88.
9. Expenditure of EAGGF and the levies of the years 1989 till 1999 refer to the periods 15/10 of the previous year till 14/10 of the current year.
10. This table does not include the positive or negative balances of the Monetary Compensation Amounts.

16.5 Budgetary impact of sugar imports from ACP countries, Brasilia, Cuba and India

Each year about 1.3 million tonnes of sugar[11] are imported duty free from the ACP countries under the Sugar Protocol of the Lomé Agreement at a price equivalent to the Intervention Price plus the regional premium of the UK (called Preferential Sugar – PS). On average another 0.3 million tonnes of sugar per year are imported from the ACP countries and India at a highly reduced variable duty (presently 81 Euros/t) and a price equal to the intervention price plus the regional premium in the UK. Compared to the

[11] The sugar is imported as raw sugar, but the quantity is expressed in white sugar equivalents.

world market prices, these PS/SPS prices are highly subsidised. Because of the sugar surplus in the EC, the import of PS and SPS cause an additional export of a quantity of sugar equivalent to the quantity of PS and SPS. The EC has to finance the export refunds of these additional exports to the tune of about 750 million ECUs in 1998/99. This amount is financed from the EAGGF and is not covered by the production levies.

When the Sugar Protocol was negotiated in 1973/74, the EC had an interest to secure supply of raw cane sugar for the refineries in the UK. At that time the world market prices of sugar were high (at the same level as the intervention price of sugar). Over the years the world market price of sugar declined, but the EC agreed to continue paying the intervention price for the imported sugar from the ACP countries (for the agreed quantities). The main justification put forward for paying such a relatively high price is that the implicit subsidy should be seen as a sort of development aid.

In the present context, a strong case can be made for financing the implicit subsidy for the sugar imported under the Sugar Protocol and the SPS Agreement, from EDF resources. That contribution from the EDF could be made part of the budget neutrality calculations, which means that the EDF finances the export refunds of exporting a quantity of sugar equivalent to the import from ACP countries.

It is not possible to apply the same reasoning to the 82,000 tonnes of sugar imported mainly from Brasilia and Cuba at a reduced duty of 98 Euro/t and a price equal to the Intervention Price. This preferential arrangement was the result of trade negotiations between the EC and Brasilia and Cuba in 1995 (and was not meant as development aid). These two countries used to export substantial quantities of raw cane sugar to Finland and Portugal at world market prices. These sugar trade flows had to be discontinued when these two countries joined the EC. As a compensation the EC offered the above mentioned preferential import of 82,000 tonnes of white sugar.

16.6 Conclusions

In about 10 years time the gross expenditures of the CMO Sugar (including storage refunds; excluding non-annex I products) have decreased from about 8% of the EAGGF budget to on average 4.3% in recent years (or 5.4% when export refunds for non-annex I products are taken into account as well). The net budgetary costs of the CMO Sugar, thus gross expenditures minus levy and duty receipts (excluding non-annex I products) have declined from about 2.4% of total EC expenditures about 10 years ago to on average 0.9% in recent years (or 1.1% when export refunds for non-annex I products are taken into account as well).

The net budgetary costs amount to about 900 million Euros in recent years. About 80% of this amount is related to the export refunds of exporting a quantity of sugar equivalent to the preferential imports of sugar. Other non-covered costs are:

- administration costs of the Member States (10% of the total);
- special aid for the refining industry and the sugar industry in Spain (4% of the total);

- production refunds for 60,000 tonnes of sugar used by the chemical and pharmaceutical industry (3%); and
- aid for transporting sugar from the French overseas territories to Europe (2% of the total).

There are no logical reasons why the administration costs of the Member States should not be covered by the levies because those costs are part and parcel of implementing and maintaining the CMO Sugar. There is however a legal reason: the Council Regulations do not provide for including these administration costs in the budget neutrality calculations (see Council Reg. 2038/1999).

Suppliers of Preferential Sugar receive the intervention price minus a highly reduced duty or no duty at all. At the same time, a quantity of sugar equal to the quantity of imported Preferential Sugar has to be exported with the support of export refunds, to be financed from the EAGGF. The main justification for paying a relatively high price for the import of Preferential Sugar is that the implicit subsidy should be seen as a sort of development aid. It is logical therefore that the costs of that system, in the form of export refunds for exporting an equivalent quantity of sugar, should be financed from EDF resources. That contribution of the EDF could be made part of the budget neutrality calculations, which means that the EDF finances the export refunds of exporting a quantity of sugar equivalent to the import from ACP countries.

