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WORKING PAPERS

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A Survey of the Costs of World Sugar Policies

Brent Borrell
and
Ronald C. Duncan

Lifting government controls on sugar prices and production would probably increase world sugar prices. World prices would definitely be less volatile, and the end of intervention would certainly improve world welfare, especially in the sugar-exporting developing countries.

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This paper — a product of the International Trade Division, International Economics Department — is part of a larger effort in PRE to understand the implications for developing countries of changes in the industrial countries' trade policies. Copies are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Audrey Kitson-Walters, room S7-053, extension 33712 (26 pages).

The world sugar market has long been characterized by volatile prices and widespread intervention.

Controls on domestic prices, demand, and supply have created an inefficient pattern of world production, consumption, and trade. Without government controls, production would shift from the subsidized, higher-cost countries (especially Japan, the European Community, and the United States) to the lower-cost countries (such as Australia, Brazil, and Thailand).

The resources saved could be directed to other activities, and with lower sugar prices, consumers would have more money to spend on other goods and services.

Borrell and Duncan describe how government support of sugar producers exacerbates the volatility of sugar prices. Government-controlled increases in production have come only after price peaks (as in 1963, 1974, and 1980). The resulting surges in production far exceeded steady growth in consumption.

Production increases greatly when world prices are high but does not contract greatly when they are low. When world prices fall because of a surge in production, protective policies are activated to support the expanded industries, causing world prices to remain depressed for several years.

Because so many domestic markets are insulated, the burden of adjustment is borne by the relatively small unprotected exporting countries (such as Thailand). Moreover, to induce needed adjustments in supply and demand, the world price must vary more than is otherwise necessary.

Borrell and Duncan survey estimates of the economic costs of various forms of government assistance to sugar industries.

The impact of policies in the high-cost countries (Japan, the EC, and the United States) is to reduce world sugar prices in the long run (perhaps by more than 30%), to increase price variability by as much as 28%, and to increase the probability of very low prices. The impact of production controls in Australia and Brazil is to increase world prices and the instability of world prices.

What would happen if all interventions ceased? It cannot be concluded unambiguously that average world sugar prices would increase, but they probably would. World prices would definitely vary less, and world welfare would definitely improve, especially in developing countries that depend heavily on sugar exports.

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A SURVEY OF THE COSTS OF WORLD SUGAR POLICIES

by

Brent Borrell and Ronald C. Duncan

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1. INTRODUCTION

Volatility in world agricultural commodity markets has long given rise to forces which compel farmers to form coalitions and to demand political action to address problems caused by price instability and risk. The incentives for consumer groups (and perhaps taxpayers) to respond politically to volatile prices are different from those of farmers. The uneven political pressures from different groups gives rise to policy interventions which consistently favor one group over another, usually farmer groups.

Volatile prices and widespread government intervention have long been features of the world sugar market. Prices appear to follow a pattern of short, sharp peaks and extended price troughs. Indeed sugar is one of the most volatile of all primary commodity markets.

To gain some independence from the volatile world market, producers in most countries have lobbied their governments to operate schemes aimed at controlling domestic prices, supply and demand. Numerous price, production, trade and stock-holding policies have been devised.

Ultimately, this insulation from the market has greatly distorted production, consumption, trade and world price.Under a more liberal trading order, production would tend to shift from subsidised, higher-cost countries (such as the United States, the European Community and Japan) to lower-cost countries (such as Thailand,Brazil, Australia and other efficient exporting countries). The world's sugar requirements would therefore be produced with less resources. The resources saved could be used in other industries to generate additional income. Consumers currently paying high domestic prices would be able to buy more agricultural and other goods and thus have higher real incomes.

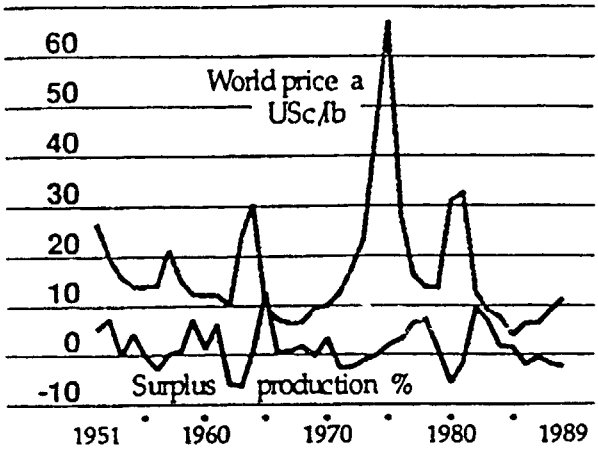
The Uruguay round of the GATT multilateral trade negotiations has opened an avenue for agricultural trade liberalization. Many special interest groups, however, stand in the way of trade reforms. Long-lasting and effective reforms will not be achieved easily. To achieve durable reforms, measures must be adopted that alter the incentives which affect the policy formation process. Understanding the policy formation processes which spawn and sustain interventionist trade policies in particular markets will help in assessing the long-term effectiveness of various options for trade reforms.

To provide a framework for assessing the prospects for trade reform in the sugar market, the paper begins by explaining the main features of the policy formation processes affecting the sugar market. The discussion draws heavily on a recent model of the world market developed by Wong, Sturgiss and Borrell (1989), and indeed some parts of this paper summarize that work directly. Some of the key features of existing policies are discussed and the findings of a number of empirical studies are highlighted to draw attention to the economic costs and welfare effects of such policies. The paper concludes with our best bet assessment of the prospects for reform.

