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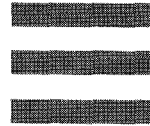
DISCUSSION
P
APER

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***Domestic and world
market effects of EC
sugar policies***

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PAPER
P91.1



*Domestic and world
market effects of EC
sugar policies*

Ivan M. Roberts and Patrick Whish-Wilson

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Foreword

EC sugar policies are periodically reviewed, usually for terms of about five years. Such a review was carried out in 1990 but the EC Commission has proposed that the present arrangements be extended with some minor changes for a period of only two years.

The review of the sugar policies and the debate generally about agricultural policy in the Community are taking place against the background of significant pressures for change within the European Community and elsewhere. Some such pressures arise from a combination of the Uruguay Round of multilateral trade negotiations, efforts to reduce economic barriers within Europe by 1992, German reunification and influences arising from political and economic changes in Eastern Europe.

The Common Sugar Policy of the European Community has a significant impact on world market prices for sugar. As such, developments in that policy are important for the Australian sugar industry, which obtains most of its returns from the export market. This study is intended as a contribution to the current debate on sugar policies and on agricultural policies generally.

A major objective of the study is to ascertain the effects of the Common Sugar Policy on producers and consumers. In addition, alternatives for reform and their implications for interested parties both within the European Community and in Australia are evaluated.

This discussion paper is the most recent product of ABARE's ongoing research program in the field of sugar policy. Earlier publications have dealt with Japanese and US sugar policies. In many respects, this study may be considered as a companion document to that on US sugar policies which was published in April 1990, given the substantial impact that policies in both areas have on world market conditions and the use of a common model in preparing the two studies.

BRIAN FISHER
Executive Director

Australian Bureau of Agricultural
and Resource Economics

January 1991

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Summary

In this paper the sugar support policies of the European Community are examined to ascertain how reforming those policies would affect various groups within the European Community, the world market price and returns to the Australian sugar industry.

Effects of EC sugar support

Like other agricultural industries in the European Community the EC sugar industry is highly supported under the Common Agricultural Policy. Support arrangements for sugar, however, are markedly different from those for most other agricultural products. They are characterised by limits on the quantities receiving support, with support now designed to be budget neutral. Despite these features, the same kinds of effects on production, trade and world prices can be recognised for sugar as for other EC agricultural products.

The Community changed from being a net sugar importer in the mid-1970s to being a major world sugar exporter. Internal prices in the Community are greatly above world market prices most of the time and exports receive substantial support. One of the major differences from other EC regimes, however, is that the subsidies on sugar exports are largely financed by EC consumers rather than taxpayers.

The EC support system for sugar does not reduce or limit production — it stimulates it. This is because producers in some member countries have quotas that are set well beyond the quantities they would produce at the world price. Indeed, the present regime was established, for social reasons, largely to prevent output falling markedly in certain high cost areas.

Nevertheless, the quotas place limits on the extent to which supported production can expand. The system also allows Community production to respond at the

EC sugar is highly supported

High internal sugar prices

System stimulates production

Production responsive at the margin

*Demand and supply effects
of policy*

margin to changes in world market prices as some important producing countries within the Community produce significant quantities of sugar beyond their quotas. A temporary decline in EC production in the mid-1980s when world prices were very depressed indicates this to be the case.

Although the EC sugar support system permits responsiveness of production at the margin it also:

- institutionalises high levels of high cost production in inefficient producing areas;
- largely eliminates risk from production and is likely to result in increased investment in plant and equipment that will stimulate production beyond the quota limits;
- reduces domestic consumption, through high internal prices, thereby stimulating exports;
- allows differing national policy interpretations that, for the countries that produce at least a third of the Community's sugar, negate the production restraining impact of the quotas — these differing practices include price averaging between the two categories of quota production and in some instances between quota and non-quota production; such price averaging is particularly production distorting, especially when it is combined with higher support prices for some of the countries involved and with national supports, such as in Italy and Spain;
- increases the production of sugar in certain African, Caribbean and Pacific countries that have preferential access to the EC market and places the equivalent of that extra production on the world market with the assistance of EC export subsidies that are designated as aid.

Periodic review of policy

Unlike other EC agricultural regimes, the sugar support arrangements are normally reviewed every five years or so. The current arrangements expire in 1990-91. However, the EC Commission has recommended that current policies and quota levels be basically continued for another two years before being reviewed again. The Commission has also recommended minor policy changes, including the elimination of storage subsidies that encourage producers to carry over non-quota sugar to be set against the subsequent year's

quota production and the reduction of national support in Italy. While the Commission has made these proposals, it is the Council of Ministers, which is made up of the Agricultural Ministers of each member state, which will make the final decisions.

Current influences on policies

Current issues that could have an important bearing on the nature and effects of EC sugar policies are:

- Community expansion due to the reunification of the two Germanies;
- the cost to certain groups in the Community arising from the policies;
- the 1992 thrust toward a unified EC market;
- the GATT Uruguay Round of multilateral trade negotiations; and
- concern about monopoly influences in the sugar processing industry.

With German reunification the quotas for Germany have been increased by a total of 847 kt. This is about 180 kt beyond past production in the area that was the Democratic Republic of Germany and is also well above past consumption in that area. Such quotas further institutionalise increases in EC surplus production that can only be marketed through extra subsidies — in this instance paid for largely by EC consumers.

The cost of the sugar support arrangements to EC consumers is estimated to have averaged some 3000 million ECU a year (in constant 1989 values) over the period 1979–89 as a direct result of the inflated prices for the quantities of sugar that they have used. This is equivalent to some 10 ECU per person or 40 ECU per family of four. Although this may not be considered to be large, sugar is but one of many agricultural products receiving similar levels of support, and the cumulative cost is substantial (see Bureau of Agricultural Economics 1985, p. 108).

The transfers to producers have been somewhat less owing to levies averaging almost 600 million ECU a year (in 1989 values) over the period 1979–89 which producers have to pay in order to finance export subsidies on quota sugar. Net support to

Major issues affecting policies

– *German reunification*

– *cost to EC consumers*

– *losses to EC economy*

- arrangements contravene principle of a unified market

producers over the period was equivalent to an estimated 53 per cent of the value of actual EC sugar production if it were valued at world market prices. Losses to the EC economy due to resource misallocation by producers and consumers over the period are estimated to have averaged 370–800 million ECU a year (in 1989 values).

The arrangements for support and levels of support for sugar differ widely among countries within the European Community. These differences are greater than for most other commodities and contravene the principles of a unified market. The differences arise because of price averaging across categories of quota and non-quota sugar in some countries, political influences in the distribution of quotas between members and the provision of national supports in some countries only. To these differences can be added those relating to the monetary compensatory amount (MCA) arrangements of border subsidies

Currency units used in this study

The currency unit used in this study is, in most instances, the ECU or European Currency Unit. The ECU is the common accounting unit that has been used in the European Community since 1 January 1979. It is a 'basket' unit consisting of specified amounts of the currencies of EC members. Average annual parities between the ECU and the US and Australian dollars over the period 1979–90 were as follows:

	1 ECU is equivalent to:	
	US\$	SA
1979	1.37	1.22
1980	1.39	1.22
1981	1.12	0.97
1982	0.98	0.96
1983	0.89	0.99
1984	0.79	0.90
1985	0.76	1.09
1986	0.98	1.46
1987	1.15	1.64
1988	1.18	1.51
1989	1.10	1.39
1990 ^e	1.26	1.62

^e Estimate based on data for first three quarters of the year.
Source: IMF (1990a,b).

and taxes that are acknowledged to contravene the principles of a unified market for CAP products.

From the Uruguay Round of multilateral trade negotiations, which aims to make agricultural trade more liberal and less distorted by national support policies, there are pressures to reduce agricultural support generally and to modify support arrangements. Some of the support arrangements in the EC sugar regime — such as quotas that limit the quantities on which support is paid — could be applied more generally to agricultural support to reduce trade distortions internationally.

However, marked changes would be necessary in the application and size of quotas and in domestic pricing arrangements if EC sugar support were to become relatively trade neutral. In particular, support would need to be provided through deficiency payments rather than, as at present, through inflated consumer prices. The sum of Community quotas would need to be set at levels below the quantities that would be produced (unsupported) at world prices, and quotas would need to be readily tradable throughout the Community.

Two internal political problems that would need to be addressed in achieving a more trade neutral system are the distortions from the MCA system and a need for greater budget flexibility to finance deficiency payments. Nevertheless, the EC sugar system is more amenable to being reformed to make it more trade neutral than systems for most other EC agricultural products.

Gains from reducing support

If EC policy makers are concerned to reduce the economic cost of sugar industry support, the greatest gains would arise from the complete elimination of support. However, in the European Community there are many political pressures that constrain the ability of policy makers to bring about such a fundamental reform.

If it is accepted that only marginal reforms can be made, significant gains to EC producers and consumers and to the EC economy in total can still be made.

*– Uruguay Round pressure
to reduce support*

*Changes needed to make
support trade neutral*

*Political problems to be
addressed*

*Biggest gains from
eliminating support*

EC sugar production would fall in high cost areas

EC producers and economy would benefit

Political difficulties in reforming quotas

Using ABARE's world sugar model (SUGABARE) it was found that significant reductions in EC quota levels would result in marked increases in world free market prices. It was also found that a combination of higher world prices for overquota EC production, reduced levies on quota sugar and reduced production costs associated with lower EC output of quota sugar would exceed the losses of revenue to producers from lower quota production.

This is especially the case if the reduction in quota production is concentrated in the Community's higher cost production areas. In fact, for reductions in EC sugar production to occur, it is likely that most such reductions would necessarily take place in the higher cost areas of the Community. This is because reductions in quotas in low cost areas that are already producing significant quantities above their quotas at world prices would have little impact on aggregate production in those areas, at least in the short term. Thus, although EC producers as a group would gain from significant reductions in the size of quotas, there would, nevertheless, be marked changes in producers' welfare between high and low cost areas.

Over the period 1991-95 a 1 Mt reduction in 'A' quota allotments (the quantity specified for the whole Community) and a proportionate reduction in 'B' quotas (smaller quantities, calculated as a percentage of the A quota) are estimated to result in an increase in world prices of 11 per cent. EC producers as a group would benefit by around 150 million ECU a year, while the EC economy overall would benefit by some 225 million ECU a year (in 1989 values).

With a 50 per cent reduction in B quotas alone, the gains to EC producers are estimated to be larger at around 250 million ECU a year, while the economy would benefit by about 220 million ECU a year (in 1989 values). Part of the gains to producers as a group would stem from a concentration of the reductions in output in the highest cost member countries.

Political difficulties could be expected to occur when instituting quota reforms to obtain the greatest improvement in EC economic benefits. This would be particularly the case if different rates of quota reductions were applied in an effort to reduce

production most in the highest cost countries. The same effect with fewer political difficulties could eventually be achieved by uniform proportionate cuts to quotas throughout the Community at the same time as making quotas tradable both within and between member countries. For the market in quotas to operate efficiently, however, the MCA system would need to be eliminated and, importantly, all countries would need to face the same conditions of complete price differentiation between A, B and C sugar (where 'C' sugar is the quantity produced beyond A and B quota sugar).

*– reduced by uniform cuts
and tradable quotas*

It is estimated that by replacing the present consumer financed EC support by taxpayer financed support in the form of deficiency payments, world market prices for sugar would be higher by 7.3 per cent over the first half of the 1990s. EC consumers would no longer have to incur the transfers to producers and processors which averaged about 3000 million ECU a year in the 1980s (in 1989 values). However, budget costs of around 2500 million ECU would be required to provide the same level of support to producers.

*Consumers benefit from
deficiency payments to
producers*

Other exporting countries — and in particular their sugar producers — would be major beneficiaries of reductions in EC quota levels. It is estimated that on average from 1991 to 1995, Australian sugar exports would increase in value by \$A193 million a year (in 1989 values) if the Community reduced its A quotas by 1 Mt and its B quotas proportionately. The gains would be slightly less, at \$A171 million a year (in 1989 values) over the period, from a cut of 50 per cent in the Community's B quotas. A changeover to a deficiency payment system in the Community would increase Australian export returns for sugar over the period by an estimated \$A126 million a year (in 1989 values).

*Other exporters benefit from
lower EC quotas*

Reductions in the prices of other crops could have a marked effect in increasing C sugar production. In the context of reform of EC policies as a result of the Uruguay Round of multilateral trade negotiations, significant reductions in support prices for competing crops to those for sugar beet could occur. In such circumstances it is important that quota levels for

*Importance of policy
consistency with
alternative crops*

sugar be reduced at the same time, if depressing effects on world market prices are to be avoided.

It is estimated that it would require a reduction of approximately 1 Mt in A quotas and a proportionate reduction in B quotas along with a 20 per cent reduction in the EC intervention price for sugar to offset the world price depressing effect of a 20 per cent reduction in EC cereal prices. At the same time, those countries which currently practise mixed pricing or averaging would need to move to strict price differentiation if the required supply response was to occur.

Policy reform would enhance efficiency

While the EC sugar regime is sometimes cited as a model for controlling the production of items in surplus, there are clearly many reforms to that regime which would markedly enhance its efficiency and reduce the economic costs that it imposes. Such reforms include the reduction or elimination of B quotas, the reduction of A quotas to levels below quantities that would be produced at world prices in all parts of the Community, the elimination of averaging provisions between the various categories of sugar in certain countries, the strict enforcement of full price differentiation between quota and non-quota sugar, the tradability of quota rights and the elimination of national supports.

Introduction and historical background

Introduction

The European Community has a support regime for sugar that differs greatly from other EC support arrangements. Nevertheless similar changes in the position of the Community in world trade can be observed for sugar as for other major EC agricultural commodities. In short, under the Common Sugar Policy the countries that now constitute the European Community collectively changed from being a net importer of sugar to becoming a significant net exporter during the 1970s and remained a large net exporter throughout the 1980s. Such was also the situation for wheat and beef, while for dairy products the Community changed from being a relatively small to a very large net exporter.

Unlike the regimes for the other major commodities covered under the Common Agricultural Policy, the Community's sugar regime has been subject to regular revisions every five years or so, in order to adjust its parameters to changing circumstances. There have been times, however, when current regimes have been extended or amended for a year or two before new or modified arrangements were made for a further five years. Current arrangements stem from 1986-87 and have been operating for five years; so the program is due for review.

The objectives in this paper are to examine the nature of the EC sugar policies, to ascertain the kinds of effects

that they have had on production, consumption and trade and to calculate the effects that various changes to the policies would have on trade and world prices. To do this the world sugar model that was developed by Wong, Sturgiss and Borrell (1989) is applied.

Historical background

The EC sugar regime has applied in a form that is analagous to its present arrangements since 1968. When it was first introduced there were but six countries in the Community — France, the Federal Republic of Germany, Italy, Belgium, the Netherlands and Luxembourg. The Community has subsequently expanded greatly, with the United Kingdom, Denmark and Ireland joining in 1973, Greece in 1981 and Spain and Portugal in 1986. Along with the entry of each of these additional countries there has been the adoption of the Common Sugar Policy by the nations involved.

A central element of the Common Sugar Policy since 1968 has been the application of quotas, or specified quantities of production on which producers have received administratively determined support prices. According to Harris, Swinbank and Wilkinson (1983, p. 128) the quotas were introduced as a temporary measure in 1968 and that their fundamental purpose was 'to protect those areas of relatively inefficient production which could have been expected to reduce or

1 World production, consumption and trade in sugar Raw value*

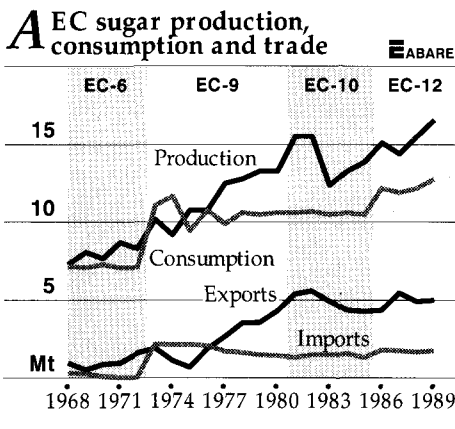
	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
	Mt	Mt	Mt	Mt	Mt	Mt	Mt	Mt	Mt	Mt	Mt	Mt	Mt	Mt	Mt	Mt
World production	76.9	78.9	82.5	90.4	90.8	88.9	84.6	92.2	102.0	97.1	99.4	98.4	100.4	104.0	104.8	107.9
World consumption	77.3	74.5	79.3	82.5	86.2	89.6	87.9	87.9	94.0	94.1	96.8	98.0	100.9	105.3	105.1	107.0
Total world exports	22.1	20.6	22.8	28.4	25.0	25.9	26.7	28.9	30.4	29.0	28.5	27.8	27.2	28.2	27.4	27.9
Total EC exports ^a	1.1	0.7	1.9	2.7	3.6	3.6	4.3	5.4	5.6	4.9	4.4	4.3	4.4	5.5	4.9	5.0
Total EC imports ^a	2.2	2.2	2.1	1.7	1.7	1.5	1.4	1.4	1.5	1.5	1.6	1.3	1.8	1.7	1.7	1.8
EC net exports ^{ab}	-1.1	-1.5	-0.2	1.0	1.9	2.1	2.9	4.0	4.1	3.4	2.8	3.0	2.6	3.8	3.2	3.2
Net exports to 'free' market ^c																
World	16.2	13.4	15.6	20.7	17.4	18.3	19.4	20.6	21.7	20.6	19.2	19.0	18.2	18.5	18.5	17.6
European Community ^{ab}	0.1	-0.2	1.2	2.4	3.3	3.4	4.2	5.3	5.5	4.8	4.3	4.2	4.1	5.3	4.7	4.5
	(0.6)		(7.7)	(11.6)	(19.0)	(18.6)	(21.6)	(25.7)	(25.5)	(23.3)	(22.4)	(22.1)	(22.5)	(28.6)	(25.4)	(25.6)
Other countries	16.1	13.4	14.4	18.4	14.1	14.9	15.2	15.3	16.1	15.8	14.9	14.8	14.1	13.2	13.8	13.1

^a For EC-9 to 1980; for EC-10 from 1981 to 1985, for EC-12 from 1986. ^b A negative figure denotes net imports. ^c Total net exports to the free market are derived by adding together each country's net exports after deducting its net exports (if any) under special arrangements. Such arrangements include EC imports of up to 1.4 Mt a year from ACP countries under the Lomé Convention.