Doubts can be raised about the (continued) justification of the Storage Costs Equalisation Scheme (SCES). The benefits are meagre and do possibly not justify the costs. This element of public sector involvement in a commercial activity can be abolished without real harm for the sector and the stakeholders concerned. The commercial entities will take care of incorporating the storage costs in their prices (which might cause a 6% price increase throughout the year).

In case the SCES would be abolished, a new financing arrangement has to be made for the minimum stock requirement. Commercial entities should be compensated for additional storage costs when they are required to keep minimum stocks higher than the stocks they would keep on the basis of commercial considerations.

The fact that C-sugar, carried forward to the next season and then becoming quota sugar, qualifies also for storage costs refunds is not logic in view of the objectives of the CMO Sugar in general and of the SCES in particular. The main argument against this arrangement is that there is no need, in view of stabilising markets and/or securing sufficient supply, to carry C-sugar forward to the next season. Moreover, this facility might stimulate C-sugar production at the costs of a higher storage levy imposed on quota sugar production.

17 The CMO sugar, regional development and economic and social cohesion

17.1 Introduction

This chapter deals with the evaluation questions 5.1 and 5.2, which read:
"*Has the common organisation, and in particular the quota system, made a significant contribution to regional development by maintaining the sugar industry in regions with less natural aptitude for the production of sugar beet?" and:*
"Has the system of support prices and quotas under the market organisation had any significant effects, in terms of economic and social cohesion, on the economy of the European Union?"

Question 5.1 and 5.2 are combined because the regions to which question 5.1 refers, -regions not well suited for beet production-, are by and large also regions, at which the 'economic and social cohesion policy' of the EC is aimed. Thus the analyses needed to answers the questions will overlap for a great deal.

It should be noted that question 5.1 has already been answered for a great deal in chapter 15, where the regional distribution of sugar production has been analysed. In that chapter it has been shown that the CMO Sugar has avoided a (further) concentration of beet production in regions with a comparative advantage in beet production, and has protected beet production in regions less suited for it, through the system of fixed and non-tradeable quotas.

It should also be noted that whereas regional specialisation concerns the concentration of production in regions most suited for sugar beet production, the objective of regional development (as worded in the evaluation question 5.1) is focused on "maintaining production" in regions not well suited for sugar beet production. Specialisation on the basis of comparative advantages and maintaining production in regions not well suited for beet production are two contradictory objectives.

Because question 5.1 has already been answered for a great deal in chapter 15, this chapter will be focused on question 5.2. The contribution of sugar production and the CMO Sugar to 'economic and social cohesion' will be evaluated by analysing:

- to what extent sugar beet production is concentrated in the Priority Regions of the Economic and Social Cohesion Policy of the EC (see section 17.3);
- to what extent have Priority Regions benefited from income transfers through the system of production levies and export refunds (see section 17.4);
- to what extent have Priority Regions benefited from income transfers through intra EC trade of sugar (see section 17.5);
- to what extent have Priority Regions benefited from the national aid programmes for the sugar sector, as allowed by the CMO Sugar.

These analyses provide also some additional insights (in addition to what has been concluded in chapter 15) relevant for the answers on question 5.1.

Because question 5.2 refers to the 'economic and social cohesion policy" of the EC, first a summary of that policy is presented in section 17.2.

17.2 Priority regions of the Economic and Social Cohesion Policy

The Treaty of Rome (1957) referred to regional problems, bit it did not include a specific policy aimed at stimulating economic development in regions with specific economic development constraints. After the EC Summit of December 1985 in Luxembourg, a section on "Economic and Social Cohesion" was included in the amended Treaty (the Single European Act). Later on, the Treaty on European Union (Maastricht, 1992) and the Treaty of Amsterdam (1997) reaffirmed the principle of economic and social cohesion, and made economic and social cohesion one of the Union's priority objectives. In Article 158 of the Maastricht Treaty, it was formulated that "in order to promote its overall harmonious development, the Community shall aim at strengthening its economic and social cohesion, i.e. *"reducing disparities between the levels of development of the various regions and reducing the backwardness of the least favoured regions or islands, including rural areas."* Special funds, called Structural Funds, were put in place, to finance specific activities and projects in the priority regions at which the economic and social cohesion would be aimed.