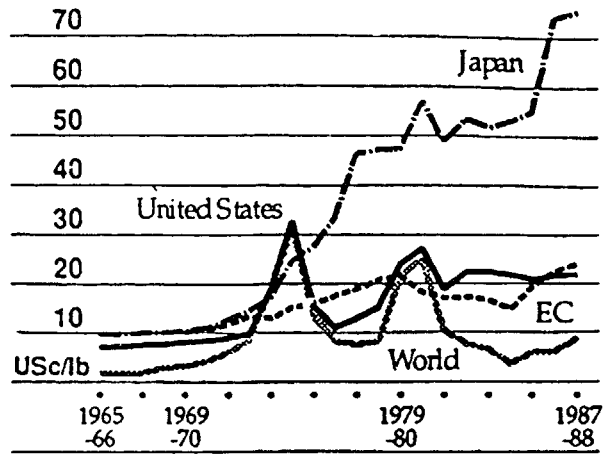
2. THE WORLD SUGAR MARKET

The volatility of world sugar prices is shown in figure A. In June 1985 the (nominal) world market price slumped to an historical low of US2.8c/lb. A decade earlier, in the boom year of 1974, sugar had sold for a brief period at around US120c/lb (in 1985 values) and averaged US59c/lb for the year. The average real price over the past 35 years (again, in 1985 values) has been around US16c/lb, and the average cost of production (worldwide) is estimated at around US20c/lb. Because of the volatility of the world market, virtually all countries - even those exporting nations with low production costs - have attempted in some way to modify their domestic markets so as to insulate their producers from low prices. This protection has both compensated for, and sustained, the long term excess of costs over export returns.

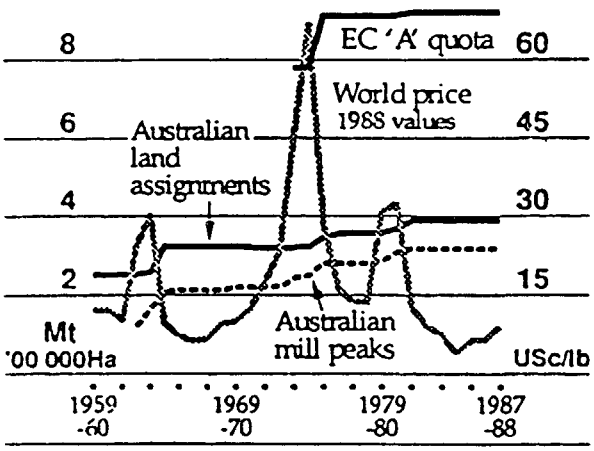
A World sugar price and surplus production



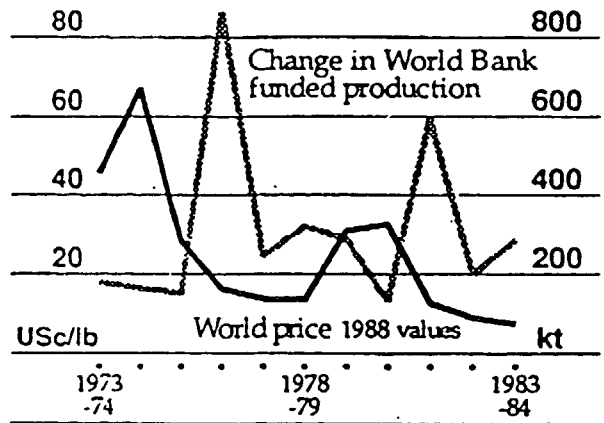
B World and domestic prices Nominal



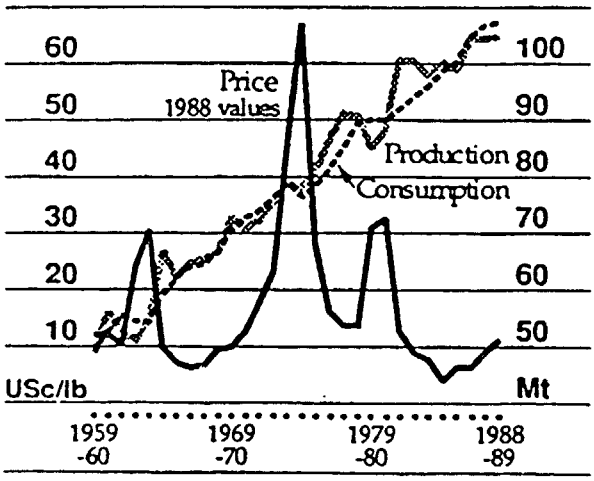
C Production control settings and world price



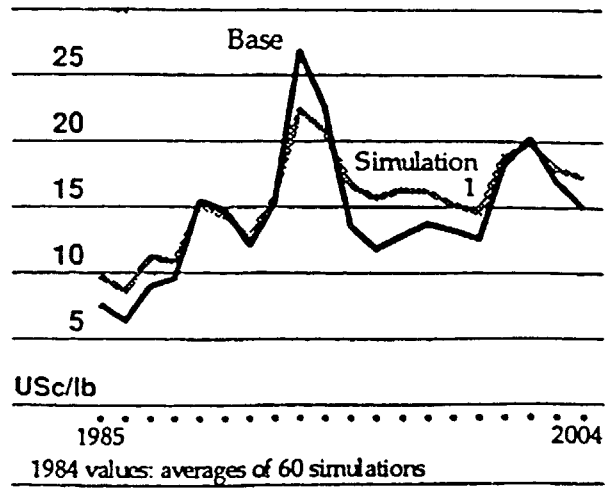
D Production funded by World Bank, and world price



E World production, consumption and price



F Production flexibility, with world prices to OECD economies



1984 values: averages of 60 simulations

Source (all figures): Wong, Sturgiss and Borrell (1989).