* To convert raw value to white equivalent multiply by 0.92.

Note: Figures in parentheses show EC net exports to the world free market as a percentage of world net exports to the free market.

Source: International Sugar Organisation (1988, 1990).



cease production had quotas not been used, but instead a lower support price set'. They refer to an EC Commission document (Commission of the European Communities 1973, p. 5) which indicated that in the absence of quotas it would have been necessary to reduce support prices by 25 per cent in the mid-1970s to obtain adequate control over production, in which case sugar production would have disappeared in the French Antilles and declined sharply in Reunion, Italy and in several northern regions of the Community.

Prior to 1968 the EC-6 was approximately self-sufficient in sugar, with small net exports in some years and small net imports in others. In the period 1968-72, when the Common Sugar Policy was adopted, the group was consistently a net exporter, with net exports reaching 1.5 Mt in 1972 (figure A). But when the United Kingdom, which was a net importer of about 2 Mt a year entered in 1973, the

Community became a significant net importer.

Under the policies that existed at the time and given advances in production technology, production increased more rapidly than consumption in the expanding Community and by 1977 it became a net exporter of about 1 Mt. The trend toward increasing production continued into the 1980s but consumption stagnated and net exports rose every year until 1982 when they peaked at 4.1 Mt. That trend toward expansion in EC exports abated in the period 1983-86 when net exports reached a low point of 2.6 Mt before increasing once more to exceed 3 Mt in each of 1987, 1988 and 1989.

These changes in EC net exports are placed in the context of aggregate world figures in production, consumption and trade in table 1. Points of interest about sugar in the European Community that emerge from table 1 are:

- the continuous growth in EC net exports (and in the period 1974-76 the reduction in net imports) from the introduction of the policy until 1982;
- the reduction in net exports over the years from 1982-86;
- the resumption of larger net exports after 1986; and
- the large increase in the Community's share of world exports that has occurred since the mid-1970s.

It is argued in the following chapters that all these developments were induced largely by the nature of the Common Sugar Policy.

The Common Sugar Policy

Policy objectives

The objectives or goals of the Common Sugar Policy are much the same as those for the Common Agricultural Policy generally. Those objectives have been spelt out in detail in Article 39 of the Treaty of Rome, under which the European Economic Community was formed, and include the promotion of improved agricultural incomes and of technical and economic efficiency, the stabilisation of markets, and guaranteed regular supplies to consumers at reasonable prices.

While such objectives are common in statements of agricultural policies in most countries they do not really provide a true representation of policy objectives. Tangermann (1985, p. 85) points out that many policy objectives are implicit and may be recognisable only through analysis of the policies themselves and of the motivations of policy makers at the time they introduce legislation.

From the examination of EC sugar policies that follows, income support for EC farmers emerges as a revealed objective. Also, stabilisation of markets might qualify as an objective in the narrow sense that the arrangements stabilise domestic market prices. However, it is questionable whether the other stated policy objectives are met. Indeed, the policy ensures that EC sugar production will not be efficient in an economic sense and that EC consumers will pay much more for sugar than if the policy did not

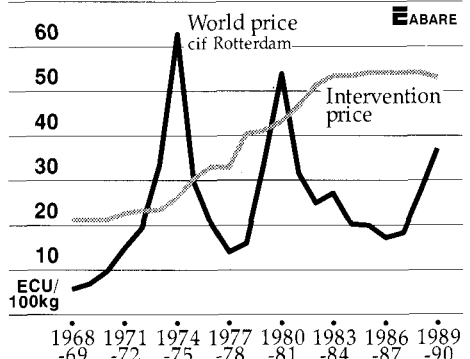
exist. Whether that means that EC consumers face 'reasonable' prices is purely subjective. However, they do pay far higher prices than those they would face in a free market.

Policy mechanisms

The EC sugar regime uses basically two sets of measures that are designed to support internal EC market prices at levels generally well above world market prices and to control the amount of sugar that is subject to support.

The measures used to support internal market prices are much the same as those used for other major products such as grains, meat and dairy products. A set of administered prices is determined each year by the Council of Agriculture Ministers. It includes the *target* price, which as the name suggests is a price to be aimed

B World market price for white sugar and EC intervention price



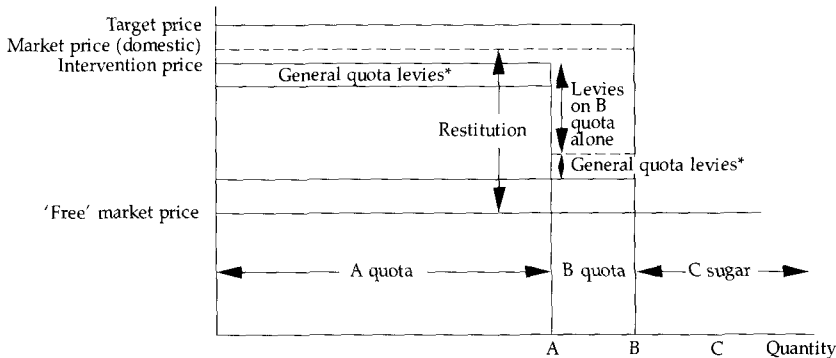
at in the management of the market. Then there is the *intervention* price at which national intervention agencies are required to purchase sugar. That price effectively places a floor under the domestic market price. As can be seen from figure B, intervention prices have been substantially above world market prices throughout most of the period for which the Common Sugar Policy has applied. The only exceptions have been in the peak years of a period of very volatile world prices, namely 1973-74, 1974-75 and 1980-81.

Imports are prevented from undermining the internal support prices through a system of variable import levies determined by the difference between the minimum import price, which is the lowest price at which imports are available at Community ports, and a *threshold* price. The threshold price is calculated from the target price and transport charges between the Community's largest producing area and the most distant deficit area.

When internal market prices are above world prices, which is usually the case,

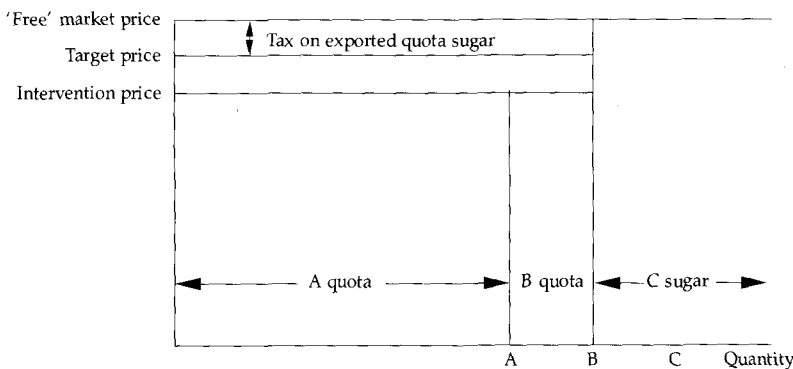
C EC sugar support and levy arrangements

EC support (intervention) price well above 'free' market price



* Includes a 'basic' levy of 2 per cent, the 'elimination' levy and the additional levy. The effective A quota price is the market price less the general quota levies; the effective B quota price is the market price minus the levies that apply to B quota sugar minus the general quota levies.

EC internal price below 'free' market price



disposal of quantities that receive support but which are in excess of domestic requirements is through export with the assistance of *export restitutions* (export subsidies). This allows EC sugar exports to compete at world market prices (figure C). When world prices are above the threshold price, provision exists for import subsidies. Any exports of A and B quota sugar (see explanation below) in this period would be subject to an equivalent export tax (figure C).

The sugar arrangements differ markedly from regimes such as those for grains and beef, however, in that the quantities supported are subject to limits. Production beyond the stipulated limits must be exported without assistance at the world market price.

The quantities supported under the Common Sugar Policy are limited by a three-tier system of quotas, with support being provided on sugar produced within two of the three tiers. The arrangements are as follows:

'A' quota — This is a specified quantity of sugar determined for the whole Community and allocated among the member countries through negotiation. In turn the country quotas are allocated among processors. Processors, in turn, allocate quotas to supplying growers in the form of contracts. 'A' quota sugar receives the fully supported internal market price but is subject to certain levies, discussed below.

'B' quota — 'B' quotas represent smaller quantities than A quotas and are determined as a percentage of the A quota (in the period 1986-87 to 1990-91 it was 21.7 per cent for the Community as a whole; the extent of B quotas as a percentage of A quotas differs among member countries). B quotas are allocated to countries, processors and growers in the

same way as A quotas. However, B quota sugar is subject to certain levies that are above those applying to A quota sugar. These levies, which are discussed below, are imposed specifically on B quota sugar if the funds from them are required to finance industry support arrangements. Producers may elect to offset some of a particular year's B quota sugar against their next year's A quota.

'C' sugar — This category includes all sugar produced beyond A and B quota sugar. All such sugar, except quantities which growers may elect to offset against their next year's A quota, must be exported without any Common Sugar Policy support by 1 January following the close of the marketing year. No quantitative limits apply to C sugar production.

The quantities of B quota and C sugar that are carried forward to offset against the next year's A quota are normally limited to 20 per cent of the A quota.

The levies that are applied to A and B quota sugar are central to the operation of the Common Sugar Policy, which since the mid-1980s has been designed to be self-financing. The levies are:

- a 'basic' levy of up to 2 per cent of the intervention price, which applies to both A and B quota sugar.
- a B quota levy of up to 30 per cent of the intervention price, but if this is insufficient an additional levy of up to 7.5 per cent is imposed.
- an 'elimination' levy which has applied since 1986-87 to both A and B quota sugar. The objective of this levy is to eliminate the deficit between the cost of the programs and the levies that had been applied over the five years to 1985-86. This levy is applied at an average rate for the Community of 1.31 per cent of the 1985-86 inter-

vention price but the rates differ among member countries depending on the proportion of the total of producer levies raised in the five years ended 1985-86. This rate of levy was determined to clear the deficit over a period of five years.

- an 'additional' levy on both A and B quota sugar to cover any shortfall between the cost of running the Common Sugar Policy in any one specific year and the various above-mentioned levies.

The cost of the levies is split 60:40 between growers and processors (Harris, Swinbank and Wilkinson 1983).

From the above description of the quotas and levies, it is apparent that the levies on B quota sugar can be far larger than those on A quota sugar. The actual extent of the difference is determined by the levies of up to 30 per cent and up to an additional 7.5 per cent that apply to B quota sugar. The application of these additional levies results in the effective support prices for B quota sugar being a maximum of 37.5 per cent of the intervention price below the A quota price. The support and levy arrangements are depicted in figure C, while aggregate Community quota levels that have applied since 1968-69 are shown in table 2.

2 EC sugar quota levels

	A quota kt	B quota kt	Total A + B kt
EC-6			
1968-69	6 480	2 050	8 530
1969-70	6 480	2 050	8 530
1970-71	6 480	2 050	8 530
1971-72	6 480	2 050	8 530
1972-73	6 480	2 050	8 530
1973-74	6 480	2 050	8 530
EC-9			
1974-75	7 820	2 931	10 751
1975-76	9 136	4 114	13 250
1976-77	9 136	3 199	12 335
1977-78	9 136	3 199	12 335
1978-79	9 136	2 512	11 648
1979-80	9 136	2 512	11 648
1980-81	9 136	2 512	11 648
EC-10			
1981-82	9 516	2 242	11 758
1982-83	9 516	2 242	11 758
1983-84	9 516	2 242	11 758
1984-85	9 516	2 242	11 758
1985-86	9 516	2 242	11 758
EC-12			
1986-87	10 540	2 288	12 828
1987-88	10 540	2 288	12 828
1988-89	10 540	2 288	12 828
1989-90	10 540	2 288	12 828
1990-91	10 540	2 288	12 828

Source: Commission of the European Communities (1990a).

Policy coverage

An important element of the EC's sugar support arrangements is that as well as applying to sugar they apply to 'isoglucose' which is defined as products derived from glucose or its polymers, containing at least 10 per cent fructose. Separate A and B quotas apply for isoglucose for each member country (excluding Ireland and Denmark) which results in the same kinds of limits on support that apply for sugar also applying for starch based sweeteners. As at 1990-91 the total of A and B quotas for isoglucose in the Community is 291 kt dry matter, compared with aggregate sugar quotas 12.8 Mt white value.

The application of limits to the quantities of both sugar and starch based substitutes receiving support is in contrast to the open-ended support that has applied in the United States. In the latter country the high support for sugar is reflected in

high domestic market prices that have encouraged the development and production of starch based substitutes, in particular high fructose corn syrup, thus proliferating the economic distortions from the sugar support regime (Sturgiss, Field and Young 1990). In the case of the European Community, such additional distortions are limited though not prevented or eliminated by the incorporation of isoglucose in the regime.

Arrangements for ACP producers and imports

Under the terms of the Lomé Agreement with African, Caribbean and Pacific states (ACP countries) and an agreement with India, the European Community permits the entry of 1.4 Mt of raw sugar, or 1.3 Mt white sugar equivalent. This sugar enters the Community at cif prices which are equivalent to EC internal support prices.

As the Community's production of A and B quota sugar already exceeds the Community's own consumption, these imports result in an increase in the quantity of the Community's quota sugar that is exported with the aid of export restitutions (subsidies). Harris, Swinbank and

Wilkinson (1983, p. 318) indicated that export restitutions on an amount of sugar equivalent to the ACP imports were moved from the Community Agricultural Guarantee and Guidance Fund (EAGGF) under which price support is provided to agriculture, to the Development Aid heading in 1981.

With the expansion of the European Community to incorporate Spain and Portugal from 1 January 1986, interim arrangements have been made for imports by Portugal which has been almost entirely dependent on imports. Portugal has imported around 300 kt of sugar a year whereas Spain has been approximately self-sufficient.

Under the interim arrangements Portugal may import a quota of 75 kt at a reduced import levy from four ACP states from which Portugal had been importing when it joined the Community. The balance is to be imported from the Community's raw sugar supplies, largely ACP cane sugar, some cane sugar from French Overseas Departments and EC beet raw sugars. Provision exists for Portugal to import additional quantities if available supplies from the above sources are inadequate.

Application and effects of the EC sugar regime

From chapter 2 some of the main characteristics of the EC support regime and its effects on production, consumption and trade and some factors which influence its economic efficiency can be identified. These include:

- support is restricted to specified quantities — it is not open ended;
- EC producers of sugar are levied so that the support arrangements are budget neutral;
- the regime operates for the processed product; and
- the regime covers isoglucose as well as sugar, thereby preventing some of the substitution effects that would arise from the internal price support for sugar.

In this chapter specific ways in which the sugar support arrangements are applied in different parts of the Community and some of the main effects of the policy as it is applied in practice on production, consumption and prices within the European Community are examined.

While some of the regulatory limitations imposed by the regime could restrict distortions that would arise from a more open-ended support system, there are several features of the EC system and its operation that are still market distorting. Indeed some of them could well institutionalise market distortions.

The most obvious market distorting element of the EC arrangement for sugar is that domestic prices are supported at levels that are normally well above world market prices. The higher prices result in

significant extra costs to consumers that exceed the transfers by them to producers, thereby incurring economic costs for the Community. The nature of those economic costs is discussed in box 1.

As well as the obvious economic costs to consumers associated with the supported internal prices, there are economic costs arising from resource misallocations in the production of sugar. These resource misallocations and associated costs can be seen to arise from seven main sources:

- the installation of extra production capacity arising from the security of returns on quota sugar and the ability to cover fixed capital costs from such returns to produce non-quota sugar at marginal cost;
- political pressures for EC policy makers to increase quotas after periods of high world prices while never reducing A quotas when world prices decline;
- an element of cross-subsidisation of B quota sugar as a result of the levy arrangements applying for quota sugar;
- the stimulus to production through 'mixed price' or price averaging across the various categories of sugar as practised in some member countries;
- an incentive to produce some sugar beyond A and B quota entitlements to ensure that quotas are filled and quota benefits are not lost;
- the allocation of quotas to countries which would produce less than quota levels if they had not received the quota benefits; and

- the operation of the monetary compensatory amount (MCA) system which boosts producers' returns in domestic currencies in certain member countries.

These seven resource misallocations and associated costs are now discussed in more detail.

Quotas and production capacity

The argument that sugar producers and processors could cover their fixed costs with the high and secure returns from their quota sugar and produce C sugar at marginal cost was advanced by Harris

(1980). Theoretical aspects of this proposition are given in box 2. From the argument presented in that box it is concluded that some producers and processors who were producing C sugar as well as their B quota sugar would be able to do so only because their fixed capital cost in purchasing the specialised capital equipment needed for beet production and processing were covered by the high returns for quota sugar. The marginal cost at which they produced the C sugar could still be below their average cost and they would have incurred losses had it not been for the fact that the cost of their fixed capital was covered by quota

Box 1: Economic costs to the European Community arising from sugar prices to domestic consumers being held above world prices

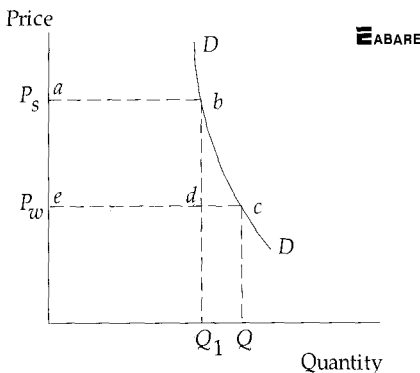
One effect of the EC sugar regime is to raise EC prices to consumers to well above world market prices in most years. The extent of the difference between the internal market price and the world market price, however, will depend to a degree on whether the world market price is the price that EC sugar would be sold for on world markets (an *fob* export parity price) or the price that sugar imported free of duty from exporting countries could enter the Community (cif import parity price).