The Structural Funds are aimed at the following priority regions (period 1994-99):

- the less developed regions (objective 1):
  - regions at NUTS level 2 whose per capita GDP is less than 75% of the Community average;
  - the most remote regions also fall within this category. Their economic development is hindered by structural factors (remoteness, island status);
- converting regions affected by industrial decline (objective 2), characterised by:
  - an unemployment rate above the Community average;
  - a percentage share of industrial employment higher than the Community average; and by
  - a fall in industrial employment;
- rural areas (objective 5b):
  - regions with low GDP per capita; and
  - satisfying at least two of the following three criteria:
    - High share of agricultural employment;
    - Low level of agricultural income;
    - Low population density and/or significant depopulation trend;
- regions north of the 62nd parallel with very low population density (below 8 inhabitants per km (objective 6).

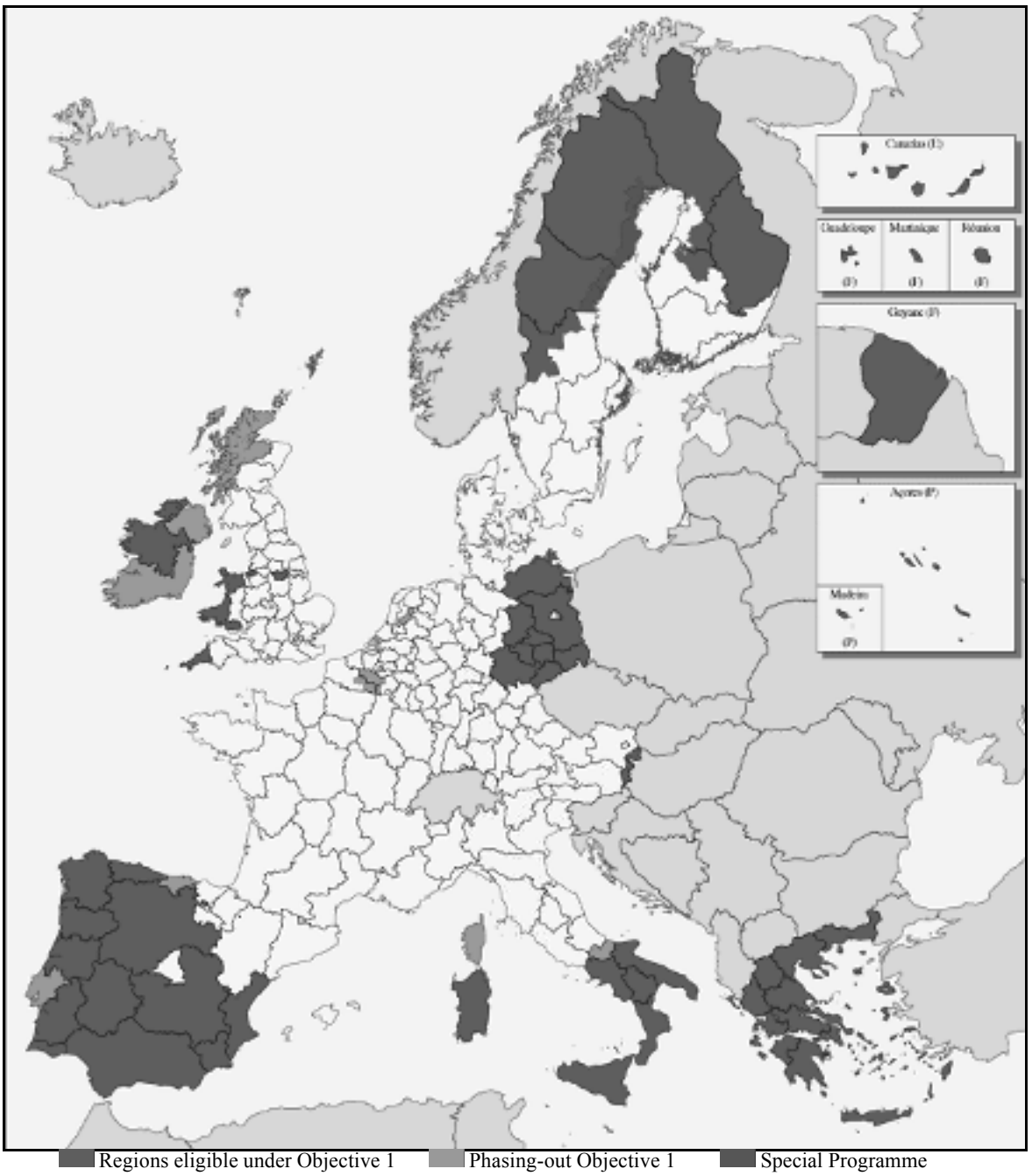
For the programming period 2000-2006, the priority regions have been defined as follows:[12]:

[12] Vanhove, N. (1999), Regional Policy: A European Approach.

- regions whose development is lagging behind (objective 1):
  - regions whose GDP per capita is less than 75% of the Community average,
  - ultra-peripheral regions,
  - very sparsely populated regions of Finland and Sweden formerly eligible under Objective 6;
- areas undergoing economic and social conversion (new objective 2) in particular:
  - industrial areas,
  - rural areas,
  - urban areas, and
  - areas dependent on the fishing industry.

The regions eligible for Structural Funds under the new objective 1 are indicated in the map of figure 17.1.

Figure 17.1 Map of Objective 1 areas for 2000-2006



Regions eligible under Objective 1 Phasing-out Objective 1 Special Programme
Source: European Commission.

17.3 Sugar beet production and the Priority Regions of regional development

Table 17.1 shows that sugar beets are grown in 82 of the 130 regions, while 25 are Priority Regions of Objective 1. The last column of that table shows that 35% of all

regions and 31% of the beet growing regions were Priority Regions. Thus there is no specific correlation between 'being a Priority Region' and 'being a region where beets are grown'.

The Priority Regions account for 53% of all agricultural holdings in the EC and 35% of the agricultural area " (for the details per region see annex L, table L.1). However, in these regions, only 20% of the total of the beet area is situated. Thus the average level of specialisation in beet growing in the Priority Regions is lower than the average level of specialisation in the EC as a whole.

Nevertheless, some of the objective-1-reions are important beet regions. In the regions of Sachsen-Anhalt (D), Mecklenburg-Vorpommern (D), Anatoliki Makedonia kai Thraki (ELL) and Castilla-Leon, more than 10% of the agricultural holdings grow beet, while the EC-15 average is only 3.8%. At the same time though, in several of the objective-1-regions no beet is grown, or only in small quantities. This is because the soil type or climate of those regions is not suited for growing beet.

Table 17.1 Beet growing and objective 1 regions

	Total number	Priority Regions of objective 1	Regions partly objective 1	Priority Regions as % of total
All regions	130	46	12	35%
Beet growing regions	82	25	7	31%

Note: Priority Regions of objective 1 are entirely eligible for Structural Funds. Regions partly objective 1 are only partly eligible for Structural Funds.

In table L.2 (see annex L) 74 beet growing regions are listed in descending order of average yield; 24 of them are Priority Regions and 5 are partly eligible for Structural Funds. It appears that 16 of those 24 Priority Regions have beet yields below the EC average of 53.15 tonnes per hectare; all 5 regions partly eligible have yields above the EC-average. Thus most (two-thirds) of the beet growing Priority Regions have average yields below the EC average.

In table M.3 (see annex L) beet growing regions are listed in increasing order of sugar production growth between 1990 and 1997[13]. Forty regions experienced a decrease of production of which 24 where Priority Regions. In 18 regions, the beet area more than halved, or even disappeared completely; 15 of these regions were Priority Regions. To the contrary, production increased in 47 regions of which 7 were Priority Regions. Thus Priority Regions were over-represented in the category of regions experiencing a decrease of sugar production.

[13] Sugar production is here not allocated to regions based on the location of the processing factories, but based on the location of sugar beet area. The sugar production of a region is then equal to the sugar beet area of the region, multiplied by the beet yield per ha and by the average sugar extraction yield of the beet.

17.4 Income transfers through production levies and export refunds

The system whereby export refunds are partly financed by production levies (see chapter 16) causes an income transfer amongst Member States. The amount of the production levies is a function of the actual production of quota sugar, isoglucose and inulin syrup, while the amount of refunds is a function of the quantities exported. For some Member States the amount of paid production levies is higher than the amount of export refunds received, while it is the other way around for other Member States.