Among the producing countries, those most exposed to world price volatility are those that export a large share of production, such as Thailand and Australia. Cuba, although a large exporter, has its exposure reduced through a bilateral trade deal with the Soviet Union. The producers which are least exposed are those with large domestic markets. In these countries consumers and taxpayers subsidise producers and insulate them from the world price fluctuations. The most notable examples in this category are the United States, the European Community, Japan, the USSR, India and China.

The sugar policies of major developed countries have attracted much attention by the magnitude of support they offer to producers and their seeming disregard for the high costs incurred. The stated aims of sugar policy in developed countries are usually stability and maintenance of farm incomes, in the face of volatile prices, and industry expansion. In some cases self-sufficiency has been a consideration, as in Europe and Japan. Intervention is also widespread in developing countries, where a primary aim of policy is to earn or conserve foreign exchange. In high price years, sugar is a valuable foreign exchange earner for exporting nations but a severe drain on reserves for importers.

In their attempts to achieve these stated aims, governments use controls on supply - that is, on domestic production and trade - and/or operate a stocking policy. Thus all industry variables come under government control or influence.

In figure B the producer prices in Japan, the United States and the European Community are presented, together with world prices, in nominal terms. It can be seen that support to producers in these countries is very high: in Japan the producer price in 1986 was eleven times the world price. As well as providing support, these domestic prices provide a degree of stability - in all cases producers are protected in times of falling world prices. The United States is notable for its insulation of producers from world price troughs but not from the peaks; it appears that support of producers' incomes is a nigher priority than any benefits from price stability.

Protection against low producer prices can also be achieved by placing restrictions on production. figure C shows three such controls: the A quota in the European Community, and land assignments and mill peaks in Australia. (These are all, in essence, limits on the quantities of sugar that receive a supported price). Controlled expansions of the industry occur, but contractions do not, even in times of very low prices.

Government policies, designed in part to protect producers from instability in world prices, have tended to exacerbate world price fluctuations, because increases in supply have not been well synchronised with the rather stable growth in demand[1]. Governments change production controls only after long intervals (as in figure C), and then in large steps. The government controlled increases in production have come only after world price peaks. The resulting surges in production worldwide can far exceed increases in consumption (see figures A and E).

Though high world prices have led to large increases in production, low world prices have not led to large contractions. When world prices fall due to a surge in production, protective policies are activated to support the expanded industries and new fixed investments around the world. This protection of expanded production causes world prices to remain depressed for some years. After a time, consumption again exceeds production, and stocks fall to a level where a large weather induced drop in production can again lead to a sharp increase in world price. Price booms and slumps have therefore been a major feature of the market.

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[1] For instance, the World Bank has financed large expansions of production following the peaks of 1975 and 1980-81 (see figure D). In each case the peak in World Bank investments came two years after the world price peak, and at the same time that production increases arising from changes in government policies reached the world market.

Because of the insulation of many domestic markets by their governments, the burden of adjustment is borne by the relatively small unprotected sectors of the market. To induce the necessary adjustments of supply and demand, the world price must vary more than would otherwise be required.

. *Economic Effects of Policy Intervention*

Under a trading system in which policy interventions were reduced, so that producers had incentives to respond directly to the world price, producers would be likely to base their production plans on anticipated growth in consumption and on changing market conditions. Severe shortages of sugar and high prices would then be less likely to occur, as would overexpansion and periods of drastically low prices; the price would become less variable.

Whether the average world price level over time would be higher or lower than otherwise is difficult to predict. It is possible that the average world price would increase because of the reduced tendency for higher-cost producers to expand under the stimulus of high support prices. On the other hand, with the removal of supply controls in the lower-cost countries it might be profitable for efficient producers to supply the world market at a price lower than would otherwise prevail.

What is more certain is that there would be a shift in production away from subsidised, higher-cost countries to lower-cost countries. The welfare of producers in efficient exporting countries would be lifted through greater trade opportunities. The welfare of consumers and taxpayers in importing countries would also be increased because the world's sugar would ultimately be produced with less resources. Prices paid by consumers would be lowered overall and subsidies paid by taxpayers would be reduced or eliminated.

. *The Policy Formation Process*

Intervention in the world sugar market began over 300 years ago, when European countries strictly regulated the trade in sugar to facilitate taxation of their sugar producing colonies (Ballinger 1971). The colonies were forced to export exclusively to the respective mother countries (or to their colonies) where large import duties were exacted. These duties, by increasing the landed price of sugar, indirectly provided an incentive for the establishment of sugar production (especially from beet) in Europe and North America. These sugar industries therefore grew up heavily dependent on the import taxes, and thus with a strong interest in this intervention being maintained.

a.Vested interests

With few exceptions, groups whose welfare is directly affected by government intervention seek to influence policies in a way which favors them. In the higher-cost countries, producer groups influence sugar policies in a fashion which consistently favors producers at the expense of consumers, taxpayers and producers in other countries. In Japan, the United States and the European Community, for example, subsidies have in recent years made up more than half the income of a sugar farmer or sweetener producer. These costs, unless they are budget items, are not usually transparent to consumers, taxpayers or voters.