The relevant price with which to compare the internal supported price will depend on

whether the Community would remain a net exporter of sugar if support were removed or if it would become a net importer. In the former case an export parity price would be the most appropriate price from which to gauge the price effects of support. In the latter case the most appropriate price for comparison would be an import parity price. The transfers from EC consumers to producers arising from the internal support price being held above world prices are depicted in the diagram.

In the diagram, *DD* is the EC demand curve for sugar; P_w is the world price for sugar (import or export parity as discussed above); and P_s is the internal support price.

At the world market price P_w , EC consumers would have used an amount of sugar Q . However, because the price is supported at P_s they consume only Q_1 . The utility or welfare of consumers (sometimes termed consumers' surplus) is reduced by the area *abce* as a result of the price rise. Part of that area (*abde*) is a direct transfer to producers on the quantity purchased at the supported price. The other part of the loss in consumers' surplus (*bcd*) is a loss to the EC economy.



sugar returns and having been such could be considered to have a low opportunity cost.

The fact that no sugar producers in the Community produce C sugar alone suggests that C sugar production in its

own right is not profitable relative to other activities, at least over a number of years, and that C sugar production depends significantly on investments made with the primary objective of producing quota sugar (see Borrell and Duncan 1990).

Box 2: Links between quota and non-quota sugar production

Harris (1980) and Noble (1990) argue that lower cost EC producers are able to expand their production as a result of their quotas through covering their fixed costs by their quota returns and being able to produce non-quota sugar at marginal cost. Borrell and Tsolakis (1984) elaborated on this idea by using the theoretical structure for a single producer, as shown in the diagram.

In the diagram, P_A is the A quota price; P_B is the B quota price; P_w is the world or C sugar price; Q_A is the total A quota quantity; Q_B is the total of A quota plus B quota quantity; Q_w is the total of A quota plus B quota plus C sugar production; Q_{be} is the initial break-even quantity where returns for A sugar are sufficient to cover total (fixed plus variable) costs.

Provided the price for A quota sugar, P_A , was sufficiently high and the quantity of A quota sugar was above a break-even point, the producer or processor would fully cover total costs from A quota sugar and obtain some surplus. The excess of total returns over total cost on A sugar, if only the full A quota were produced, would be the area *abcd*.

As shown in the diagram, the producer would be maximising total profits at the point where the marginal revenue (which is the world price) equals the marginal cost of production, at point *e*. That point, however, is shown to be below the average total cost of production of Q_w . Consequently, if it were not for the quotas and the surplus that they provide, this grower would not have covered total costs and would not have continued to produce at the price P_w in the long term.

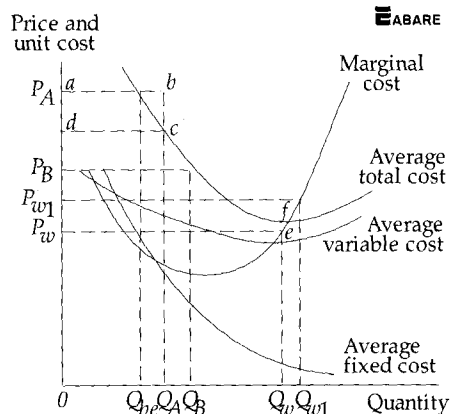
Furthermore, if P_w were the expected long term price and the producer did not have the benefit of the higher quota returns, that

producer would not have entered the industry. For producers in this situation the existence of the quotas, with the associated price support, would stimulate production, not only of quota but also of overquota sugar.

If, on the other hand, world prices were consistently around P_{w1} , above the point *f*, where the marginal cost equals average total cost, the producer would maximise profits by producing Q_{w1} , which would, in the static framework, be unaffected by the quotas.

It is also possible, or even likely, that the surplus generated by producers from quota production could result in the application of improved capital and other inputs that could shift the marginal cost curve downwards and to the right, which would further stimulate total production.

So there are some arguments which indicate that the existence of the quotas would stimulate overquota production, but the extent would depend greatly on the characteristics of the costs of individual producers and the levels of world market prices relative to those costs.



The expectation that C sugar production in its own right might not be profitable would seem to be reasonable given the inflated cost of land resulting from the support of alternative enterprises and given the wide range of crops and livestock products that receive substantial support under the Common Agricultural Policy.

Growth in A quotas

In the period since 1968-69 when the Common Sugar Policy was introduced, there has never been a reduction in A quota levels. In fact, apart from increases in A quotas in total that have arisen from the entry of new member countries in 1973, 1981 and 1986, there have only been two significant changes in A quota settings — an increase from 7.82 Mt in 1975-76 and in 1981-82 from 9.385 Mt, which included a quota for Greece which had just entered the European Community, to 9.516 Mt.

The increased level from 1975-76 was decided upon following two years of exceptionally high world market prices in 1974 and 1975. Again the increase in 1981-82 followed a period of high world market prices in 1980 and 1981. The changes in the A quotas and the levels of world market prices for sugar are shown in figure D.

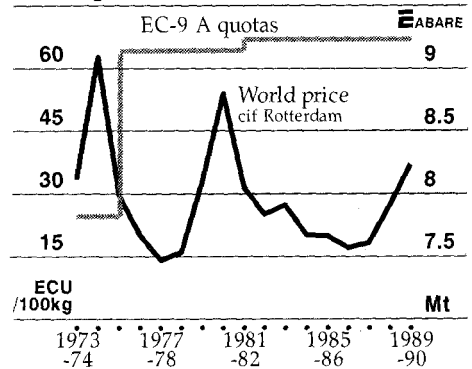
At the same time as A quotas were increased in 1975-76, there was a significant increase in B quota allocations. It appears to be significant that A quota volumes have been maintained, even at times of very low world market prices such as occurred from 1984 to 1987. A degree of responsiveness to market conditions may be observed, however, in the setting of B quotas, especially in the

1970s. B quota allocations rose sharply in 1974-75 and 1975-76 along with the booming world prices at that time but were subsequently reduced when world market prices fell.

Perhaps the readiness of EC policy makers to reduce B quota allocations in the period from 1976-77 to 1980-81 was a reflection of the fact that B quota production up to 1980-81 was never anywhere near as large as the allocations — the farmers just did not fill their quotas. Evidently the levies on B quota sugar were sufficiently high to prevent many farmers in the Community from filling their B quotas.

It may also be observed that considerable quantities of C sugar were often produced in the same years as the B quotas were unfilled (table 3). This reflects a number of characteristics of the arrangements. One is the country specific nature of the quotas. Producers in one country may have relatively high cost structures and may be granted fairly large quotas. They will fill their A quotas. However, if the B quota levies were sufficiently large, they may not be able, given their relatively high costs, to fill their B quotas. Italy is a

D World sugar price and EC-9 A quotas



country that fits this description fairly well, although there are price averaging factors there that help growers to fill their B quotas, as will be discussed later. On the other hand France has many low cost producers by Community standards, who can produce significant quantities of C sugar at all but the lowest world prices. Another factor that could result in C sugar production at a time when B quotas are unfilled is that producers can carry C sugar forward to offset against their next year's A quota.

Country by country production performance in relation to quota allocations is

shown for selected major producing countries in selected years in table 4.

Support for B quota sugar

Although the EC sugar regime is designed to be self-financing in a budgetary sense, there are elements in addition to those discussed in box 2 which make it production distorting. One such element results from the support for B quota sugar that has occurred because of the levy arrangements for A and B quota sugar.

It may be observed that the A quotas have, since 1975-76, approximated

3 Degree to which EC quotas have been filled ^a

	A quota	A quota production	B quota	B quota production	Production beyond A and B quotas ^b	Total production
	Mt	Mt	Mt	Mt	Mt	Mt
EC-9						
1974-75	7.280	6.98	2.931	1.38	0.21	8.6
1975-76	9.136	8.53	4.114	1.07	0.10	9.6
1976-77	9.136	8.64	3.199	1.21	0.15	10.0
1977-78	9.136	8.88	3.199	1.86	0.79	11.5
1978-79	9.136	8.96	2.512	1.91	0.81	11.7
1979-80	9.136	9.05	2.512	1.79	1.45	12.3
1980-81	9.136	8.91	2.512	2.11	1.19	12.1
EC-10						
1981-82	9.516	9.36	2.242	2.17	3.52	15.0
1982-83	9.516	9.27	2.242	2.05	2.52	13.9
1983-84	9.516	9.27	2.242	1.66	0.08	11.0
1984-85	9.516	9.27	2.242	1.92	1.31	12.5
1985-86	9.516	9.30	2.242	1.93	1.49	12.7
EC-12						
1986-87	10.540	10.35	2.288	2.18	1.60	14.1
1987-88	10.540	10.24	2.288	2.16	0.81	13.2
1988-89	10.540	10.30 ^p	2.288	2.20 ^p	1.41	13.9 ^p

^a All data are in white sugar equivalent. ^b Includes C sugar and quantities carried forward to be set against next year's A quota. ^p Provisional.

Source: Commission of the European Communities (1990a).

4 EC sugar quotas and production, by country White sugar

	Basic quantity		Sugar carried over from previous year	Current year	Production of A sugar	Production of B sugar	Production of C sugar not carried over	Sugar carried over to next year
	A quota sugar	B quota sugar						
	kt	kt	kt	kt	kt	kt	kt	kt
1981-82: Earlier high world price – high production year								
Germany, FR	1 990	612	–	3 396	1 990	612	641	153
France	2 996	806	–	5 447	2 877	759	1 307	504
Italy	1 320	248	–	2 048	1 319	248	233	248
Netherlands	690	182	–	1 044	690	182	140	32
Belgium	680	146	–	1 028	680	146	152	50
Luxembourg	–	–	–	–	–	–	–	–
United Kingdom	1 040	104	–	1 092	1 040	52	–	–
Ireland	182	18	–	168	168	–	–	–
Denmark	328	97	–	480	328	97	55	–
Greece	290	29	–	323	290	29	–	4
EC-10	9 516	2 242	–	15 026	9 382	2 125	2 528	991
1984-85: Low world price – low production year								
Germany, FR	1 990	612	40	2 893	1 990	610	134	199
France	2 996	806	147	4 257	2 860	759	356	429
Italy	1 320	248	1	1 274	1 275	–	–	–
Netherlands	690	182	–	934	690	182	10	52
Belgium	680	146	–	841	680	145	16	–
Luxembourg	–	–	–	–	–	–	–	–
United Kingdom	1 040	104	–	1 314	1 040	104	120	50
Ireland	182	18	19	222	182	18	22	19
Denmark	328	97	–	547	328	97	122	–
Greece	290	29	7	219	226	–	–	–
EC-10	9 516	2 242	214	12 501	9 271	1 915	780	749
1988-89: Medium world price – relatively high production year								
Belgium	680	146	17	925	680	146	64	52
Denmark	328	97	–	506	328	97	81	–
Germany, FR	1 990	612	224	2 763	1 990	611	271	115
Greece	290	29	–	216	216	–	–	–
Spain	960	40	38	1 187	960	40	57	168
France	2 996	806	457	4 351	2 889	759	789	371
Ireland	182	18	34	195	182	18	–	29
Italy	1 320	248	264	1 479	1 320	248	–	175
Luxembourg	–	–	–	–	–	–	–	–
Netherlands	690	182	138	988	690	182	164	90
Portugal	64	6	–	1	1	–	–	–
United Kingdom	1 040	104	102	1 304	1 040	104	160	102
EC-12	10 540	2 288	1 274	13 915	10 296	2 205	1 586	1 102

Source: Commission of the European Communities (1990a).

domestic consumption but since 1986, when Spain and Portugal joined the Community, consumption has exceeded A quotas by some 300 kt a year. The remaining quota sugar which is equivalent to B quota sugar less any excess of total consumption above A quota sugar will be exported, as well as all C sugar which is not carried over for offsetting against subsequent A quotas.

So when the deficit on Community sugar support (which the elimination levy was designed to expunge over the period 1986-87 to 1990-91) is eliminated, the support arrangements should be fully financed by levies on growers and processors on a year by year basis. However, the levies for financing the cost of support, which is mainly for export restitutions, are not all paid by producers and processors on the quantity of supported sugar that is exported. They are paid partly as levies on A quota as well as on B quota sugar.

In fact, as long as A quota production approximates EC consumption, the one reason that effective prices received for B quota sugar, after the levies, will usually be above C sugar prices is that a fairly large part of the restitutions on exported quota sugar (which would approximate B quota production) is financed through the levies on A quota sugar. That large part arises despite the relatively small basic levy of only 2 per cent that applies to both A and B quota sugar and the again fairly small additional levies that can be applied across A and B quota sugar to finance any annual deficit. It arises because the quantity of A quota sugar is usually about five times as large as the quantity of B quota sugar produced (see table 3) and because of the limit of 37.5 per cent that applies to levies that are specific to B quota sugar alone.

A hypothetical example of how the levies result in prices for B quota sugar

that are above those for C sugar in years of low world prices is shown in box 3.

The most important thing to note about these levy arrangements from the standpoint of the economic efficiency of the policies is that although they are budgetarily self-financing they still distort both consumption and production. Essentially what the Community has done is to make the producers pay the subsidies on exports of quota sugar from levies placed on all quota sugar, but at different rates for A and B quota sugar. As consumers ultimately finance the full excess of producers' returns for quota sugar above the value of that sugar at world prices, they ultimately finance a large part of the producer levies, which are equivalent to the export subsidies.

Mixed pricing

Yet another source of production distortion that arises from the EC sugar regime is the practice of price averaging across the three categories of sugar. While the pricing and levy arrangements at the Community level differentiate clearly between the prices, levies and sales conditions for A quota, B quota and C sugar, that degree of differentiation is not practised in some member countries.

Full price averaging involves the payment of a uniform weighted average price to the growers for all their beet (Landell Mills 1990b). The practice of price averaging across categories of sugar stimulates production levels as the A quota price is paid for most production and when it is averaged with lower prices received for much smaller quantities of B quota and C sugar, the price received for the marginal unit of production is much increased relative to the world market

price. It is this price for the marginal unit produced, in conjunction with the cost of producing that marginal unit, that determines the level of production.

The means by which various degrees of price averaging can increase aggregate production by individual growers, member countries and by the European Community in total are discussed in detail in box 4.

The degree of price averaging has varied over time. Belgium and the Netherlands had full price averaging policies until the mid-1980s. However, Belgium now operates a 'little' mix, with only 10 per cent of its B sugar averaged with its A sugar, while the Netherlands operates a partial mixed price 'incorporating a limited quantity of C beet' (Landell Mills 1990a).

Box 3: Example of how the levies on quota sugar affect B sugar prices

In this hypothetical example, the aim is to show how levies on A and B quota sugar result in prices for B quota sugar being above prices of unassisted C sugar in a year of low world prices.

Assumptions

- The internal EC price is supported at the intervention price level.
- EC intervention price = 100 units/t (where 'units' are hypothetical currency units).
- World price received from exports in a particular year = 40 units/t.
- A quota production = 10.5 Mt.
- B quota production = 2.2 Mt.
- EC consumption = 10.5 Mt.
- EC exports = the equivalent of B quota production (2.2 Mt) + C sugar production (assuming no C sugar is carried forward).
- Basic levy on both A and B quota sugar = 2 per cent.
- Limit on levies that are specific to B quota sugar alone = 37.5 per cent.
- The only costs of budgetary support are those associated with covering the difference between the internal supported price and the price received on world markets on the 2.2 Mt of supported sugar that is exported.

Example

Budgetary cost of export restitutions
 = $(100 - 40) \times 2.2$ million units
 = 132 million units

General 2 per cent levy on A and B quota sugar
 = $100 \times (10.5 + 2.2) \times 0.02$ million units
 = 25.4 million units

Specific levies on B quota sugar
 = 2.2×37.5 million units
 = 82.5 million units.

Total of 'normal' levies on A and B quota sugar
 = $25.4 + 82.5$ million units
 = 107.9 million units.

Excess of budgetary cost over 'normal' levies collected
 = $132 - 107.9$ million units
 = 24.1 million units

Additional levy on both A and B quota sugar to fully offset funding short fall
 = $\frac{24.1}{(10.5 + 2.2)} = 1.9$ units/t = 1.9 per cent

Total levies on A quota sugar

General levy	2.0 per cent
Additional levy	1.9 per cent
Total levies	3.9 per cent

Total levies on B quota sugar

General levy	2.0 per cent
Specific B quota levies	37.5 per cent
Additional levy	1.9 per cent
Total levies	41.4 per cent

Effective prices after levies

A quota sugar = $100 - 3.9 = 96.1$ units/t
 B quota sugar = $100 - 41.4 = 58.6$ units/t
 C sugar = 40 units/t

When a country has practised price averaging in the past, its industry is likely to remain larger than if that practice had never been applied for a number of years. This is because the higher marginal price received in the past would have stimulated the overall capacity of the industry, including the purchase of capital of a relatively fixed nature such as major items of farm plant and equipment and processing equipment in factories. The cost of such equipment having been sunk can result in it continuing to be used even though the price averaging may have been discontinued.

Currently, Italy, Spain and Greece practise full price averaging and degrees of price averaging are also practised in the United Kingdom and Ireland (averaging A and B quotas but not C sugar). In 1987-88, these countries produced 4.4 Mt of sugar or one-third of the EC total.