The totals of the production levies and export refunds per Member State of the year 1998/99 are listed in table 17.2. It appears that four Member States (Germany, the Netherlands, Austria and Sweden) are net-payers to the system, while France, Belgium, Italy and the UK are the largest net-receivers. The figure of Belgium might be 'distorted' because a lot of sugar originating from France is exported via Belgium, which causes that the related export refunds are disbursed by the Belgium Paying Agency.

Several of the beet producing Priority Regions (see section 17.3) are situated in Greece, Portugal, Italy and Spain. Greece, Portugal and Italy are net-receivers of the system, of which the Priority Regions in those countries will also take advantage.

Table 17.2 Production levies and export refunds per Member State (1998/99), in millions of ECUs

	Production levies		Export refunds		Balance
	In million ECU	% of total	In million ECU	% of total	
Denmark	32.9	3.6%	51.8	4.1%	+18.9
Germany	275.9	30.5%	157.8	12.5%	-118.1
Greece	4.0	0.4%	15.2	1.2%	+14.8
Spain	27.2	3.0%	27.6	2.2%	+0.4
France (incl DOM)	262.7	29.1%	463.1	36.6%	+200.4
Ireland	8.0	0.9%	8.0	0.6%	0
Italy	92.2	10.2%	139.5	11.0%	+47.3
Netherlands	50.5	5.6%	33.7	2.7%	-16.8
Austria	26.1	2.9%	16.4	1.3%	-9.7
Portugal (incl Açores)	1.7	0.2%	13.3	1.1%	+11.6
Finland	5.4	0.6%	8.9	0.7%	+3.5
Sweden	14.7	1.6%	10.2	0.8%	-4.5
Belgium	56.3	6.2%	185.4	14.7%	+129.1
UK	46.4	5.1%	134.4	10.6%	+88
EC-15	904.1	100.0%	1,265.3	100.0%	

Notes:

- The total of the balances does not add up to zero because part of the export refunds is not covered by receipts from the production levies, but is paid by resources from the EC budget.
- Production levies refer to the campaign 1998/99 (1.7.98-30.6.1999); Export refunds refer to the budgetary year 1998 (16.10.1998-15.10.1999)

Source: Production levies: based on final production tables of DG VI.
Export refunds: DG VI-G-1.

17.5 Income transfers through intra EC-trade

Sugar prices in the EC are artificially high because of the price regulation system of the CMO Sugar (see chapter 5). The main justification of the relatively high prices is the protection of the income of beet farmers. Ultimately the consumers pay for the costs of protecting the income of the farmers. When a Member State is a net exporter of quota sugar to other Member States, the producers of the net exporter receive in fact an income transfer from the consumers in the net importer (the net trade transfer).

Spain, Greece, Portugal and Sweden are the sugar deficit Member States (see chapter 4). The deficit of Greece is mostly met by imports from Italy and the UK. Spain imports mostly from France, Germany and Belgium. Sweden fills its deficit by imports mainly from Denmark and the UK. Consumers in these importing Member States indirectly subsidise farmers in other Member States. Because almost all regions of these four Member States are Priority Regions (see section 17.2), the direction of this income transfer is mostly in contradiction with the aim of Economic and Social Cohesion Policy of the EC.

It should also be noted that some Member States may be net receivers of the trade transfer, while being a net payer to the export refund system (when it contributes more in the form of production levies than it receives in the form of export refunds; see section 17.4).

17.6 National aid programmes

Poor soils, unfavourable weather, weak farm structures and/or remoteness causing hinder the development of the sugar industry in some regions. The CMO Sugar has therefore allowed Italy and Spain to provide special national support to the sugar industry. Also the French government is allowed to provide special support to the sugar industry in the French overseas territories. Because a substantial part of those national aid programmes are aimed at Priority Regions, they will support the Economic and Social Cohesion Policy of the EC.

Italy and Spain
In Italy, the industry faces difficulties in applying modern production methods, while the Southern regions lag behind in development and income levels. Beet growing and processing is considered indispensable for the economic development of the agricultural sector in Italy in general and the Southern regions in particular (see also Council reg. 2038/1999). Since 1968, Italy is authorised to grant, under certain conditions, national aid to the producers of sugar beet and sugar. The aim of the aid is to restructure and modernise the industry. The aid has to be reduced gradually between 1995/96 and 1999/00 (see table 17.3).