The amount firms or individuals stand to gain from policy interventions will determine their incentive to form 'distributional coalitions' (Olsen 1982) to lobby to maintain or increase the protection. Those who incur the costs of the support policies - consumers and taxpayers who fund such subsidies, and other groups such as producers of other goods who incur less obvious economic costs - have, as groups, strong incentives to press for reforms. However, as individuals, the incentives to press for reform are small because the cost of the policies to individuals (even when clearly perceived), tends to be small. As well, the costs of forming a strong lobby group out of a diverse and numerous group such as sugar consumers are usually quite large in comparison to the benefits to be obtained from policy reform.

Producers, however, may have very large incentives to form coalitions. Relatively small producer groups, who have a great deal of fixed capital in the sweetener industry, have strong incentives to lobby to maintain support. For instance, in the United States, the six large companies which own all the mills and farms in Florida received total support estimated at US$329m in 1984-85 (in 1984 dollar values), (Borrell, Sturgiss and Wong 1987). In the same year the estimated cost of the sugar policy to a US family of four was about US$55. Thus, the political will to reform is not strong, even where the benefits of an existing policy are enjoyed by relatively few and the costs exceed the benefits and are borne by many.

b. Volatility of prices

The variability of world market prices may help producer groups to achieve regulatory changes which ultimately increase the total level of support they receive. When the world price rises, producers seek political support for increases in either production quotas, producer prices or subsidised investment — since production controls and fixed domestic prices may clearly disadvantage even some high-cost producers when world price is high. At the same time, if security of supply or maintenance of foreign reserves are government objectives, high prices in the world market may provide an additional stimulus for governments to encourage expansion of domestic production - even if it is not profitable for the economy as a whole.

When prices fall due to a surge in production, producers have a strong incentive to seek protection of the value of their fixed investments. Particularly for a government which has encouraged the previous expansion, it can be politically difficult to reduce protection, despite its rising financial and economic costs. High levels of protection are thus given to enlarged industries, lengthening the period of excessive production and depressed prices. Indeed, the expectation of protection against low prices may have encouraged producers to over-expand when given the opportunity to increase production.

It is usually only after a long period of depressed prices, if at all, that some action is taken to decrease levels of support. When world prices fall the costs of export rebates and stockholding increase, as has happened in recent years in the European Community. Further, the cost to consumers increases. (In Japan, for example, though the recent high value of the yen has lowered the world price of imported goods, the lower prices for agricultural products have not been passed on to consumers; however, some pressure is now being mounted for this to be done (see ABARE 1988)). In each case, pressure is applied through the political system to change the level of some intervention (such as domestic price or production controls). Changes are likely to be small, however, and to occur only slowly.

Thus the high degree of price volatility in the world market tends to help producers in many countries to lobby for changes in policy which ultimately lead to increases in the supported output of their industries even when prices are low. Paradoxically, such behaviour exacerbates world market instability. Through a shift to freer trade world prices may become more stabilised, thereby reducing the incentives for producers to lobby for increases in intervention. A shift to freer trade would also result in better resource allocation. Thus, intervention is both a cause and an effect of instability in world prices. It is also a cause of sustained resource misallocation in the production of sugar and other sweeteners worldwide.

3. EMPIRICAL EVIDENCE OF THE EFFECTS OF INTERVENTION

Protectionist agricultural policies have so distorted world markets that it is difficult to determine accurately what form these markets might assume under more liberal trading practices. Nonetheless, some studies analysing the separate effects of specific country policies have been undertaken, and others have been conducted which look at the joint effects of policies of several countries. Such studies provide important insights about the impacts of intervention and the effectiveness of policy reform.

. *Separate Effects: OECD Countries*

Since 1975, EC, US and Japanese policies have encouraged sweetener production which has contributed to the structural surpluses of sugar and periods of severe low prices on the world market. During this time the European Community has risen from the status of a net importer to second largest exporter. The United States has declined from the largest importer, accounting for 20 per cent of world imports or 5.5 million tons to around 1 million tons (3.5 per cent). Japan, now the second largest importer, has experienced a 25 per cent reduction in imports.

Both the United States and the European Community offer some form of compensation to exporters for lowering the world price. Compensation is granted by allowing exporters restricted access to the high priced US and EC markets. Import quotas are used to restrict access and the rents which exporters can appropriate from these markets. In the European Community the quotas have been virtually fixed since 1975. In the United States rents received by quota holders have been declining in line with declining imports

Apart from lowering the world price, US, EC and Japanese policies also increase instability in the world price. To equilibrate demand and supply, larger price adjustments are required in the world market than otherwise would be necessary. The lower and less stable prices directly cause resource allocation distortions and reduced welfare in third countries. Also, by indirectly inducing changes in policies in other counties, for example, to protect producers' incomes, resource allocation and welfare can be indirectly affected. Import quota rents, such as those given by the United States to the Caribbean Basin Countries, are another cause of resource allocation distortions and changes in welfare in and between third countries. Selective allocation of quotas can protect high-cost producers like Dominican Republic and Jamaica from low cost producers like Zimbabwe, Swaziland and Thailand. Moreover, quota rents can be capitalized into factor prices, raising costs of production and decreasing the long-term international competitiveness of countries heavily protected by quotas.

a. United States

Sugar consumption and imports have declined in the United States due to the technical developments in, and price competitiveness of, alternative sweeteners. These alternatives include high fructose corn syrup and low-caloric sweeteners such as aspartame. The high and stable US price resulting from protection, has been a major factor contributing to the declining trend in sugar consumption and imports. Sugar's share of the total US sweetener market fell from 79 per cent in 1970 to 41 per cent by 1988.