As pointed out by Landell Mills (1990b), and as shown in box 4, the countries which practise price differentiation are more exposed to world market forces than the countries which practise

price averaging. They also observed that now that Belgium and the Netherlands have adopted differentials in their pricing although not complete price differentiation, all of the main, or what they call 'vocational' exporters, practise differentiated pricing. Those exporters include France, the Federal Republic of Germany, Belgium and the Netherlands.

Even though the countries that practise price averaging may not be the Community's main exporters, this practice is still distorting in a Community-wide sense. An extra unit of production in a country that has price averaging increases EC production as much as an extra unit in a major exporting member country. To the extent that price averaging has been reduced in the exporting countries, the Netherlands and Belgium, there has been an improvement in market orientation.

Extra production to ensure quota benefits

A further factor which would tend to result in higher EC sugar production as a result

Box 4: Effects of price averaging on production

One of the more important effects of a quota arrangement such as that applying for sugar in the European Community is that the quotas are intended to limit production that would otherwise be distorted by the high support prices. For some major producing countries in the Community, the incentive not to produce beyond the quotas is the price penalty on overquota production in doing so. If, on the other hand, producers are sufficiently efficient to produce at the world (or C sugar) price they are not prevented from doing so. As is evident from box 2, such a system can stimulate total EC sugar production. However, it would not stimulate it as much as when producers were able to average their

prices for A and B quota sugar and for C sugar. The effects of averaging of the prices for the various categories will differ between producers (growers and processors) depending on:

- the degree of price averaging practised — whether it was for A and B quota sugar alone, just for part of A and B quota sugar or whether the averaging also included C sugar;
- the relative sizes of these categories of sugar;
- the responsiveness of producers' supplies to the price received for the marginal unit produced; and
- the cost levels of individual producers.

Full averaging at the national level

To explain the effect of averaging prices across A and B quota sugar and C sugar it is assumed that a particular country practices full averaging. That is, the total returns for A, B and C sugar are pooled and each grower of sugar beet is paid the same price per tonne of beet irrespective of the category into which it falls. Commencing with the situation for the country as a whole, the situation would be as shown in the diagram. In the diagram, Q_A is the national A quota quantity in sugar beet equivalent and $Q_A - Q_B$ is the total B quota quantity in beet equivalent. P_A is the Community support (intervention price) price for A quota sugar in beet equivalent and P_B the community support price for B quota sugar also in beet equivalent. P_w is the beet equivalent of the world market price, which is below both P_A and P_B . MC is the aggregate supply (marginal cost) curve for sugar beet for the country, which is the horizontal summation of the supply curves of all sugar beet producers. It is assumed that this is a fairly high cost country.

If averaging did not occur, sugar beet production would have been only Q_n , the quantity at which the supply (marginal cost) curve intersected the marginal return curve which is the B quota price line. This would have been sufficient to produce enough beet to fill the A quota Q_A , but not sufficient to fill the B quota ($Q_B - Q_A$) as well.

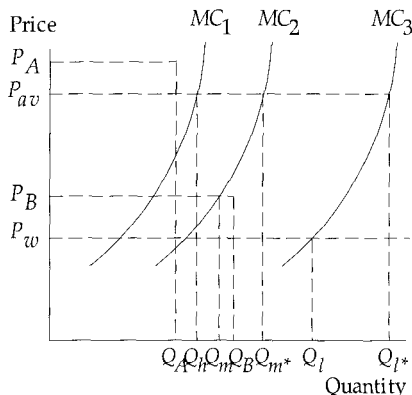
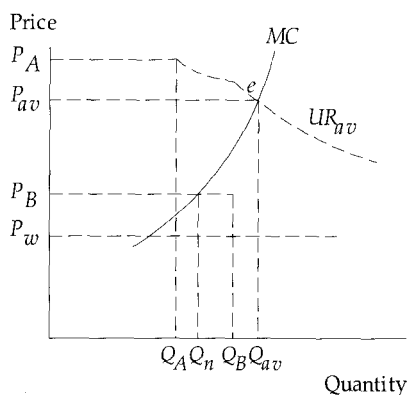
However, under price averaging, producers would have received price P_A if they

produced any quantity up to Q_A . But as soon as they produced any quantities above Q_A , the average price received would decline, reflecting in the first instance the lower price of B quota beets and then for quantities beyond Q_B the still lower price of beets for C sugar. The average price line for quantities beyond Q_A is the dotted line UR_{av} which would eventually become asymptotic to P_w .

As the supply curve of sugar beet producers in this country is MC and that curve intersects the average price line UR_{av} at the point e , the quantity produced in the country when full averaging applied would have been Q_{av} . The effect of producers receiving the average price rather than fully differentiated prices for the different categories of sugar would be to increase the country's production by $Q_{av} - Q_n$. So instead of the country not even being able to fill its B quota as well as its A quota, the averaging would enable it to fill its A and B quotas and to produce $Q_{av} - Q_B$ of beets for C sugar.

Averaging at the individual grower level

In the explanation above for averaging at the national level, the collective decisions of growers affect both the levels of production and the average price simultaneously. However, individual growers are usually too small to materially affect the quantity produced nationally or the average price. Each grower decides how much to produce given that grower's supply (marginal cost) curve and expectations of the average price,



which in turn are conditioned by judgments about how much of the various categories will be produced by other growers and of the prices for each category.

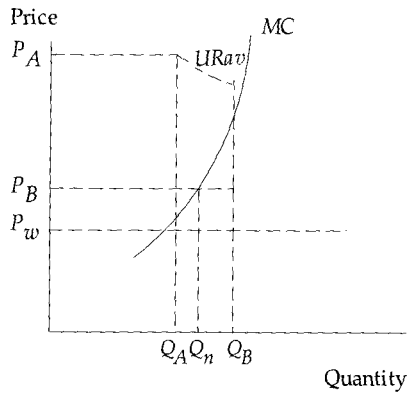
In the second diagram the situation of three separate growers each facing the same expectations of average national prices is depicted. For ease of explanation each grower is assumed to have the same A and B quota entitlements. However, grower 1 is a relatively high cost producer, with a marginal cost curve MC_1 , grower 2 is a medium cost producer, with a marginal cost curve MC_2 , and grower 3 is a low cost producer, with a marginal cost curve MC_3 .

If a fully differentiated quota system had applied, grower 1, who has the high cost supply curve MC_1 , would produce the A quota entitlement Q_A . However, the costs of this grower would preclude any production above the A quota. If, on the other hand national price averaging applied, this grower, expecting a price of P_{av} , would produce Q_h . The price averaging effect would be to raise production by $Q_h - Q_A$. Similar situations would apply for the medium cost producer whose production would be increased from Q_m with a differentiated system to Q_m^* , with averaging and for the low cost producer whose production would rise from Q_l with price differentiation to Q_l^* , with averaging. Overall the production of the three producers would rise by $(Q_h - Q_A) + (Q_m^* - Q_m) + (Q_l^* - Q_l)$. The national increase due to averaging would be the sum of the increases by all individual growers.

Limited averaging at the national level

The degree of price averaging will influence the extent of its effect on production. Where a country averages prices for A and B quota beets only and excludes beet for C sugar the averaged price for quota sugar will be higher. At the national level the effect for a country which has relatively high production costs and which would not even fill its B quota without any averaging is shown in the last diagram.

In this example the nation, being a relatively high cost producer, has an



aggregate supply curve MC . Had strictly differentiated prices applied for A and B quota beet production, total production would have been Q_n which would have been sufficient to fill the national quota Q_A but only to produce $Q_n - Q_A$ of B beet.

If it is assumed that averaging A and B beet occurs, the price P_A would apply up to the A quota quantity Q_A . But for each additional unit of B quota beet produced the average unit return declines along the dotted line UR_{av} . With averaging of A and B prices for beet, the unit return at Q_B the quantity sufficient to fill both A and B quotas is shown to be well above the national marginal cost, so growers will produce to fill both the national A and B quotas. However, as shown here for this relatively high cost country, there are no producers who could grow beet at the world (or C sugar) price, P_w . So in this instance national production will have been increased by $Q_B - Q_n$ as a result of the averaging for A and B quota beet alone. So, while the averaging can stimulate production, the increase will be contained within the total of the quota.

Main points

Full averaging for A, B and C beets increases production of quota sugar and can also stimulate C sugar production.

Averaging for A and B beets alone stimulates production of quota sugar but should not directly stimulate production of C sugar.

of the quota arrangements results from the risk aversion of growers who face the loss of quota benefits if their quotas are not filled. Where those benefits are large, as with A quotas, risk averse growers will plant a certain amount in excess of what might be required normally to obtain the quota benefits, just to make sure that seasonal conditions do not force a shortfall in production. This risk averse behaviour would be abetted by the ability to carry forward quantities of B and C sugar to offset against the next season's uncertain A quota production.

The EC sugar regime has, since 1981-82, encouraged the carrying forward of one season's B and C sugar to be offset against the next season's A quota by paying refunds on the storage costs involved. When growers can hold sugar with little storage cost and with an opportunity to obtain much higher prices for it in the next season, many will do so. The amount of sugar that can be carried forward in this way is 20 per cent of the A quota quantity.

Allocation of quotas between countries

An important facet of EC sugar arrangements that appears to result in significant upward distortions to production is the way in which the quotas are allocated between countries. For some countries which differentiate strictly in pricing between A, B and C sugar, and which regularly produce significant quantities of C sugar, their sugar production will be responsive to world prices. That does not mean that the support is fully trade neutral as can be seen from the principles discussed earlier in box 2. However, these industries will be responsive to world market conditions.

For some EC countries, however, production is normally largely confined to A and B sugar. These countries would be likely to produce significantly less if they did not obtain the high support prices for quota sugar. So, while the Community's production of C sugar is responsive to world market prices, significant quantities of quota sugar are produced in some countries where production would otherwise be much lower. In particular, relatively large quotas may be granted to certain countries with high cost production, as a form of Community funded regional social support. Such quotas would increase production in those countries, thereby expanding production in the Community as a whole.

Examination of table 4 indicates that certain countries, in particular France, but also the Federal Republic of Germany, regularly produce significant quantities of C sugar as well as filling most of their A and B quotas. In contrast, countries like Italy and the United Kingdom produce very little C sugar.

For countries where production is no greater or only a little greater than the quotas, the quota system does not restrict sugar production at all — it increases production. The reason is that producers are not prevented from producing as much C sugar as they like, but they choose to produce little C sugar because their cost structures limit production to levels that receive supported prices. On the other hand the high returns for quota sugar stimulate production within the quotas. Effectively the quotas and the support which accompanies them expand production but limit the extent of the expansion.

Apart from France, the Federal Republic of Germany, Belgium, the Netherlands and to some degree the United

Kingdom, very little C sugar is produced and retained as C sugar. If overquota production occurs in these other countries most of it is carried over to be offset against the next season's A quota.

It may be observed that the countries which seldom produce much beyond their quota amounts are largely the same countries which practise price averaging. The largest is Italy, where growers receive significant special support beyond that in other Community countries in addition to there being a price averaging regime. For example, Italian producers have had a higher intervention price than has applied for other members of the Community except for Spain. In addition, Italian producers receive national aid amounting to 23.64 per cent of the common Community white sugar intervention price (Landell Mills 1990b).

The effects on Italian sugar production of the combination of price averaging, national support and the higher intervention price are discussed in box 5. It is estimated that in 1986-87 Italian sugar production would have been boosted by 0.4-0.8 Mt as a result of Community and national support. In 1987-88, when 0.26 Mt of C sugar was carried forward to be set against the next year's A quota the combined effects of these factors and the ability to carry forward C sugar would have been greater still.

The analysis presented in box 5 is strictly a short term appraisal using short term supply elasticities. Landell Mills (1990a) report that the Italian government claims that the national supports are necessary because of higher costs of production, particularly in the south and that 'growers must receive additional compensation in order to keep them in production'. If that claim is correct, the

longer term production stimulating effect of the support measures for Italy would be greater than the effects estimated in box 5.

While Italy has been taken as the main example of how the EC allocation of quotas provides a stimulus to EC sugar production, the same principle applies for the other countries which produce very little C sugar and which practise price averaging.

Green currency and MCA effects

One characteristic of the EC arrangements of administered support prices has been that for agricultural products that come under Common Agricultural Policy pricing provisions the support prices are translated into national currencies at different exchange rates from the general exchange rates at which the national currencies are traded. These rates for agriculture are termed green rates. The differences between the agricultural and the national rates are covered by a system of border subsidies and taxes known as monetary compensatory amounts (MCAs).

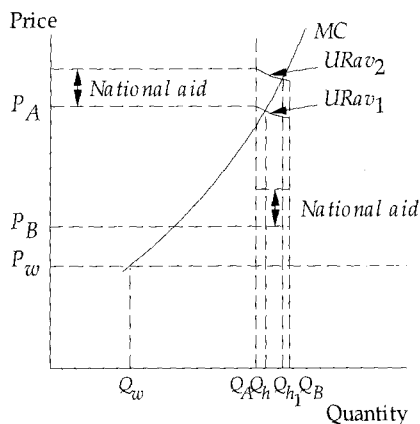
Since 1984-85 efforts have been made to phase out MCAs. The method that has been adopted has been to establish green central rates, with the MCAs being determined from the difference between each country's green rate and the green central rate — see Bureau of Agricultural Economics (1985). The green central rate has, in turn, been directly linked to the German Deutschemark, which has normally been the Community's strongest currency. By doing this the creation of higher positive MCAs (border subsidies for exports from the country with those MCAs) is prevented. However, by linking the green central rates to the strongest

Box 5: Assessment of production stimulating effects of support in Italy

Two elements of the support regime in Italy interact to make the sugar policy more production stimulating in that country than in most other EC countries. They are price averaging in conjunction with substantial national supports. In this box a brief assessment is made of the effect of this support on production.

National support in Italy has been provided at a rate of 23.64 per cent of the common EC intervention price for white sugar but it has been paid on A and B sugar only (Landell Mills 1990b). Since 1981-82, Italy's sugar production has averaged just under the total of that country's total of A and B quotas. Also, substantial use of favourable EC storage cost compensation arrangements for sugar that was produced above quotas in individual high production years enabled most overquota sugar from such years to be carried forward and offset against the next year's A quotas (see Commission of the European Communities 1990c). Consequently national support which applies for quota sugar only would have been provided on almost all of the sugar produced in Italy. The interaction of this national support with price averaging arrangements for beet on average is depicted in the diagram.

The national support would have raised the average unit return line from UR_{av1} to



UR_{av2} and had the effect of increasing Italian production from Q_h to Q_{h1} , thereby approximately filling the quotas on average over the period. Had no national support been given, but price averaging applied, Italian production would have been Q_h , giving a production stimulating effect for price averaging of $Q_h - Q_A$, if it is assumed that the marginal cost curve MC intersects the line Q_A above the price P_B . If all support were removed, production would fall to Q_w .

In the following examples a brief assessment is made of the extent to which sugar support enhances Italy's production, using the following assumptions for 1987-88.

- The production included as actual production for each year includes A, B and C sugar but does not include C sugar which is carried over and set against the next season's A quota.
- The A and B quota, pricing and levy arrangements are those that applied to Italy in 1987-88, while C sugar was valued at the export parity price.
- Italian national support was 23.64 per cent of the common intervention price, or 12.81 ECU/100 kg on quota sugar.
- The proportionate distribution of returns between processors and growers was fixed.
- The average price for sugar that was estimated from the above assumptions for 1987-88 was 60.4 ECU/100 kg which included national as well as Community support.
- The elasticity of supply for Italy was 0.57 (Gemmill 1976). This elasticity was estimated from average prices and would therefore be appropriate to apply in Italy where price averaging is practised.

Assuming a constant supply elasticity of 0.57 it is estimated that if all Italian sugar received only the world market price in 1987-88, Italian sugar production would have been only 815 kt compared with actual production (excluding C sugar carried forward to offset against the next year's A quota production) of 1603 kt.

However, the estimate is sensitive to the assumed supply elasticity, and a separate analysis was carried out to estimate Italy's supply elasticity. From that analysis, which is reported in appendix A, it was estimated that the elasticity was 1.36 over the period 1973–87. With an elasticity of that level the estimated Italian production would have been only 319 kt in 1987–88 had it received the world price.

While the latter elasticity estimate is well above that calculated by Gemmill, some economists have argued that elasticities of supply generally should be lower than those estimated by Gemmill (see Buckwell 1988 and discussion in chapter

4). If it were assumed that the elasticity of supply was 0.3, Italian production in 1987–88 given returns equal to the world price would have been 1123 kt — still well below actual production.

On the basis of this analysis, it is concluded that in the absence of support, Italian sugar production would be significantly below even its A quota total of 1320 kt in most years depending on the responsiveness of production to prices. Such an observation is consistent with the Italian government's view reported by Landell Mills (1990a) that Italian growers depended on government support to remain in production, particularly those in the south.

currency, the negative MCAs (border taxes) of the members with the weakest currencies are increased. This mechanism is sometimes termed 'the switch-over' or 'central rate correcting factor'. Over the period from its inception of 1984–85 to March 1990, this arrangement has resulted in a distortion between the green rates and the central rates equivalent to 14.5 per cent (Agra Europe 1990a).

This distortion would have been reflected in increased negative MCAs (border taxes) for Community members other than the Federal Republic of Germany had provision not been made for those countries to compensate for the creation of these negative MCAs by devaluing their green currencies relative to their green central rates. Such devaluations, which have been widely applied either in whole or recently in part, have resulted in increases in Community determined farm prices in these countries' national currencies. By so doing they have resulted in average price increases to farmers for the European Community as a whole in national currencies that have exceeded those determined centrally in ECU.