Also in Spain the production of sugar beet suffers from structural difficulties. The problems are similar to those in Italy. In addition, there is some sugar cane production,

which is difficult to maintain compared to other crops. Nevertheless, it has been decided to maintain the (limited) production of cane in Spain, which requires special support. When Spain became a member of the EC, it was also authorised to grant national aid to its sugar industry. The aid is granted only to quota sugar and is subject to a limit, as indicated in table 17.3.

Table 17.3 Adjustment aid in Italy and Spain (ECU/t sugar)

Year	Italy-North	Italy-Centre	Italy-South	Spain-Beet	Spain-Cane
1995-96	81.5	81.5	81.5	86.7	72.5
1996-97	54.3	54.3	76.1	54.3	72.5
1997-98	38.0	43.5	70.6	43.5	72.5
1998-99	21.7	32.6	65.2	32.6	72.5
1999-00	10.9	21.7	59.8	21.7	72.5
2000-01	-	-	54.3	-	72.5

Source: Council Regulation N° 2038/1999, Art. 53.

French Overseas Departments

In the French Overseas Departments, the cane sugar industry is confronted with difficulties in applying modern production techniques and with additional costs due to the distance from Europe, small size, difficult terrain and climate. The permanent nature of these constraints have serious effects on the economic and social development of the French Overseas Departments. At the same time, growing of cane and the production of sugar are essential elements of the local economy.

Since 1981, national aid is allowed for the production of sugar in the French Overseas Departments. Poseidom, a programme established in 1989 by the EC Council aims to address the specific problems that hinder the economic development of the regions. The national aid for the sugar sector consists of a subsidy for the processing of sugar cane into rum. This aid is co-financed by France, the EC and the distillers. The EC grants also a subsidy for planting sugar cane and provides support for land improvement (removing volcanic stones, constructing farm roads, drainage, irrigation, improving soil structure).

Furthermore, under the CMO sugar marketing aid is provided to sugar from the French overseas territories, in the form of a compensation for the higher transport and storage costs of sugar from the French overseas territories compared to sugar produced in the EC. The objective is that the sugar from the French overseas territories enter the EC at the same price as the preferential sugar imports.

17.7 Conclusions

The CMO Sugar has protected beet production in regions less suited for it, through the system of fixed and non-tradeable quotas, while at the same time avoiding a (further) concentration of beet production in regions with a comparative advantage in beet

production. Maintaining production in regions not well suited for beet production and concentration of production on the basis of comparative advantages (specialisation) are two contradictory objectives.

The CMO sugar could not contribute specifically to the Economic and Social Cohesion Policy of the EC, because beet growing was not particularly concentrated in the Priority Regions at which that policy was focused. Only about 31% of all beet growing regions were Priority Regions; a percentage about equal to the 35% of all regions in the EC which were Priority Regions.

In fact the average level of specialisation in beet growing in the Priority Regions is lower than the average level of specialisation in the EC as a whole. The Priority Regions account for 53% of all agricultural holdings in the EC and 35% of the agricultural area, while in those regions only 20% of the total of the beet area is situated.

In two third of the beet growing Priority Regions (16 out of 24) beet production will be less profitable than average, because the average yield is below the EC average. The marginal profitability of beet growing in quite a number of Priority Regions is also witnessed by the fact that Priority Regions were over-represented in the category of regions that experienced a decrease of sugar production between 1990 and 1997.

Four Member States (Germany, the Netherlands, Austria and Sweden) are net-payers to the system, while France, Belgium, Italy and the UK are the largest net-receivers. Several of the beet producing Priority Regions are situated in Greece, Portugal, Italy and Spain. Greece, Portugal and Italy are net-receivers of the system, of which the Priority Regions in those countries will also take advantage.

Spain, Greece, Portugal and Sweden are the sugar deficit Member States. Consumers in these importing Member States indirectly subsidise farmers in other Member States, through the relatively high sugar prices. Because almost all regions of these four Member States are Priority Regions, the direction of this income transfer is mostly in contradiction with the aim of Economic and Social Cohesion Policy of the EC.

The CMO Sugar has allowed Italy and Spain to provide special national support to the sugar industry. Because a substantial part of those national aid programmes are aimed at Priority Regions in Italy and Spain, they have supported the Economic and Social Cohesion Policy of the EC.

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