The major feature of US sweetener policy has been the level of protection it has offered not only to sugar producers but also to producers of high fructose corn syrup (see figure B). The chief instruments of the policy are the target domestic price (termed the market stabilisation price) and the import controls which support it. The import quota is determined on the basis of the chosen stabilisation price level and likely US supply and demand conditions. When the world price rises above the stabilisation price, import quotas are not set and domestic prices follow the world price up.

Domestic sugar production is based on both beets and cane. Domestic sugar production has increased rapidly in recent years to 6.7 Mt in 1987-88 from just under 5.5 Mt in 1985--86. This increase has been caused largely by beet growers switching production from wheat to beets in response to declining relative returns from wheat. The size of the increase indicates an increase in responsiveness of some beet growers to changes in relative prices of wheat and beet since the 1980 Farm Bill. This increased sensitivity can be explained as a response to the change in sugar price policy. In the 1980s sugar prices have been more stable than previously and have been announced up to 4 years beforehand. Uncertainty regarding sugar returns has therefore been removed which has changed the relative attractiveness of beets and wheat production.

Corn syrup has many of the attributes of sugar and is readily substitutable for it in many uses (for example, soft drinks). In the United States its costs of production are low relative to protected sugar

price enabling its producers to undercut the sugar price and rapidly expand their market share of the caloric sweetener market. Corn syrup production has been allowed to grow uncontrolled (unlike in the European Community, where it is limited by very small production quotas). By 1985, high fructose corn syrup had virtually completed its substitution for sugar in applications where substitution was relatively easy. Henceforth high fructose corn syrup is expected to maintain its share of the caloric sweetener market.

Reduced US import demand for sugar is estimated to have greatly depressed world sugar prices in the 1980s. Sudaryanto (1987) estimated that in 1982-83 US sugar policies depressed the world price by 49 per cent. Borrell, Sturgiss and Wong (1987) estimated a depressing effect of 34 to 50 per cent for the period 1982 to 1986. More recently, Sturgiss, Field and Young (1990) have estimated sugar policy to have depressed the price on average by between 21 and 33 per cent over the period 1982 to 1988, although for some years reductions of up to 48 per cent were estimated. Moreover, Sturgiss, Field and Young (1990) estimated that US grains pricing arrangements depressed the world sugar price a further 9 per cent over the period 1986 to 1988.

The work of Borrell, Sturgiss and Wong (1987) and Sturgiss, Field and Young (1990) suggests that the impact of US policy is particularly severe during the depressed phase of the world price cycle, because it is then that the gap between US and world prices is greatest. Borrell, Sturgiss and Wong (1987) estimate US policy increases world price instability by between 8 and 12.5 per cent. The policy increases the chance of both very low and very high prices. Nonetheless, averaged out over the long term (a 20 year period) the depressing effect of US policy, although not as severe as has been the case during the 1980s, is sizable. Borrell, Sturgiss and Wong (1987) estimate a reduction of 9 per cent on average.

There are at least two reasons why the impact of US policy has been so large. First is that the increases in domestic production of both high fructose corn syrup and sugar in the United States displaced an estimated 68 to 82 percent of imported sugar by 1988 (Sturgiss, Field and Young 1990). Second, is that consumers and producers elsewhere in the world are mostly unresponsive to changes in world price. Because declines in the world price cause, at best, small changes in the quantities of sugar supplied and demanded, relatively large falls in world price are required to induce absorption of the imports displaced from the United States. With so little adjustment in production and consumption, falling prices mostly induce increased stock holding.

Although US policy provides some compensation to exporters due to the lower world price, for most exporting countries the policy now imposes net costs. The main beneficiaries of the policy are Japan, the Soviet Union and China. In table 1, a summary of the estimated costs and/or benefits of the policy on exporters for select years is given.

For Australia, Brazil, the European Community, Fiji and Thailand, US policy imposed hefty costs, at least between 1982 and 1988. Access to the high-priced US market was insufficient to provide compensation for the loss of export revenue from the world market - no compensation is given to the European Community.

For the Caribbean Basin countries, access to the high-priced US market is considered to be a form of aid under the United State's Caribbean Basin Initiative. However, although the benefit was sizable in the early eighties, in line with the declining import quota it has since declined and indeed, in 1988 at least, is estimated to have imposed a net cost on the region. Moreover, considering that the estimates given exclude the economic effects associated with resource misallocations arising from distortions to trade, the costs are likely to be greater than reported. Areas which once produced sugar for the US market have been forced out of sugar production, having been unable to compete on the depressed world market. Sturgiss, Field and Young (1990) report that exports from the region decreased by 0.6Mt between 1983 and 1988, corresponding to a loss of revenue of $340m. Based on this consideration the costs of US policies on the region may have outweighed the benefits by as early as 1986.

The Philippines and Argentina may similarly be suffering net costs from the policy when consideration of the wider economic effects is made. Like the Caribbean Basin countries, the Philippines has reduced both total exports and exports to the unprotected world market over the eighties. It was highly dependant on access to the high-priced US market in the early eighties. With the reduction of access to the US market the Philippines has found itself uncompetitive on the world market. By contrast, Thailand, Fiji, Swaziland, Zimbabwe and Malawi are developing countries which were only given very limited access to the US market. Highly dependant on the free world market, these countries had to remain highly competitive to export. Despite depressed world prices these countries increased exports during the eighties.