The implications of these MCA factors for sugar production and consumption in the Community are that price rises that arise from the MCA system are equivalent to increases in protection above levels that would have applied had the same ECU prices for the Community been set without the different exchange rate system for agriculture. Higher support prices result in higher production, especially in member countries where price averaging is practised and where the quota limits are therefore not matched by disincentives to production expansion. Also, higher national support prices as a result of the system reduce Community consumption.

In a recent study, it was also established that MCAs imperfectly bridge the gap between prices in different EC countries and have resulted in welfare costs to the Community through distortions to trade between member countries (von Cramon-Taubadel 1990).

One of the objectives of the 1992 Community program to 'complete the internal market' is to eliminate internal barriers within the Community. The MCA system imposes such barriers. If an effort is made to remove the influence of the

MCA system, the effect that it will have on EC agricultural production, consumption and trade will depend on the method used to dismantle it.

If, for example, the method used so far of creating larger negative MCAs for subsequent reduction and eventual elimination were fully applied, the result would be further increased average national farm producer prices. If, on the other hand, the approach taken were to eliminate both the green central and green rates and to determine agricultural prices through common ECU prices at national currency parities, there would be a reduction in average support prices if other factors remain unchanged.

Effects of special ACP access

The access of ACP (African, Caribbean and Pacific) preferential sugar to the

European Community and the support of that sugar at internal Community prices has a distorting influence on world market conditions.

In effect, these provisions extend Common Sugar Policy support to cover that part of the sugar industries producing for the EC market in the supplying countries as well as Community member countries. The higher prices received in the ACP exporting countries result in higher returns and higher production. The extra production is indirectly fed onto the world free sugar market through larger supported EC sugar exports. The larger volume reaching the market reduces market prices received by those countries which do not have access to the EC market and for sugar beyond their EC export entitlements for the ACP countries themselves.

Policy reform: major issues

Broadly, reforms of support policies applying to commodities such as sugar can be divided into two categories — marginal reforms and fundamental reforms.

If certain costs can be identified with a specific policy regime, marginal reforms may be introduced to contain the costs and to make the regime manageable within certain constraints, often budgetary. Such 'reforms' may do little to reduce the cost to the economy or the Community in general. They may merely result in a transfer of the cost from one group where the cost is very evident, politically embarrassing and administratively difficult — as with costs to taxpayers in terms of budgetary outlays — to groups where the cost is less evident, such as to consumers. In so doing, certain restraints may be placed on the direct resource misallocations involved in the policies, with some benefits to society being obtained from the reforms. However, as the reforms are within a framework that is basically distorting they reduce the distortions and costs by relatively small amounts.

In the European Community there are many political and social forces that tend to direct agricultural policy along this path of marginal reform, largely with a view to reducing budgetary exposure. The sugar regime is now designed to be budget neutral, so no budget imperative exists. Furthermore, there are now strong vested interests established in national member states which have been successful in

obtaining substantial support and which can make it difficult to bring about fundamental changes.

While the history of the Common Agricultural Policy in general has been one of gradual rather than fundamental reform, there are factors which could help to bring about significant policy changes for EC sugar. Some of these are:

- the current thrust to complete the EC internal market;
- the current Uruguay Round of GATT negotiations; and
- concern about the degree of business concentration (monopoly and monopsony) in the sugar processing and other sweetener industries (Noble 1990).

Before discussing these factors, it is necessary to examine the costs and benefits of sugar policies and forces behind reforming these policies.

The cost of EC sugar policies

Most of the distortions to consumption and production that are discussed in chapter 2 result in economic costs within the European Community itself. In the case of EC consumers, the costs are substantial. EC producers including both growers and processors, on the other hand, would benefit in a direct sense due to the transfers from consumers and also from taxpayers in instances where national support is also provided (Italy, Spain and the French Overseas Departments). To the extent that the economic costs to

consumers and taxpayers exceed the benefits to producers, there is an economic cost to the EC economy.

The cost to EC consumers can be fairly readily measured, provided a reliable estimate of the extent to which price changes affect consumption (the elasticity of demand) is used. However, the extent of the costs to the Community resulting from resource allocation distortions in the sugar and other sweetener industries is much more difficult to estimate given the operation of the quota system. The reasons why it is difficult to estimate the extent of production distortions lie in a combination of three factors:

- the politically determined national quotas, which result in some countries having difficulty in filling their quotas while other countries produce well in excess of their quotas;
- the differences between countries in the degree of price averaging across the three categories of sugar; and
- the technical problems associated with estimating supply responses in the different parts of the Community, given the operation of the quota system.

Although these difficulties are acknowledged, an attempt is made in appendix B to estimate the economic costs associated with the EC sugar arrangements. In that appendix the following estimates of average costs and transfers within the European Community arising from the policy are made for the period 1979–89.

- EC consumers have provided transfers in the form of prices above world market prices, averaging 3030 million ECU a year (in constant 1989 values).
- The cost to the economy as a result of the distortion to domestic prices to consumers as a result of the regime is estimated to be within the range of

approximately 190–410 million ECU a year (in constant 1989 values) depending on the elasticity of demand.

- The cost to the economy from the misallocation of resources in production resulting from the support regime is estimated to be in the range of approximately 180–390 million ECU (in constant 1989 values) depending on the elasticity of supply.
- The overall economic cost to the Community as a result of the support system is estimated to be in the range 370–800 million ECU a year (in constant 1989 values).
- In addition to these transfers and costs there are significant transfers and costs arising from assistance measures that are funded by national governments (see Noble 1990). As well as the national assistance measures (mentioned in box 1) that apply for A and B quota sugar for Italy there are special measures for A quota cane sugar for the French Overseas Department and special measures for Spanish sugar to apply in the period of adaptation to the EC regimes until 1995. For 1989–90, these assistance measures are estimated to have cost taxpayers in the countries paying for them 355 million ECU.
- These transfers and costs can be compared with a value of the actual quantity produced at world prices averaging 4625 million ECU a year (in constant 1989 values).

Benefits from the policies and forces inducing reform

While estimates can be made of the costs to certain groups as a result of the policies, the perceived benefits from the policies are often in forms that are difficult to

quantify. Nevertheless, benefits to certain influential groups must have been perceived to flow from the policies — otherwise they would not have been initiated. The benefits from these and other Common Agricultural Policies may be perceived in terms of maintenance of farm incomes, and support of regional economies. But they also may be perceived in terms of political benefits for certain groups, with such groups including political parties and national entities.

Once a system of support for a particular sector, such as agriculture in the European Community, becomes established, a complex web of interdependencies at the farm, processor, regional, national and community levels tend to become institutionalised.

The provision of support may initially relieve hardship to producers. However, support in the form of higher prices induces greater use of purchased inputs and higher costs. It becomes capitalised into the value of fixed assets, in particular land, and is reflected in higher rents for farmers who use rented land. As a result, many people whom the support was designed to help find that over time their incomes are little if any higher than previously. If the support were removed, both the incomes of those people and asset values would fall.

These effects of support have been described by Tullock (1975, p. 671) as 'the transitional gains trap'. If governments were to threaten to reduce support, producers could claim that governments had been responsible for misleading them in providing support in the first instance, and could claim compensation.

Farmers and processors and their employees form regionally important groups with political influence, particularly when parties are closely balanced

electorally, and thus can exercise political influence for retaining the support.

In the European Community, there is a fine balance of national interest involved in the negotiation of support for agriculture, which has accounted for more than two-thirds of Community expenditure. That national interest stems partly from the receipts that individual nations obtain from the Community, which largely take the form of payments for agricultural and regional support. Consequently, any country with a particular agricultural industry that is significant in its economy has a national interest in ensuring high Community support for that industry.

In addition to these factors is the central role of the Council of Ministers which is made up of the national agriculture ministers for matters concerning agriculture. As these ministers are responsible for national agricultures they tend to be favourably disposed toward maintaining EC agricultural support.

At the same time there are countervailing forces that limit agricultural support, including the high budgetary cost of Community contributions by the industrialised member countries which have relatively small agricultures, such as the United Kingdom, and the high costs of agricultural support to consumers. Discussions of the factors that have contributed to EC agricultural support are provided in Bureau of Agricultural Economics (1985) and von Witzke (1986), while more general factors that have contributed to agricultural protection internationally are comprehensively covered in Anderson and Hayami (1986).

While vested economic and political interests are strongly entrenched in providing support for EC agriculture, including to the sugar industry, there are

certain forces inducing change in the Community that could help to bring about reform.

These include the three factors attributed at the beginning of this chapter to Noble (1990), namely completion of the internal market, the GATT round and concern about monopoly in sugar processing. In addition, EC sugar and other agricultural policies will be affected by German reunification and political and economic developments in Eastern Europe.

Pressure to complete the common market

There are probably more elements in the EC sugar support system that contravene the principles of a common EC internal market (which would enable competition on an equal footing within the European Community) than in the support regime of any other agricultural commodity. The determination of production support quotas on a national basis and the different degrees of averaging of prices across the different categories of sugar in different member countries are incompatible with a unified system which enables competition on an equitable basis throughout a single common market.

The distribution of the quotas to favour high cost countries in addition to the special higher intervention prices for those countries institutionalises production inefficiencies and inequities among countries and production areas. National assistance measures in certain high cost countries and the operation of the MCA system further institutionalise production distortions and inefficiencies.

Consequently, a substantial set of regulations and national and regional

support arrangements would need to be dismantled if the benefits of a unified market were to be achieved. The benefits arise from having common policies which allow production to be located, without special support, in the places where it is most profitable. It would also prevent discrimination against consumers and taxpayers in various parts of the Community.

The Community has embarked on a program of removing internal barriers by 1992. This deadline could act as a catalyst to reduce the barriers that exist in the sugar program.

Pressures for reform arising from the GATT

Support for agriculture generally in the European Community and many other countries is being subject to international negotiations in the Uruguay Round, with a view to attaining greater liberalisation of national policies. As support levels for sugar in the European Community have been high, greater liberalisation would result in reductions.

Agriculture has been given a central place in the Uruguay Round of multilateral trade negotiations which is being held under the auspices of the *General Agreement on Tariffs and Trade (GATT)*. This Round commenced in 1986 and was scheduled to conclude at the end of 1990.

The prominence given to agriculture in the Uruguay Round contrasts with a relatively minor place accorded agriculture in previous rounds — the Dillon, Kennedy and Tokyo rounds. This greater emphasis on agriculture arises from a consensus that many harmful distortions to agricultural trade arise from the effects of national policies and that the negotiations should aim to achieve greater liberalisation.

Many of the policy induced problems in agricultural trade can be traced to the weaker rules that have applied to import barriers and subsidies for agriculture than for manufactured products. In 1955 the United States was granted a waiver to allow it to use import quotas and fees, as a means of continuing to operate its farm support programs. Also, export subsidies are not generally permitted under the GATT but they have been allowed for agriculture provided they do not lead to more than an equitable share of world trade (GATT article XVI, see Harris, Swinbank and Wilkinson 1983, p. 275).

The weakness of these rules plus provisions that allow for customs unions or free trade areas to be accepted by the GATT (article XXIV) under conditions that barriers to imports from third countries should on the whole be lower than they were before the group was formed and that trade within those groupings should be largely free have done much to legitimise the CAP, at least in the eyes of its proponents in the Community.

The principle of a country not attaining more than an equitable share of world trade is subject to a wide range of interpretation and can be used to legitimise virtually anything. For example, the Commission of the European Communities (1990b, pp. 41–2) has pointed out that EC market shares have not risen significantly over the past few years so the Community cannot therefore be guilty of cut-throat competition. But in 1958 when the rules permitting export subsidies provided they did not lead to an inequitable share of world trade were introduced, the EC-6 was a small net importer of sugar of 240 kt raw equivalent.

In 1988 those same six countries were net exporters of 3.9 Mt raw equivalent

(3.6 Mt white equivalent) which is equivalent to 13 per cent of world trade (FAO 1990). Some of that trade was between the EC countries themselves and some of it was unsubsidised C sugar exports which for the Community as a whole totalled 0.8 Mt (white equivalent) in 1987-88 and 1.6 Mt in 1988-89. Still, for the Community as a whole, net exports of sugar were 3.0 Mt white equivalent in 1988.

Much of the Community's exports of sugar is assisted by export subsidies that have been important in allowing the Community to attain its much larger share of the world market than existed at the time when the GATT rule pertaining to such shares was instituted.

While a large part of EC sugar exports receives the benefits of export subsidies, it may be argued that growers are levied so that the cost of the export subsidies is met by them. The subsidies could be said to be producer financed. As indicated in chapter 3, this is an illusion. The export subsidies on quota sugar are financed by levies on the inflated prices paid on the domestic market by EC consumers — they are largely EC consumer financed subsidies.

In the context of the Uruguay Round negotiations, a key element that is being pursued is a reduction in export subsidies. It is possible that such pressure could have a significant bearing on future EC policy, in particular the support for amounts beyond the quantities that are consumed domestically.

A further concept that has been discussed at some length in the context of the Uruguay Round is the 'decoupling' of support for agricultural products so that support is production, consumption and trade neutral. One strategy that has been advanced by Blandford, de Gorter,

Gardner and Harvey (1989) is what is termed a Producer Entitlement Guarantee (PEG). Under this arrangement a total entitlement quantity that is less than would be produced without assistance at the world price is determined for a relevant country or group and the quantity is allocated among producers. Those producers receive a price that is supported by taxpayers through deficiency payments for the quantity entitlement, but production beyond the entitlement receives only the world price.

To operate efficiently this scheme requires that the entitlements should be freely tradable. Otherwise the system will not be production neutral and adjustment of resources to market forces and technical changes will be impeded. The EC sugar support system contains elements that are consistent with this PEG approach (see Riethmuller et al. 1990). However, it is clear that for certain countries in the Community the quotas are much larger than the quantities that would be produced without support (see chapter 3). Also, support is paid by consumers and not taxpayers, which as discussed in chapter 3 induces consumption and trade distortions. Furthermore, the quotas are not tradable throughout the Community. Nevertheless, the EC sugar regime could be adapted to a PEG arrangement more readily than most other support regimes.

Another factor that has played a part within the Uruguay Round negotiations on agriculture has been an EC 'rebalancing' proposal. Under that proposal the European Community would undertake to reduce its support for cereals if it were allowed to increase import duties on grain substitutes, oilseed meals and grain legumes. Because this approach is being discussed in the context of the Round, one

of the simulations reported later in this chapter incorporates significant reductions in support prices for wheat, which is the crop that is incorporated in the model as the main alternative cropping land use to sugar beet.

Concern in Europe about concentration in processing

The emergence of a few very large and influential sugar processing firms in the European Community could affect both Community decisions on matters of significance to the sugar industry and levels of internal prices paid for sugar. Noble (1990) noted how a few very large firms have come to dominate sugar processing in the Community and expressed concern that the emergence of one or two dominant firms may ultimately lead to monopoly driven prices.

Such an outcome, leading to higher internal prices, could impose significant costs on Community consumers given that competition from sugar imports and isoglucose is strictly limited in the European Community. In some areas such as sugar beet pricing, the Community support arrangements could limit the ability of processing monopolies to manipulate the market, yet even there the monopolies could exert political influence.

The increasing dominance of large firms in the EC sugar processing industry appears to reflect a natural tendency toward industry rationalisation associated with economies of scale (Noble 1990, p. 128). Noble indicated that EC policy toward competition would be important if the 1992 ideal of increasing competition and encouragement of trade between member states was to be realised, concluding that 'the dilemma facing the EC as far as sugar

is concerned is how to reduce surplus production and encourage competition within the Community market, while at the same time ensuring that the largest sugar companies do not dominate the market'.

Community expansion

One issue that is important in relation to the Common Sugar Policy is the extent to which quotas are expanded when new member countries enter the Community. This issue is significant at this time, because with the reunification of Germany an expanded quota is being provided for the now larger member state of Germany.

As indicated in chapter 1, the last major revision to A quota levels was in 1975. Since then, apart from a small increase in the Italian quota from 1981, the only increases in the A quotas have occurred with the provision of quotas to new members. The most recent experience has been the provision of quotas to Spain and Portugal when they entered in 1986. In that instance Spain was given an A quota of 960 kt white equivalent and Portugal a quota of 64 kt. The Spanish A quota was set just under Spain's domestic consumption, which has been around 1 Mt a year.

Portugal, on the other hand, had no significant sugar beet industry and was entirely import dependent. The quota that it was given was to provide for the development of a domestic beet sugar industry.

There seem to be no firm guidelines for the levels at which national quotas are negotiated. It may be observed that A quotas have summed to approximately EC domestic consumption, although with the entry of Portugal the total of A quotas has fallen a little below total Community consumption. The sum of A and B quotas is, however, still well above Community consumption.

The Democratic Republic of Germany was a small net importer of sugar. Its consumption has been relatively constant at around 765 kt white equivalent and its production has averaged about 660 kt white equivalent (Licht 1990). The Democratic Republic of Germany had regularly imported about 300 kt white equivalent of Cuban sugar. On the other hand, it has exported about 210 kt of sugar a year, mainly to North African countries. Data on production, consumption and trade in the late 1980s are shown in table 5.

In late 1990, the EC Council agreed that the area that was formerly the Democratic Republic of Germany should be granted A and B quotas totalling 847 kt (Agra Europe 1990c). This is significantly above consumption levels in that area and substantially above production. Provision of quotas so much in excess of former production will result in a further expansion of EC exportable surpluses. Because the internal prices for this sugar are normally well above world prices, this liberal quota will result in significant additional costs to the EC economy and place some additional downward pressures on world markets prices.