1.Income transfers to trading partners resulting from US sugar policies - in 1988 values US$m

Country or region	1982		1984		1986		1988	
	a	b	a	b	a	b	a	b
Argentina			42	21	15	8	7	2
Australia	-7	-34	-76	-194	-78	-244	-227	-526
Brazil	20	-3	-16	-134	-12	-151	-206	-511
Caribbean Basin Countries			198	111	200	132	-5	-110
Dominican Republic			120	84	87	60	5	-40
European Community	-34	-62	-167	-320	-153	-383	-409	-961
Fiji			2	-4	-4	-8	-20	-48
Philippines			83	48	69	56	39	39
Thailand			-54	-110	-79	-193	-177	-390

Source Sturgiss, Field and Young (1990), a) lower bound, b) upper bound.

When foreign competition is reduced (as occurred in those exporting countries with large quotas), domestic industries tend to become uncompetitive and resist the changes adopted in other countries (Kindleberger, 1973). Fry (1982) has argued that restricted access to protected sugar markets such as the United States, has caused producers such as those in the Caribbean to change from being low cost to high cost producers. Provision of rents from a market creates a need for government intervention of some kind in the recipient countries to control the distributions of those rents. When rents are distributed via the pricing mechanism economic distortions will be introduced to an industry. Through time, the intervention and the distortions it creates, can have costly, unintended side effects. Fry argues that in countries such as the Dominican Republic and the Philippines, high returns have caused factor prices - such as labour and fertiliser - to be bid up and inefficient growing and milling practices have developed.

Ives and Hurley (1988) provide detailed analysis of the effects of the US sugar program on the Caribbean Basin countries and the Philippines. They conclude that the program has imposed great hardship on Caribbean countries and the Philippines especially. Unemployment has soared in many regions, and in the Caribbean where sugar is the regions largest employer, the US sugar program is a major cause of this problem.

Although the costs imposed on exporting countries have been very large, losses to the rest of the world in total are estimated to be less than the cost the policy imposes on the US economy. Estimates of the income transfers and costs which the policy imposes on US groups are given in table 2. Between 1982 and 1988, the costs to US consumers and stock holders exceeded the transfers to US sugar and high fructose corn syrup manufacturers by an estimated $776m to $778m. During its most expensive period, the policy imposed costs on the US economy in excess of $1b annually — the cost varies with changes in the world price.

The subsidy equivalent afforded sugar producers and high fructose corn syrup producers is estimated to be in the order of $1b each per year between 1982 and 1988. The estimated costs imposed on consumers over the same period are in the order of $ 2.5b annually. Costs and transfers of a similar order of magnitude have been estimated in several other studies on US sugar policy (for a review of estimates from partial equilibrium studies on the US sugar program, see Rendleman and Hertel 1989).

2 Income transfers and costs to US groups resulting from US sugar policies. In 1988 values

Crop year b	Lower	Upper	Lower	Upper	Lower	Upper
	US$m	US$m	US$m	US$m	US$m	US$m
	Transfer to US sugar producers		Transfer to US HFCS producers		Cost to US consumers	
1982-85	1 304	1 164	1 035	739	3 362	2 959
1986	1 502	1 299	1 645	1 014	4 197	3 506
1987	1 124	716	1 237	548	3 042	1 853
1988	1 919	558	1 044	394	2 538	1 327
1982-88	1 108	904	1 008	614	2 903	2 315
	Transfer to government		Cost to US stockholders		Net loss to US economy	
1982-85	95	95	57	42	986	1 003
1986	9	9	13	48	1 054	1 232
1987	8	8	43	50	716	632
1988	6	6	30	34	500	404
1982-88	51	51	45	43	776	785

a Transfer may not cancel due to rounding. b September-August.
Source: Sturgiss, Field and Young (1990).

The losses to the US economy arise from efficiency losses and the income transfered from US consumers to foreign suppliers of sugar (quota holders). US sugar policy encourages industry to use resources in the production of sweeteners at a cost higher than the international value of such products, and on imports the US economy pays more for its sweeteners than their international value. Because of the benefits US policy confers to some countries, such as cheaper sugar imports for the Soviet Union, Japan and China, the net losses to the world economy are less than those to the US economy itself. For the period 1982-88, the loss to the world economy is estimated to have averaged between $300m and $500m (Sturgiss Field and Young, 1990). Sturgiss, Field and Young (1990) make a number of qualifications about their estimates, arguing they have erred on the side of conservatism - there are many reasons for believing they have underestimated the costs of US policy. Largely this is because they have not taken into account the impact of the policy on all other sectors of the economy. In a study by Rendleman and Hertel (1989), which looks at the effects of the program on 17 producing sectors, it is concluded that the gains to the US economy could be as much as double the estimates of most other studies.

b. The European Community

It is the support provided to the EC beet sugar industry under the Common Agricultural Policy which has transformed the Community from a net importer in the early 1970s into a large exporter.

In 1983 net exports amounted to 4 Mt. Domestic prices are maintained at levels well above the world price. The amount of production receiving this price is limited by quotas, and imports are subject to a system of variable levies which effectively excludes all imports except those that enter under the Lome Agreement - which allows select African, Caribbean and Pacific Island countries access to the high priced EC market for around 1.4Mt of raw sugar annually.

The intervention price serves as a floor price, since intervention agencies are required to purchase any sugar (up to the quota amount) offered to them at this price. In 1988-89 this price was 0.54ECU/kg for refined and 0.45ECU/kg for raw sugar (while the world raw sugar price was around 0.22 ECU/kg, cif Rotterdam). In fact, producers do not usually receive the full intervention price, because their receipts are levied to help finance the losses incurred by the Community on exports when (as is generally the case) the world price is lower than the supported domestic price at which traders must buy. (The Community pays an export 'restitution' to the trader to cover the difference.)

There are three categories of sugar: A, B and C, of which the first two are limited by quota and receive supported prices, while the third is unlimited and must be sold at the world price. In any year when restrictions are made, a 'co-responsibility' levy of 2 per cent is placed on both A and B sugar. If the funds from the co-responsibility levy do not cover the cost of restitutions, an additional levy of either 30 per cent or 37.5 per cent is applied on B quota sugar only. On occasions when this levy is still not enough, a further levy of 5 per cent has been imposed on A sugar and the total levy on B sugar has been raised to around 50 per cent. However, even under these conditions the effective B quota price exceeds the world price by half of the difference between the intervention price and the world price.

Thus, A quota sugar receives near to the full intervention price. The bulk of sugar produced is A quota sugar: in 1988-89, for the nine-member Community, it was 9.2 Mt (refined). The intervention price is high enough relative to costs to ensure that all A quotas are filled except where weather or disease outbreaks make it impossible. The B quota is much smaller; in 1988-89 it was set at 2.2 Mt.

The beet producer price is also regulated, a 'minimum' price being set on the basis of the sugar intervention price. In fact, this 'intervention beet price' is reduced in proportion to the levies paid by the sugar producers. This reduction is significant for beets used in B quota production.

Although C sugar production must be sold on the world market without any government support, the support provided to A and B quota production can indirectly assist producers of C sugar. In some countries, the A, B and C returns are pooled (BAE 1985), which can have the effect that producers receive over the world price for an unlimited quantity. Even in countries where this does not occur, the assistance given to the production of A and B quota sugar covers the fixed costs of production, so that it is worthwhile to produce additional (C) sugar whenever the world price covers the marginal costs. Furthermore, in some cases C sugar may be produced only to ensure sufficient sugar is produced to meet a grower's A and B quota obligations, and not because it is economical by itself.

Quotas are allocated to individual countries and then to individual factories, and are non-transferable. Thus, shortfalls in quota production cannot be met by other factories or countries and it is possible for the Community as a whole to have B quota sugar without having a full A quota, due to production difficulties in particular localities.

To protect the market from imports, a threshold price is established which determines levies on imports. It is based on a target price, which in 1988-89 was 0.57ECU/kg for raw and 0.66ECU/kg for refined sugar. When the world price is lower than the threshold price imports are subject to a levy equal to the difference between the world and threshold prices. The levy removes the incentive to import sugar. Conversely, import subsidies and export taxes (additional to the levies described above) are used when the world price is higher than the threshold price. The effect of this is to

ensure stable prices in the domestic market. Actual imports, as already mentioned, are limited to those entering under the Lome Agreement.

In essence the effects of EC policy are to exclude free entry of imports, to raise domestic producer and consumer prices above the world price, to raise production, lower consumption and increase exports. Overall, the policy greatly adds to the structural surpluses which regularly overhang the world market.

3 European Community support and world prices for sugar

Year	World price [a] (cif Rotterdam)	Intervention price [a]	Percentage of world price
	ECU/100 kg	ECU/100 kg	%
1968-69	5.81	21.23	365
1969-70	6.99	21.23	304
1970-71	9.78	21.23	217
1971-72	14.95	22.61	151
1972-73	19.50	23.34	120
1974-75	62.79	26.17	42
1975-76	29.68	30.45	103
1976-77	20.05	33.14	165
1977-78	14.08	32.83	233
1978-79	16.07	40.49	252
1979-80	33.11	41.09	124
1980-81	53.94	43.27	80
1981-82	31.58	46.95	149
1982-83	25.06	51.41	205
1983-84	27.23	53.47	302
1984-85	19.87	54.18	273
1985-86	19.38	54.18	280
1986-87	16.85	54.18	322
1987-88	20.34	54.18	266
1988-89	30.13	54.18	180

a Because of changes in EC accounting units, figures within each series are not strictly comparable. Figures in later years may be an over-estimate of producer support levels due to the application of producer levies. However, the data on the world price and EC price for each individual year are in the same units and are therefore comparable.

Sources: Commission of the European Communities (various issues).

The long-term price depressing effects of EC policy on the world market have been estimated at between 5 and 12 per cent (Tyers and Anderson, 1987; BAE, 1985; Koester and Schmitz, 1982). BAE (1985) estimates that production is between 1.3 and 2.3 million tonnes higher and exports 1.6 to 2.5 million tonnes greater than they otherwise would have been if support arrangements had not existed. However the nature of intervention in the EC sugar market so distorts supply it is very difficult to accurately model how producers would respond if exposed to the world price. Nonetheless, because the intervention price is usually several multiples of the world price (see table 3), it seems reasonable to assume that a substantial reduction in supply would occur.

Our own work suggests EC policies have the potential to cause an even greater impact on the world market than given above. Using the model of Wong, Sturgiss and Borrell (1989), a simulation was conducted in which it was assumed that A and B quota production was reduced to a level equal to EC consumption. It was assumed that C sugar only was traded and all export restitution payments

ceased. Subsidies were assumed still to be paid on reduced A and B quota production. The underlying assumption is that in the absence of export restitutions current producers of A and B quota sugar would not supply sugar to the world market - though producers of C sugar would and may even increase supply. This assumption does not seem unreasonable considering that it was not until after support prices were raised and A and B quotas were increased to a level well above 100 per cent self-sufficiency in 1975-76 that the European Community became a net exporter at all. Even with considerable subsidies before 1975-76, the European Community was not an exporter. Although changes in technology since 1975-76 have increased productivity in the industry, it appears that the large boost in subsidies granted the industry since 1975-76 has been a major factor sustaining the export of A and B quota sugar. BAE (1985) concludes that the support arrangements for quota sugar enable substantial quantities of sugar to be produced in parts of the Community where cost structures would otherwise prevent them from producing any or much sugar at all.