5 Production, consumption and trade in the Democratic Republic of Germany White sugar equivalent ^a

	International Sugar Organisation (5 years ended 1989)	F.O. Licht (5 years ended 1989-90)
	kt	kt
Production	666	662
Imports	295	306
Consumption	701	758
Exports	217	208

^a Converted at 1 t raw sugar = 0.92 t white equivalent.
Sources: International Sugar Organisation (1990);
Licht (1990).

Policy options

Since 1968 the changes that have occurred in EC sugar policies have been within the general framework of quotas and production levies, import controls and variable import levies, and export subsidies and producer levies. Because the established support system has been operating for more than two decades and the fundamental mechanisms that exist are likely to be maintained, the kinds of policy options that are considered in this study are within the basic framework of the support system that already exists.

The reforms that are analysed all have the potential to reduce costs and distortions, thereby providing benefits to the Community as a whole, in some instances to EC sugar producers and/or consumers, and to the global economy. They involve:

- reducing support prices to bring them closer to parity with world market prices;
- reducing production quotas so that a greater proportion of EC production is responsive to world market prices; and
- replacing the consumer financing of support with taxpayer financed deficiency payments.

To carry out the analysis, the SUGABARE model developed by Wong, Sturgiss and Borrell (1989) is used. That model is an econometric, partial equilibrium model which consists of nine sectors representing the largest four exporters (Brazil, Cuba, Australia and the European Community), the largest four importers (the United States, Japan, the Soviet Union

and China) and the rest of the world. While it is predominantly a single commodity model, account is taken of substitutability with major competing crops and in the case of the United States, Japan and Brazil with major alternative consumption substitutes (for example, high fructose corn syrup in the United States and Japan and the use of sugar cane for ethanol in Brazil).

An important characteristic of the model is that it can be used to estimate policy responses to market stimuli in each of the areas considered. Certain assumptions about exogenous variables (variables that are determined outside the model itself) and characteristics of the EC sector of the model are shown in appendix C.

To appraise the effects of the various alternatives, simulations were carried out for two future periods. The first was for the five years from 1991 to 1995. The second was for a twenty year period extending from 1991 through to 2010. The method used was to determine a baseline projection of production, consumption, trade and prices assuming that the policies and policy responses determined from the model without any changes apply throughout the projection period.

Assumptions were also made for future values of certain exogenous variables that influence the projections, such as income and population growth rates and future changes in prices of competing crops

(cereals). Importantly, a random weather variable was included throughout the simulation period to account for the kinds of weather shocks, such as periodic hurricanes in Cuba, that can markedly affect world supplies, trade and prices.

A simulation was then carried out for the same future period with the stipulated change in EC policy in place from 1991. The difference between the baseline and new policy simulations was observed to indicate the effects of the policy change.

It is important to interpret this procedure as a means of assessing the effects of alternative policies and not of forecasting actual future outcomes. In particular, the random weather influence could result in conditions at any specific time over the coming twenty years that could differ significantly from reality.

An important feature of the model is that it incorporates separate functions to determine EC production of A, B and C sugar. As applied in the following simulations involving reductions in quota levels, certain constraints are placed on quota production. In turn these interact with the other elements of the model to determine EC consumption, trade, internal and world prices and production of C sugar. As C sugar production is specified in the model as a function of the world price for sugar and as quota production is constrained, the results of the model should be interpreted as those that would apply with full price differentiation between A, B and C sugar. This aspect of the model is important when estimating the welfare effects of policies as the changes in production generated by the model imply strict price differentiation and not price averaging which, as discussed earlier, is prevalent in much of the Community.

Policy simulations

To simulate the effects of various policy reforms, the following policy settings were evaluated.

Current policies continued

Base simulation: Assumes no change in policy instruments. The levels of A quotas, A quota production and intervention prices are as determined by the model under the assumption that policies continue to respond to changes in world market prices as in the past. B quota production is also determined as specified in the model but is constrained to not rise above 23.56 per cent of the A quota—that is, the percentage for the EC-9 that applied throughout the 1980s.

A and B quotas reduced

Policy simulation 1: Assumes that A quotas are reduced by 1 Mt at the beginning of the period 1991–2010 and then allowed to respond to changes in world prices as specified in the model. The B quota is again constrained to not exceed 23.56 per cent of the A quota.

B quota reduced by 50 per cent

Policy simulation 2: All assumptions are as for the base simulation except that the constraint on B quota is tightened from 23.56 per cent of the A quota to half that level—that is, to 11.78 per cent of the A quota.

Prices of other crops and quota sugar reduced plus A and B quotas reduced

Policy simulation 3: Assumes prices of alternative crops are reduced by 20 per cent, the intervention price for sugar is also reduced by 20 per cent and A quotas are reduced by 1 Mt at the beginning of the

period 1991–2010. B quotas are reduced proportionately to the reduced A quotas.

Deficiency payments

Policy simulation 4: All assumptions are as for the base simulation except that price support for quota sugar is paid through deficiency payments using taxpayer funds. Consequently, the prices paid by EC consumers fall to the world market price.

Effects of alternative policies

Results from the baseline simulation for the major policy variables are presented in table 6. Two sets of results from the simulations are presented. One is for the annual average over the five years 1991–95 inclusive and is shown in table 7. The other is for the average over the twenty years 1991–2010 and is shown in table 8.

From a general appraisal of these tables, it is evident that significant changes in the

policies pursued in the European Community have marked effects on world market prices. This is understandable considering that the Community is the world's largest producer and consumer of sugar and is the third largest net exporter, with its net exports being equivalent to about 17 per cent of total world net exports to the free market. Observations about the separate simulations are outlined below.

Reduced A and B quotas

The size of the A and B quotas is one of the two main elements of the EC sugar support arrangements. The other is the difference between the internal supported prices and the world market price. If the A quotas were reduced and B quotas were reduced by the same proportion, a greater part of the Community's sugar industry would be exposed to competition at world prices. However, the likely fall in EC production that would accompany the reduction in

6 Baseline average estimates for major variables ^a

	Unit	Average 1991–95	Average 1991–2010
EC production			
A quota sugar	Mt white	9.26	9.51
B quota sugar	Mt white	2.18	2.24
C sugar	Mt white	2.89	3.90
Total	Mt white	14.33	15.65
EC consumption	Mt white	8.87	8.13
EC net exports	Mt white	5.53	7.53
EC sugar and beet prices			
Intervention price – white sugar	ECU/100 kg b	53.63	55.28
A quota beet price	ECU/100 kg b	42.96	44.06
B quota beet price	ECU/100 kg b	30.33	32.11
C sugar price – white sugar	ECU/100 kg b	29.66	34.66
Australian production	Mt raw	4.06	4.70
Australian exports	Mt raw	3.26	3.96

^a EC-9, consisting of Belgium, Denmark, France, Federal Republic of Germany, Ireland, Italy, Luxembourg, the Netherlands and the United Kingdom. ^b In 1989 values.

7 Impact of policy alternatives on world and EC market variables, 1991–95

Annual average percentage change from base simulation

	<i>Simulation 1</i>	<i>Simulation 2</i>	<i>Simulation 3</i> Price for sugar and alternative crops reduced by 20 per cent and A quota reduced by 1 Mt and B quota proportionately	<i>Simulation 4</i> Deficiency payment support
	A quota allotment reduced by 1 Mt and B quota allotment proportionately	B quota allotment reduced by 50 per cent	%	%
	%	%	%	%
World free market price	+11.0	+9.8	+1.3	+7.3
EC production				
A quota	-10.4	+0.3	-10.6	nil
B quota	-10.4	-49.8	-10.6	+0.2
C sugar	+8.6	+7.6	+58.1	+5.0
Total EC production	-6.6	-5.9	+3.2	+1.2
EC consumption	-0.3	-0.3	+4.5	+7.8
EC net exports	-16.6	-14.8	-2.2	-10.9
Australian production	+1.3	+1.2	+0.2	+0.8
Australian exports	+2.0	+1.8	+0.3	+1.3

8 Impact of policy alternatives on world and EC market variable, 1991–2010

Annual average percentage change from base simulation

	<i>Simulation 1</i>	<i>Simulation 2</i>	<i>Simulation 3</i> Price for sugar and alternative crops reduced by 20 per cent and A quota reduced by 1 Mt and B quota proportionately	<i>Simulation 4</i> Deficiency payment support
	A quota allotment reduced by 1 Mt and B quota allotment proportionately	B quota allotment reduced by 50 per cent	%	%
	%	%	%	%
World free market price	+6.8	+6.3	+1.5	+3.2
EC production				
A quota	-9.8	+0.6	-10.3	+0.3
B quota	-9.8	-49.7	-10.3	+0.5
C quota	+4.9	+4.6	+38.6	+2.6
Total EC production	-6.1	-5.6	+1.9	+0.9
EC consumption	-0.5	-0.5	+5.5	+6.9
EC net exports	-12.2	-11.1	-2.5	-5.8
Australian production	+1.2	+1.1	+0.2	+0.7
Australian exports	+1.6	+1.5	+0.2	+0.8

EC quota would increase world prices, so that production of C sugar would increase to partly offset the fall in quota sugar production.

From the results of the simulations in table 7, a 1 Mt reduction in A quotas (for the EC-9) and a proportionate reduction in B quota allocations would increase world sugar prices by 11 per cent over the first half of the 1990s. A 10.4 per cent (1.2 Mt) decline in quota sugar production would be partly offset by an 8.6 per cent (0.25 Mt) increase in C sugar production, giving a net decline in production of 6.6 per cent. This lower production in conjunction with relatively unchanged consumption would result in a marked fall in EC exports and an increase in world prices.

The effects of the simulated quota reductions are less on average over the twenty year period to 2010 than over the five year period to 1995. The reason is that over the longer period, other countries respond in their policies and producers respond directly to the higher world prices induced by the EC policy changes.

The question of which groups within the Community gain and which groups lose from these policy changes is central to an appraisal of the policy alternatives.

EC consumers are indicated to be worse off as a result of the simulated quota reductions, as higher world market prices are reflected partly in somewhat higher internal support prices. This effect is generated by the model, which allows a small part of the world price increases to be reflected in higher internal EC prices.

The welfare of EC producers will depend on the balance between several factors. They will lose some support. However, they will gain from higher prices for C sugar and lower levies on B sugar. Furthermore, the commitment of fewer

resources to sugar production would result in lower total production costs.

The extent of producers' cost savings in producing sugar will depend greatly on where in the Community the reductions in quotas are implemented. As indicated above, the reductions in production estimated through the models imply strict price differentiation between A, B and C sugar. That differentiation is already practised in the lower cost producing areas of the Community such as France. In such areas production would be relatively unaffected by quota reductions, at least in the short term, as most producers are already producing some C sugar, with a marginal return of world prices. However, reductions in quotas would have a marked impact on production in areas that currently average prices for beet across categories provided price differentiation were strictly enforced. If it were not, the averaging of prices across categories would prevent marginal prices received from falling sufficiently to achieve the falls in aggregate production indicated by the model.

Because of these factors, the quotas must be reduced in the parts of the Community where prices are either fully or substantially averaged, if the reduction in quotas is to induce the largest possible Community efficiency gains. It is in these areas that average prices across categories, in particular those which also apply national supports, that marginal production costs are highest.

Issues involved in estimating the benefits and costs to certain EC groups arising from quota reductions are discussed in box 6 and estimates of the benefits and costs are shown in table 9.

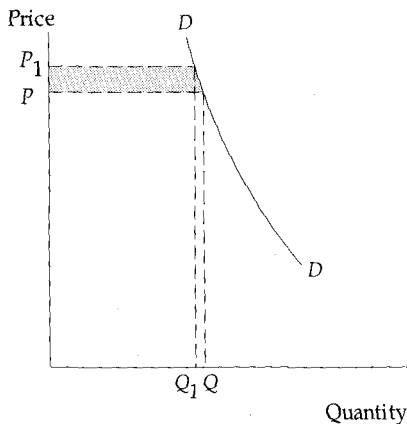
From table 9, it can be seen that the EC economy in total is estimated to benefit from a reduction in A quotas of 1 Mt with

Box 6: Assessing benefits and costs to certain groups as a result of EC quota reductions

In this box, the concepts involved in estimating the welfare effects on EC producers and consumers and on the EC economy that would result from the respective 1 Mt reduction in A quotas and proportionate reductions in B quotas assumed in simulation 1 are discussed.

Cost to consumers

As the increase in world market prices that is estimated to arise from EC quota reductions is reflected in a small rise in estimated EC support prices, there is estimated to be a loss to EC consumers as shown in the following diagram. The demand curve is DD . The EC internal price rises from P to P_1 and consumption falls from Q to Q_1 . The loss in consumer welfare is denoted by the shaded area, which is sometimes termed the reduction in consumer surplus.

**Benefits and costs to producers**

The cost or benefit to producers from the reduction in A and B quotas will be the result of several factors. First, producers will forgo the returns on the amounts by which A and B quotas are reduced. Second, they will obtain increased net returns from both greater production of and higher prices for C sugar. Third, they will receive slightly higher prices for A quota sugar and have to pay lower levies on their quota sugar. Importantly, to the extent that they reduce production of

quota sugar, they will experience cost savings on their quota sugar. Finally, for producers in countries where significant national support applies (Italy, Spain and French Overseas Departments), lower production will result in lower amounts of national support received, which will result in a saving to taxpayers in those countries. It is assumed that in those countries where price averaging currently exists, the present arrangements will be replaced by strict price differentiation and that national support will be provided only on quota sugar.

The benefits and costs to producers arising from changes in C sugar production and prices can be directly estimated from the results of the simulations. However, it is not possible to estimate directly from the SUGABARE model the benefits and costs to producers arising from the simulated reduction in quotas because the changes in quota sugar production are determined largely from the constraints imposed by the quotas, rather than by changes in producers' returns and costs.

This is also the case in the actual application of the quota system, except where producers of sugar beet respond in their production decisions to beet prices that are determined from averaged returns from quota and non-quota sugar. Such producers depend on the averaging of prices to give marginal returns which are sufficiently high to fill their present quotas and maybe produce some C sugar (see box 4). It is assumed that the countries which practice price averaging are the highest cost producers in the Community as their marginal cost of production will be at the averaged price rather than at the normally lower C sugar (beet equivalent) price. It is assumed that the reductions in quotas will be implemented in these highest cost countries before they will be implemented in lower cost areas.

Italy and Spain, which practice full averaging and also provide national supports, were assumed to be the highest cost group. The French Overseas Departments were not

included although they do receive national support. The next highest cost regions were assumed to be those which practise averaging, at least between A and B sugar — the United Kingdom, Ireland and Greece. Finally, it was assumed that the lowest costs applied in countries such as France and the Federal Republic of Germany which use differentiated prices.

For the purposes of this exercise, the elasticity of supply estimated in this study for Italy of 1.36 was used for Italy alone. As the existence of either partial averaging or price differentiation precluded the estimation of such elasticities for other countries, two alternative elasticities were assumed. These are 0.4 and 0.6.

The basis for using the assumed elasticities of 0.4 and 0.6 is that they are intermediate between the low elasticities of 0.2–0.3 favoured by Buckwell (1988) and that estimated by Gemmill (1976) for the total Community of 1.1 (see appendix B). On the basis of the separate estimate for Italy in appendix A of this study, the authors believe the underlying elasticities of supply to be closer to those estimated by Gemmill. As such the assumed alternative levels of 0.4 and 0.6 are considered to be conservative.

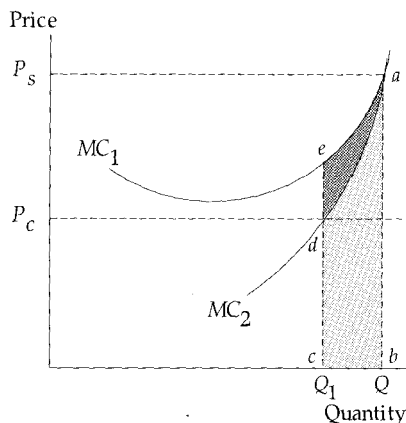
The assumption that quotas and therefore quota production will be reduced in the highest cost areas before being reduced in lower cost areas is made in order to estimate the potential economic gains that can occur through the reform. Those reforms include the quota reductions, full price differentiation and limiting any national supports to quota production alone.

Another assumption that is made is that national quotas will be reduced no further than to the point where the producers' supply curves for a country intersect the world market price line. At that point, the quotas become what is termed 'inframarginal' and should not influence production levels, at least in a short term sense. This assumption is necessary because of the inflexibility of the assumed constant supply elasticities and the large differences in the prices received by producers in high cost areas and the world market price.

Conceptually, one can only have confidence in elasticities over small price ranges. Indeed, the supply (marginal cost) curves in high cost areas could have far greater elasticities at lower prices than in the high range of prices over which estimates can be made. At the extreme, the supply curves of many producers in the high cost areas could even be above the world price throughout their whole range. Under such circumstances those producers would incur losses without support at world prices and would cease production in the absence of high prices on quota allocations. However, as the supply elasticity is (incorrectly) assumed to be constant, those producers would be shown as still producing at the world price. The issue is clarified in the following diagram.

A producer in a country that has supported prices that are normally around P_s could have an actual supply curve MC_1 . However, as actual prices received by such producers have usually been around P_s , econometric analysis could only yield estimates of the price elasticity that were consistent with observable prices around point a . If we assume that such a price elasticity were constant over the entire range of the supply curve, the 'estimated' supply curve would be MC_2 . It is this 'estimated' curve which is assumed in this exercise, as we have no knowledge of the actual shape of MC_1 . This assumption is a limitation of the analysis.

If quotas which were previously set to allow production of Q at prices around P_s



were reduced to Q_1 or below, producers with the assumed supply curve, would receive the world price P_c for marginal production. Their total production, given the assumed supply curve, would be Q_1 . The estimated saving in the producer's production cost is the area $abcd$. But, as supply elasticities are not constant, this producer, with a real supply curve of MC_1 , would not be able to produce in the long term at the world price P_c in the absence of higher returns on quota production.

In our calculations, we have assumed that quotas will be set at Q_1 . The cost saving estimated for reducing production from Q to Q_1 is estimated to be the area $abcd$ and therefore we will have underestimated the actual cost saving by the area ade .

Effects of Community expansion

Estimates are made of the benefits and costs to EC consumers, sugar producers and national taxpayers by estimating price and production changes relative to the baseline

and making adjustments to allow for the expansion of the Community.

In the case of changes in consumer welfare the changes were adjusted from the EC-9, on which the model is based, to the EC-12 on a proportionate population basis. For estimating the changes in returns and costs to producers the simulated quantity changes for the EC-9 were used as calculated — no adjustment was made as the assumptions about quota reductions were made on an absolute quantity basis.

Nevertheless, expansion of the Community was implicitly incorporated into the benefits and costs to producers. Although the simulated absolute reductions in quota production were unaltered in aggregate, they were allocated among countries according to the levels of their costs (highest cost first). In this way, new entrants such as Spain, which is a high cost country, were incorporated in the process. The estimates are shown in table 9 below.

9 Estimated effects of a simulated reduction of 1 Mt in A quota allocations and a proportionate reduction in B quota allocations on the welfare of certain EC groups a EC-12: Annual average 1991-95, in constant 1989 values

	Assumed EC elasticity of supply	
	Italy 1.36, other 0.4 million ECU	Italy 1.36, other 0.6 million ECU
Reduction in consumers' welfare	-78.0	-78.0
Effect on EC sugar producers as a group		
- reduction in returns for A quota sugar	-458.2	-458.2
- increase in returns for B quota sugar	+62.0	+62.0
- increase in returns for C sugar	+176.6	+176.6
- extra cost for additional C sugar production	-78.0	-78.0
- cost saving for not producing as much A and B quota sugar	+595.6	+606.3
- reduction in national support	-151.5	-151.5
Net effect on producers' welfare	+146.5	+157.2
Benefit to national taxpayers in Italy and Spain	+151.5	+151.5
Net benefit to EC economy	+220.0	+230.7

a A plus (+) sign signifies a benefit and a minus (-) sign a welfare loss.

a proportionate reduction in B quotas. The net gain is about 225 million ECU a year on average over the period 1991–95. Consumers are indicated to lose by about 78 million ECU, while producers gain by around 150 million ECU (in 1989 values). Taxpayers in member countries that provide national support also gain appreciably.

Although benefits for producers as a group are positive as a result of the policy initiative, the distribution of benefits and costs within the sugar industry would alter between countries. The gains arise largely because production is reduced mainly in the highest cost producing areas through reductions in quota levels in those areas. Producers in lower cost areas benefit through higher unit returns on quota sugar and on C sugar and through the ability of the lowest cost producers to expand over-quota production at improved world prices.

Given the equity issues and political costs of concentrating adjustment in the high cost areas, some mechanism other than imposing reduced national quotas would probably be necessary to make this quota reduction option politically feasible. This would be particularly the case where the adjustment costs of reducing production and processing capacity were significant, such as in the high cost areas.

One way to do this might be to reduce current quotas by a fixed percentage throughout the Community and then to introduce negotiability of quota entitlements. The price of quota entitlements would reflect the benefits that could be obtained from them by the lowest cost producers, so high cost producers could obtain benefits from selling their quotas rather than holding them. However, for such a scheme to be implemented efficiently on a Community-wide basis

the MCA system, which is really designed to institutionalise national protection and which impedes the ideal of a unified market, would need to be eliminated.

Implications for Australia

The marked increase in world prices that would accompany the simulated reduction in A and B quota sugar production and the associated reduction in EC exports would have an important impact on the Australian sugar industry and on the Australian economy.

The 11 per cent increase in average world prices for the period 1991–95 would result in only a 1.3 per cent increase in Australian production and a 2.0 per cent increase in exports as Australian supplies are indicated in the model to be relatively unresponsive to changes in world market prices, although recent changes in regulations will make the Australian industry somewhat more responsive in the future. The gain to the Australian industry and the economy arises principally from the increased returns from the world market. On average for 1991–95, Australia's sugar export returns are estimated to rise by \$A193 million a year (in 1989 values).

A 50 per cent reduction in B quota allotment

Similar effects to those estimated to occur as a result of reducing A quota allotments by 1 Mt and B quota allotment proportionately are estimated to occur as a result of a 50 per cent reduction in B quotas. Overall, during the first half of the 1990s, production would be reduced by 0.84 Mt, with B quota production falling by 1.09 Mt, C sugar production rising by 0.22 Mt and A quota production rising marginally. EC exports would also fall and a world

market prices would increase by 9.8 per cent. Domestic market prices would rise marginally and there would be a small fall in consumption.

As is apparent from a comparison of tables 7 and 8, the average annual effects of a 50 per cent reduction in B quotas would be somewhat less over a period of twenty years than over a period of five years.

As with the simulations for a fall in A and B quotas, the potential Community economic gains from reducing the B quotas result largely from an assumption that the quota reductions are applied in the highest cost countries first. These are the countries that average their returns for A, B and any C sugar produced. Such is the extent of the reduction in B sugar production, that the B quotas in all countries that are assumed to apply price averaging (that is, Italy, Spain, Greece, the United Kingdom and Ireland) are eliminated and significant reductions occur in other member countries as well. It is assumed that the marginal costs of

producers who reduce their B quota production in these other countries was the B quota price that applied before the policy change.

The benefits and costs to various groups in the Community assuming two alternative levels of supply elasticity for countries other than Italy (0.4 and 0.6) are indicated in table 10.

The Community benefits that are estimated to flow from the 50 per cent reduction in B quotas over the period 1991–95 are between 214 million and 224 million ECU a year (in 1989 values). This increase results primarily from gains in EC producers' welfare. Those gains arise largely from the increase in prices for and production of C sugar, and increased returns from A sugar. Also, importantly, the estimated reductions in the cost of producing B sugar significantly exceed the reduction in returns from B sugar. Some factors that contributed to this were a significant increase in unit returns for

10 Estimated effects of a simulated reduction of 50 per cent in B quotas on the welfare of certain EC groups ^a EC-12: Annual average 1991–95, in constant 1989 values

	Assumed EC elasticity of supply	
	Italy 1.36, other 0.4 million ECU	Italy 1.36, other 0.6 million ECU
Reduction in consumers' welfare	-68.3	-68.3
Effects on EC sugar producers as a group		
– increase in returns for A sugar	+73.8	+73.8
– reduction in returns for B sugar	-327.9	-327.9
– increase in returns for C sugar	+155.7	+155.7
– extra cost for additional A sugar production	-13.6	-13.6
– reduced cost of B sugar production	+463.1	+472.4
– increased cost of C sugar production	-68.4	-68.4
– reduction in national support	-36.5	-36.5
Net effect on producers' welfare	+246.2	+255.5
Benefit to national taxpayers	+36.5	+36.5
Net benefit to EC economy	+214.4	+223.7

^a A plus (+) sign signifies a benefit and a minus (-) sign a welfare loss.

the reduced quantity of B sugar and large unit cost reductions in the high cost countries where B quotas are completely eliminated.

The same kinds of political difficulties could be expected in achieving the cost savings associated with reducing production in the high cost countries as are discussed above for the simulation of a reduction in A and B quotas.

Implications for Australian producers

Australian producers would be significant beneficiaries of an EC policy to cut B quotas by 50 per cent. The benefits would be primarily through the increase in world market prices which is estimated to average 9.8 per cent from 1991 to 1995. But export volume would also rise somewhat — by 1.8 per cent. It is estimated that export returns for Australian sugar would rise by \$A171 million a year (in 1989 values) as a result of the policy change.

Reductions in support for sugar and alternative crops

Simulation 3 was carried out to gauge the kinds of price and quota adjustments that would be necessary within the sugar regime to fully counteract the depressing effects that marked reductions in prices for competing crops would have on world prices for sugar. If prices for cereals which compete with sugar beet for land were markedly reduced, it could be expected that, in the absence of counteracting measures for sugar, additional resources would flow into EC sugar production. As most of the additional sugar would be exported, world sugar prices would fall as a consequence.

It was found that, given a 20 per cent reduction in cereal prices, it would require a 20 per cent reduction in intervention prices along with a 1 Mt reduction in A

quotas and a proportionate reduction in B quotas to fully offset the world sugar price depressing effect of the cereal price reduction and give a very minor increase in world sugar prices.

The significance of these results lies in recognising the need in the process of policy reform (as is being discussed in the Uruguay Round) to apply commensurate reductions in support for various commodities that compete for land. If sugar quota levels are not reduced along with reductions in support prices for alternative crops, the means of adjustment within the sugar industry will be restricted, even if the intervention prices for sugar are reduced. Furthermore, for the supply responses to occur for sugar, the quotas should be reduced in the areas of the Community which currently practise price averaging, and strict price differentiation should be applied throughout the Community.

The simulation showed that the reduction in cereal prices would result in a large increase in C sugar production that would completely offset the reductions in quota sugar production. There is room for scepticism about the extent of the C sugar supply response, however, especially in high cost areas of the Community. This is because the assumed reduction in cereal price is well outside the range of observations for estimating cross-responses of supply within the model. Even so, it can be concluded that a marked reduction in cereal production would have a significant depressing effect on world prices for sugar unless they were accompanied by significant reductions in sugar quota volumes.

Deficiency payments

One of the main trade distorting characteristics of the EC sugar regime is that

domestic consumers pay prices which are maintained at levels that are normally well above world market prices. As indicated in box 1 in chapter 3, these arrangements result in losses of consumer welfare and costs to the EC economy as well as reducing EC consumption and increasing EC export surpluses. These particular distortions could be overcome by changing the financing of support so that consumers could pay the world price while support to producers was supplied by taxpayers through the budget.

The simulated effects of substituting a deficiency payment scheme for the present consumer financed support on EC production and trade are shown in tables 7 and 8 for the period 1991–95 and 1991–2010 respectively.

As might be expected the main direct effect of the policy change would be to increase EC consumption, on average, by 7.8 per cent for the five year period and 6.9 per cent for the twenty year period. This higher consumption and an associated reduction in exports induces an increase in world prices of 7.3 per cent for the five year period and 3.2 per cent over the twenty year period. There is also a small increase in EC production, principally of C sugar, in response to the higher world market prices.

While trade distortions and consumer losses through inflated prices are avoided with a deficiency payments scheme, there would nevertheless be some economic costs induced by implementing a taxpayer financed scheme. Those costs arise from the administrative costs associated with collecting the extra taxes and making the deficiency payments to producers. In addition there are economic costs arising from the distortions to resource use that arise from additional taxation (Ballard,

Shoven and Whalley 1985). In the EC context there would also be political considerations arising from the extra budgetary outlays of around 2.5 billion ECU a year (for the Community, including the reunited Germany) that would be required to finance support currently provided to producers.

Producers in other exporting countries would gain from a changeover in EC support arrangements to a deficiency payments scheme. Over the five year simulation period, Australian export volume was estimated to rise by 1.3 per cent and export returns to increase by \$A126 million a year (in 1989 values).

Some general observations

From the result of the simulations discussed above, it may be concluded that, despite the limits placed on the expansion of supported production by the EC sugar regime, adjustments to that regime would markedly affect world trade and prices. It is also evident that reforms to that policy can provide benefits to the EC economy, EC sugar consumers and/or producers as a group and to sugar producers in other exporting countries.

The conclusion that EC producers could gain collectively through a reduction in quotas at the margin may appear at first glance to be counterintuitive. However, it is consistent with broad economic principles about the exercise of market power by large exporting countries. The European Community as a group is the world's largest producer and consumer of sugar and it is a large exporter. Changes in its balance between production and consumption markedly affect world prices.

Reductions in EC quotas reduce EC production and exports and increase world

prices thereby providing benefits to the lowest cost producers in the Community who produce C sugar at differentiated prices. The higher world prices and lower EC exports also reduce the levies necessary on quota sugar to finance export subsidies. The gains to the Community are greatest if the reductions in production occur in the highest cost regions which practise averaging prices across categories and which receive national as well as Community support. Consequently, to achieve the maximum benefits, marked transfers of resources would be necessary between high cost and low cost regions. Transferability of quotas would be important in achieving such a result.

The model used in this study differs significantly from most other models that have been used to assess the effects of EC sugar policies on world prices and trade. It has also been applied differently in that the simulations carried out indicate the effect of policy changes to parameters within the existing system (to quotas and internal support prices) rather than the general effects of policy liberalisation. Nevertheless, even within the constraints imposed of maintaining the general current quota and pricing system, simulated changes to world market prices of up to 11.0 per cent were estimated.

Other modelling approaches have shown that EC support policies have markedly depressed world market prices.

Roberts (1982), using a highly aggregated single commodity model for the world free market and relying largely on supply and demand elasticities estimated by Gemmill (1976), estimated that between 1969 and 1980, world market prices would have been 7.2–11.3 per cent higher if EC sugar was not supported.

Roningen and Dixit (1989) estimated that, in 1986-87, full elimination of support for agricultural products in the European Community alone would have increased world market prices for sugar by 18.6 per cent. They also estimated that the elimination of agricultural support in all industrialised market economies (North America, Western Europe, Japan, Australia and New Zealand) would have increased world market prices for sugar by 52.7 per cent. Those authors applied the SWOPSIM model which is a medium term partial equilibrium trade model that indicates adjustments to prices over a period of about five years.

Tyers and Anderson (1987) estimated that unilateral liberalisation of EC agricultural policies would have increased world prices of sugar by 6–18 per cent depending on the period for which the estimates were made and whether the effects were short or long term.

Borrell and Duncan (1990) estimated that EC subsidised exports of A and B quota sugar alone 'has the potential to lower world prices by 17.5 per cent on average over the long term and by at least 30 per cent during the low price phases of the world price cycle'. They cite an estimate by Sudaryanto (1987) that, for 1982-83, EC policies in total lowered the world price by 35 per cent.

Current EC Commission proposals

Although the major policy settings for the Common Sugar Policy have usually covered five year periods, the most recent proposals by the Commission cover mainly the two year period 1991-92 and 1992-93. The proposals are basically to maintain quotas at current levels. However, certain relatively minor reforms are proposed (Commission of the

European Communities 1990c). These include:

- storage cost reimbursements for C sugar that is carried forward will be available for only six months instead of for the full year as applied previously; and
- elimination of national aids in Italy over two years, with aid applying within that period being restricted to sugar beet alone.

Both of these measures if they are adopted by the Council of Ministers and in the case of Italy by its national government would represent positive though marginal reforms.

Concluding comments

Certain aspects of the EC policies for sugar, in particular the limits on quantities receiving Community support, enable EC sugar production to be more responsive to changes in world market prices than is the case for most commodities supported under the Common Agricultural Policy. However, the policy is applied in markedly

different ways in different parts of the Community and stimulates production, especially in the higher cost producing regions in the Community. The higher resultant production and reduced consumption because of high internal support prices result in significantly reduced world market prices.

From the analysis in this paper, it is concluded that a reduction in quotas along with strict enforcement of price differentiation between A, B and C sugar would result in significant economic gains to the Community and also to producers as a group, especially if quotas were made transferable. In addition, trade distortions would be reduced if the present market price support were replaced by deficiency payments, although significant budget costs would result.

It appears from historical precedent that if reductions were to be made in quotas in the process of reform, it would be easier politically to reduce B rather than A quotas.

Estimating the elasticity of supply for Italy

As indicated in box 5, Italy practises price averaging between A and B quota sugar and C sugar. Under this system, sugar beet growers will optimise their returns by producing at the level where their marginal cost equates with the average price received. Because they respond to an *average* price for all beet rather than to different prices for beet for A quota, B quota and C sugar, it should be possible to estimate the elasticity of supply to changes in average prices if it is assumed that the price for sugar beet received by farmers is directly related to the average prices received by processors for sugar. This is done in this appendix.

Model used

The general model used to estimate the supply of sugar in Italy is:

$$QB_t = f(QB_{t-1}, PB_{t-1}, PF_t, PO_{t-1}, PP_t)$$

where QB_t is the quantity of beet sugar produced in year t ; QB_{t-1} is the quantity of beet sugar produced in year $t-1$ (that is, in the previous year); PB_{t-1} is the average price of sugar beet received in the previous year; PF_t is the price of fertiliser; PO_{t-1} is the price of competing crops, cereals and rice, in the previous year; and PP_t is the price of potatoes, a competing crop, in the current year.

Assuming the function to be log linear for all variables, the model may be written in the following form:

$$\log QB_t = a + a_1 \log QB_{t-1} + a_2 \log PB_{t-1} + a_3 \log PF_t + a_4 \log PO_{t-1} + a_5 \log PP_t$$

The period analysed was 1973–87, with fourteen annual observations. Data for Italian sugar production were drawn from F.O. Licht (1990). The price for sugar beet was the series for the unit value of sugar beet from Eurostat (1983, 1988). The prices for other cereals and rice and for potatoes were drawn from EC agricultural price indexes (Eurostat 1989). All prices were deflated by the consumer price index for Italy, drawn from IMF (1990a).

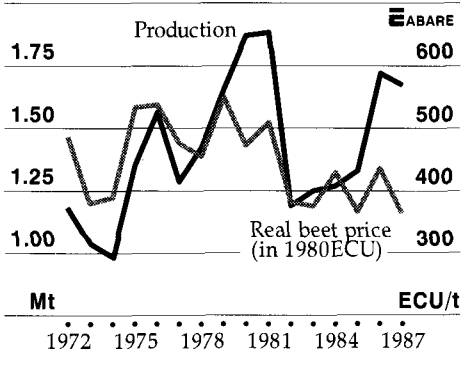
Results

After estimating the equation it was found that all of the variables on the right hand side except PF_t were statistically significant and of the expected size. Because of this the variable PF (price of fertiliser) was excluded from the equation. The final result obtained was:

$$\begin{aligned} \log QB_t = & 0.79 + 0.36 \log QB_{t-1} \\ & (0.59) \quad (2.91) \\ & + 1.36 \log PB_{t-1} - 0.74 \log PO_{t-1} \\ & (6.33) \quad (-3.24) \\ & - 0.22 \log PP_t \\ & (-2.87) \end{aligned}$$

DW = 2.95, $R^2 = 0.81$ and figures in parentheses are Student's t values.

E Italian sugar production and real sugar beet price



All causal variables in the equation have coefficients that are significant at the 2 per cent level or better. That for the price

of sugar beet (PB_{t-1}) was highly significant at much less than the 1 per cent level and a high degree of confidence can be placed in the statistical significance of the estimate. An indication of the responsiveness of Italian sugar production to the real price of sugar beet is provided in figure E.

From this equation, the estimated elasticity of Italian beet sugar supply with respect to the price of beet was 1.36 in the period analysed. Sugar beet production was also shown to be responsive to prices for other crops, the elasticity with respect to the index for cereals and rice being -0.74 and that with respect to the price of potatoes -0.22 .

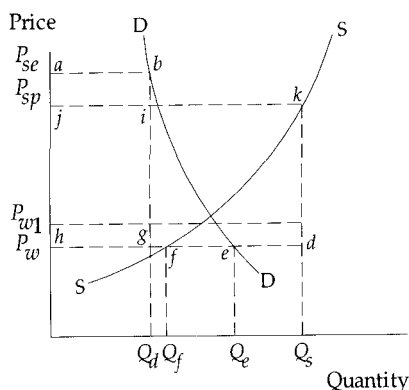
Estimating the economic costs and transfers from the EC sugar regime

The basic model

The basic model for estimating the economic costs and transfers associated with policies that set prices to producers and consumers at levels generally above world market prices is shown in the diagram, where DD is the demand curve; SS is the supply curve; P_{se} is the supported price paid by consumers; P_w is the world price; Q_s is the quantity produced; Q_d is domestic consumption; P_{sp} is effective support price received by producers; and P_{w1} is the world price with EC support removed.

Cost to consumers

The internal market price P_{se} paid by consumers is assumed to be above the world price P_w . At the world price, EC consumption would be Q_e , while at the actual price paid by consumers, P_{se} , which is the internal market price, EC consumers



purchase Q_d . The loss in consumer welfare (or consumer surplus) as a result of the higher price is the area $abeh$. This area can be divided into two parts. One is the consumer transfer which goes to producers — this is the area $abgh$ which represents the greater amount that consumers pay for sugar than they would pay if they could obtain the same quantity at the world price. The other is a deadweight loss or loss to the economy (see box 1 in chapter 3) equal to the area beg .

In this instance the world price is taken as given at P_w , but it could be argued that to estimate the effect of EC support the relevant difference between the internal price and the world price should be P_{se} minus not the actual observed world price but the world price that would apply if EC support were removed, P_{w1} . This was the approach taken in Bureau of Agricultural Economics (1985) to estimate EC support costs.

However, it may equally be argued that if the world price in the absence of EC support were P_{w1} , the implementation of the support regime would have forced the world price down to the observed level P_w . In that case the relevant price for comparison would be P_w .

The difference between these two different ways of assessing the relevant world price from which to determine effects of support is one purely of interpretation. In one instance the effect of the removal of support is assessed. In the other the effect of applying the support

is assessed. Here the effects of applying the support are gauged from the price P_w — that is, the observed world price is used as the basis for comparison.

From the model used in this study, the EC elasticity of demand for sugar is estimated at -0.32 (Wong, Sturgiss and Borrell 1989, p. 15). This elasticity is high relative to those estimated for other developed economies. For example, the same authors estimated the price elasticity of demand for sugar in the United States to be -0.05 and that in Japan to be -0.12 .

Gemmill (1976, p. 94) also estimated EC elasticities of demand to be high (his estimates were for individual countries and were -0.20 for Spain, -0.33 for France and between -0.35 and -0.44 for the Federal Republic of Germany) relative to levels in other developed countries.

Intuitively it might be expected that sugar which is largely used as an ingredient in processed products would have a price inelastic demand. However, the development of other sweeteners could result in significant substitution for sugar when sugar prices change, which would have the effect of increasing sugar's price elasticity. As indicated in chapter 1, however, isoglucose production at least is controlled in the Community, restricting such substitution. Nevertheless, significant substitution could be expected from non-caloric sweeteners such as aspartame and various other substitutes in industrial processes.

Considering the above factors, estimates of the cost to consumers arising from the European Community's sugar support are based on three alternative elasticities of demand, namely -0.2 , -0.32 and -0.40 .

The internal price is taken to be the intervention price and the world price is

assumed to be an EC export parity price (chosen because the EC is a net exporter). The period for which the consumer transfers and costs is estimated is the average for the period 1979–89, which includes years of both high and low prices.

It is estimated that over this period, it cost EC consumers an average of 3030 million ECU a year more (in constant 1989 values) for the sugar that they consumed than if they had purchased the same quantity at the world market price. It is this consumer transfer that finances the support received by EC sugar producers.

Cost to EC economy

There are economic losses to the EC economy as a result of the loss of utility to EC sugar consumers because of the high consumer prices. At various assumed elasticities of demand, estimates of these losses are as follows:

Elasticity of demand	Economic loss (consumption deadweight loss)
	mECU ^a
-0.20	194
-0.32	322
-0.40	412

^a In constant 1989 values.

The transfer of 3030 million ECU goes to EC producers (growers and processors) of sugar, while growers also receive support for storage costs. However, the producers have to pay back part of their returns to cover the cost of market support, which is basically export subsidies. As discussed earlier, those subsidy costs are now fully covered by production levies which in recent years have included the elimination levy, the special elimination

levy and the additional levy as well as the basic production levy. These production levies averaged an estimated 583 million ECU a year between 1979 and 1989 (in constant 1989 values). (Estimates derived from data in the Official Journal of the European Communities 1990.)

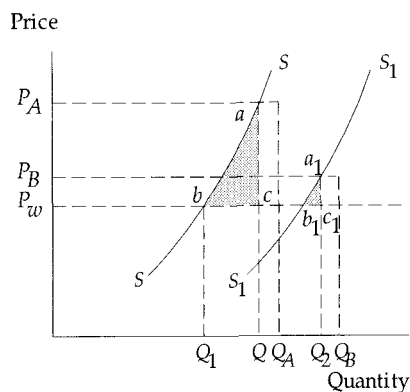
The production deadweight losses that result from the regime are much more difficult to estimate than the consumption deadweight losses, because of the operation of EC quota arrangements. Given the marked differences in the application of the regimes in the various member countries — especially with respect to averaging prices for sugar beet or having differentiated prices for A, B and C beet, and the far different degrees of production efficiency in different countries in the Community — wide differences could be expected in the extent of the production deadweight losses in different parts of the Community.

These economic costs would be greatest where there is price averaging across the three categories of sugar and where there is significant national and well as Community support. The countries with both such distortions are Italy, Spain and the French Overseas Departments, while significant distortions would also apply because of price averaging in Greece, the United Kingdom, Ireland and perhaps the Netherlands.

In France and the Federal Republic of Germany, on the other hand, where prices are differentiated and there is no, or little, specific national support for sugar, the production deadweight losses would be much lower. There would, however, be some such losses.

An example for a single, high cost producer in a system with differentiated prices where A quotas are not filled

nationally, is shown in the diagram. A producer with a supply curve SS would have output of Q which falls short of the A quota (it is noted that even in France, which is generally a low cost country, A quotas are never quite entirely filled). At the world price, that producer would have produced only Q_1 , and the economic cost to the nation as a result of the support to that producer would be the area abc . Another producer, who has the same A and B quotas as the first mentioned producer, has a supply curve S_1S_1 . That producer has output of Q_2 , which fills the A quota and part of the B quota. In this instance the economic cost or deadweight loss to the economy is the area $a_1b_1c_1$.



Estimating elasticities of supply

The problem that is encountered in estimating the economic costs that are incurred for the Community as a result of inefficient resource allocation by individuals is that the supply curves for those individuals cannot be identified from aggregate national data. This is particularly the case because there is price averaging in some countries and not in others. The issues relating to countries which employ averaging between the categories of quota and non-quota sugar are discussed in box 4. Essentially the problem of measuring

the economic cost resulting from the support system is that the system itself obscures the degree to which production responds to market prices.

In their analysis, Wong, Sturgiss and Borrell (1989) estimated the following elasticities of supply for the different categories of EC sugar:

	Supply elasticity
A quota sugar	zero
B quota sugar	0.325
C sugar	1.632

As A quotas have invariably been virtually filled, analyses relating quantities to price cannot show any response. For B sugar, however, production during much of the period for estimation (1975–85) varied considerably and estimation of a supply elasticity was therefore possible. Overquota production was postulated to respond directly to world prices and could therefore be readily estimated.

Because of the heavy weighting of A quota sugar and the absolute non-responsiveness of A quota sugar to price as indicated in the model, the weighted average supply elasticity given the operation of the quotas is estimated to be only around 0.25.

It is important to appreciate that the quota system as it operates for sugar in the European Community does not in any way reduce production of sugar by *any* producers, below what it would be if the producers received only the world price, as producers are free to produce C sugar at the world price. However, the system can limit the degree to which individual producers can produce beyond the amount that they would produce at the world price because of the high supported internal price — because of the quantitative limit

on the quotas. This means that the responsiveness of production to prices received by producers for their marginal units of production is constrained by the support system. Consequently, the C sugar elasticity as shown above at 1.632 would be too high to apply to all EC production.

Gemmill (1976) estimated the elasticity of supply for sugar in EC member countries using average prices in the calculations. The weighted average of his estimates was 1.1. However, Buckwell (1988) reported a study by Graham which indicated the supply elasticity to be only around 0.1 in the long run for Belgium, France and the Federal Republic of Germany. These large differences appear to reflect the difficulties of estimating the underlying elasticities of supply when the system that applies, in this instance, quotas, restricts the observable elasticities (see appendix C).

Whereas the underlying elasticity of supply may not be readily observable in countries such as Belgium, France and the Federal Republic of Germany, where producers receive specific returns from different quotas, it is possible to observe and estimate the elasticity of supply in countries where producers receive prices that are averaged across all sugar produced. Such is the case for Italy where it is estimated in appendix A that the short run elasticity of supply between 1973 and 1987 was 1.36. In the long run, the elasticity is likely to be even higher.

Resource misallocation

In addition to the problems of estimating representative supply elasticities, there are problems in assessing the resource misallocations that could stem from the extra investment in sugar production that

would arise from the high, relatively riskless guaranteed return from A quota sugar, and the degree of risk reduction for B quota sugar. As indicated in box 2, it can be conceptualised that these factors can result in more entrants to the industry than otherwise and also result in higher production of C sugar.

Perhaps the best that can be done in trying to assess the economic costs associated with resource use distortions in EC sugar production is to apply a conservative long term supply elasticity to actual production at average prices. Buckwell (1988) postulated that an elasticity that could be applied to average prices could be around 0.25. That seems low in relation to supply elasticities for most major crops and for sugar in most countries—for example, Sullivan, Wainio and Roningen (1989) indicate the supply elasticity for sugar to be 0.5 for the United States and 0.45 for Japan, while the estimated elasticity for Italy from appendix A is 1.36.

Consequently, to estimate production deadweight losses as a result of support and regulation of the sugar and processing

industry for the European Community, a range of elasticities of 0.25 to 0.6 is used. The estimated annual production deadweight losses on average from 1979–89 (in constant 1989 values) are shown in the following table:

Long run elasticity of supply	Economic cost (production deadweight loss) mECU
0.25	178
0.40	275
0.60	394

Considering the size of the elasticity estimated for Italy in appendix A the authors consider that even the estimate with the long run elasticity of supply of 0.6 could be low for the production deadweight loss. One could expect supplies of sugar beet which is grown largely as a rotation crop with cereals and other crops that collectively cover much larger areas to be fairly highly responsive both to changes in its own price and to changes in the prices of competing crops.

SUGABARE model: EC sector and relevant assumptions

The econometric estimation of the model uses annual data for the period 1975–85 inclusive for the EC–9. Analysis was restricted to this period because of subsequent expansion of the European Community to include Spain and Portugal. Even though Greece entered in 1981, it has a relatively small sugar industry. Consequently, the main changes that may be observed to have arisen from the Common Sugar Policy would be reflected in data for the EC–9.

The EC sector consists of three groups of equations for supply, demand and prices, with a market clearing identity.

In the group of equations for estimating supply, A and B quota and C sugar are all independently estimated with:

- A quota production reacting asymmetrically to world price, with it increasing when world prices rise but not declining when they fall;
- B quota production responding to prices for B quota sugar beet; and
- C sugar receiving and responding to world market prices.

The various estimates for responses of Community production incorporate the direct influences of market prices and the effects of policy variables which themselves are specified to be influenced by market prices.

The three sets of equations for the EC sector which are drawn from Wong, Sturgiss and Borrell (1989) with some minor changes are outlined in the following sections.

Supply

$$\Delta A Q_t = 0.0174 \exp(0.114 \Delta W P_{t-2})$$

(0.77) (3.48)

$$- 0.571 D C_{1t}$$

(-4.56)

$$D W = 1.83$$

$$B Q_t = -1.96 + 0.0231 B P_{t-2} + 0.102 T$$

(-2.00) (2.20) (3.90)

$$\bar{R}^2 = 0.57 \quad D W = 1.35$$

$$C Q_t = 8.3208 + 0.0508 W P_t + 0.0634 W P_{t-2}$$

(2.40) (2.63) (2.78)

$$- 0.1214 W H_t - 4.4528 D C_{2t}$$

(-2.42) (-3.59)

$$\bar{R}^2 = 0.62 \quad D W = 2.48$$

$$Q_t = 1.087 (A Q_t + B Q_t + C Q_t)$$

Demand

$$C_i / N_t = 67.724 + 0.0128 Y_{et} / N_{et}$$

(6.07) (0.451)

$$- 0.2258 I P_t - 0.7390 T$$

(-3.46) (-3.62)

$$\bar{R}^2 = 0.62 \quad D W = 2.92$$

$$S_i / C_i = 0.897 W P_t^{-0.379} + 0.0509 C Q_t$$

(4.05) (-5.2) (3.82)

$$D W = 1.57$$

Market clearing

$$X_t = Q_t + S_{t-1} - C_t - S_t$$

Prices

$$IP_t = 5.53 + 0.786 IP_{t-1} + 0.101 WP_{t-1}$$

(1.39) (9.44) (3.52)

$$\bar{R}^2 = 0.96 \quad \text{Durbin's H-statistic} = 0.45$$

$$IB_t = 6.12 + 0.796 IP_t$$

(2.91) (19.88)

$$\bar{R}^2 = 0.98 \quad DW = 1.4$$

$$BP_t = IB_t(1 - L/100)$$

where

$$L = CL + AL + EL$$

$$CL = 2 \text{ if } RM > 0$$

$$= 0 \text{ if } RM = 0$$

$$AL = 0 \quad \text{if } RM = 0$$

$$= 30 \quad \text{if } CM < RM < AM(37.5)$$

$$= 37.5 \quad \text{if } AM(30) < RM < AM(37.5)$$

$$= 37.5 + [(RM - AM(37.5)) / (AQ + BQ)] / IP$$

$$\text{if } RM < AM(37.5)$$

$$EL = 1.31\% \text{ for } 1987-91$$

$$= 0 \text{ for all other years}$$

Explanation of variables used

- AQ* is A quota sugar production (Mt refined)
- BQ* is B quota sugar production (Mt refined)
- CQ* is C sugar production (Mt refined)

- Q* is EC total production (Mt raw sugar equivalent)
- C* is EC consumption (Mt raw sugar equivalent)
- S* is EC closing stocks (Mt raw sugar equivalent)
- X* is EC net exports (Mt raw sugar equivalent)
- IP* is intervention price (ECU/100 kg raw sugar)
- WP* is world refined sugar price (ECU/100 kg)
- BP* is price paid for B quota beets (ECU/100 kg)
- WH* is price received by EC wheat growers (index)
- IB* is intervention price for beets (ECU/100 kg beets)
- L* is total of all levies applying for B sugar (%)
- CL* is coresponsibility levy rate (%)
- AL* is additional levy rate (%)
- EL* is EC average elimination levy rate (%)
- RM* is the cost of export restitutions (mECU)
- CM* is money raised from coresponsibility levy on both A and B sugar (mECU)
- AM(X)* is money raised from additional levy of X per cent (mECU)
- Y_e* is EC income (index)
- N_e* is EC population ('000 million)
- DC₁* is a dummy variable equal to 1 in 1975 and 0 otherwise
- DC₂* is a dummy variable equal to 1 in years 1975-77 and 0 otherwise
- T* is time (1953 = 1)
- Δ is the first difference operator (signifies the change in a year)

The equations were estimated using ordinary least squares except for those to determine changes in A quotas and to estimate stocks which required nonlinear least squares estimators. The coefficients have the expected signs and are generally significant. The dummy variables were included in the A and B quota production equations because the Community experienced three bad seasons during the period 1975–77 due to poor weather conditions and disease. The A quota was

not filled in 1975 and the B quotas were well short of average production levels in these years.

Assumptions about the behaviour of a number of exogenous variables were needed to simulate the model into the future for the period 1991–2010.

The EC's real wheat price index, which was used as an indicator for cereal prices, was decreased by 1.5 per cent a year and the world oil price was maintained in real terms throughout the period.

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