The results of our work indicate that the European Community's dumping of A and B quota sugar on the world market alone has the potential to lower world price 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. (For 1982-83, Sudaryanto (1987) estimates EC policies in total lowered the world price by 35 per cent). Dumping of A and B quota sugar on the world market is not the only way EC policy depresses world price. Because EC consumer prices are also set above the world price, EC consumption is depressed to some extent as well. The effect of this on the world price is not included in our own measurement above, although it is in Sudaryanto's. Nonetheless, taking our estimate above as a broad indication of the impact of EC policies on the world market, some indication of the welfare effects on exporting countries can be made. For Australia and Brazil, the policy is estimated to have cost up to $160m each, annually between 1982 and 1988 (in 1984 dollar values), for Thailand up to $72m, for the Philippines and South Africa up to about $50m, for the Dominican Republic $23m and for Columbia and Guatemala around $13m each.

For the ACP countries with access to the high priced EC market under the Lome Convention, the net effect of the policy, after allowing for the price-depressing effects on the world market is estimated to be positive for most countries between 1982 and 1988. These benefits are summarised in table 4. Among the larger exporters of this group, Mauritius appears to have been a clear beneficiary of the policy between 1982 and 1988, while for Zimbabwe, Swaziland and Fiji the benefits have been considerably less, especially when measured on a unit export basis as shown in table 5. Over 75 per cent of Mauritian exports have access to the EC market, while it is less than 33 per cent in the case of the other countries mentioned above. Koester and Schmitz (1982) estimated the welfare effects of EC policy on the ACP countries for 1978-79 and also found wide disparities in the net benefits conferred on recipient countries. They point out that although the preferential access granted ACP countries is regarded as a form of aid for these countries, there is no correlation between the net benefit conferred and the GDP of those countries. They found that the welfare effects are arbitrary and do not correspond to any obvious objective of EC development policy.

Like the estimates made by Sturgiss, Field and Young (1990) for the effects of US policy on Caribbean countries, the estimates given in table 4 and 5 exclude the economic effects associated with resource misallocations arising from distortions to trade. Therefore, the benefits are likely to be less than reported. Zimbabwe and Swaziland, in particular, increased their exports to the world market during the eighties despite the depressed world price. If world prices had not been so depressed by the EC policy, exports from these countries may have expanded even more quickly. If such effects could have been factored into the calculations, the estimated net benefits would be less than reported. Furthermore, the gross benefits are those arising during a period of very low world prices and are therefore near their maximum. At other stages of the world price cycle the gross benefits would be less and even negative. Presently the gross benefits from access to the high-priced EC market are less than between 1982 and 1988 because the world price is considerably higher than it was then. Meanwhile, the EC policy still exerts a price-depressing effect on the world market. The net benefits shown in table 4 should not therefore be regarded as indicators of the long-term annualised benefit of the policy for these countries. (Estimates of future effects if the policy are given later).

4 Net benefits to ACP countries from EC sugar policy in 1984 values, US$m

	1982	1983	1984	1985	1986	1987	1988
Barbados	6.73	11.20	9.93	11.06	9.41	16.80	13.72
Belize	3.41	6.80	6.77	7.73	6.74	12.67	9.97
Congo	2.34	2.45	1.82	2.56	2.01	3.30	2.63
Cote d'Ivoire	-1.21	0.09	1.78	2.40	2.24	3.83	3.00
Fiji	14.88	33.58	29.38	31.14	30.35	49.29	39.02
Guyana	22.07	34.31	33.64	35.76	31.67	54.97	46.19
Jamaica	21.58	29.33	27.63	28.15	25.56	42.84	34.16
Madagascar	1.95	2.39	2.18	2.24	2.63	3.85	2.89
Malawi	0.45	2.33	2.31	1.00	2.35	4.28	3.27
Mauritius	78.56	112.43	107.23	114.75	97.98	166.30	133.64
St Christopher Nevis	1.57	3.21	2.90	3.26	2.89	5.03	4.10
Swaziland	7.94	18.91	16.80	19.61	13.89	31.20	24.33
Tanzania	1.77	2.00	2.20	2.33	2.07	3.53	2.83
Trinidad and Tobago	8.88	11.51	12.78	10.87	9.56	16.17	12.96
Zimbabwe	-6.10	-0.11	-0.30	1.17	-0.58	3.62	4.66

5 Net benefits to ACP countries per tonne of exports, US$ 1984

	1982	1983	1984	1985	1986	1987	1988
Barbados	77.37	153.41	115.48	141.75	106.95	221.08	201.81
Belize	32.82	58.63	66.41	80.56	68.76	150.88	117.26
Congo	na	272.19	82.59	512.35	154.94	194.17	154.84
Cote d'Ivoire	-19.52	1.23	77.46	239.64	448.70	3829.93	499.33
Fiji	35.86	101.45	77.31	74.32	96.36	112.79	94.24
Guyana	83.30	128.49	156.48	155.46	144.63	281.91	332.33
Jamaica	203.58	308.70	328.97	230.70	280.84	516.13	319.21
Madagascar	177.05	132.84	114.84	97.36	na	321.04	151.87
Malawi	5.78	24.78	25.91	6.98	25.24	36.86	31.43
Mauritius	124.10	174.58	190.80	200.96	148.01	239.29	193.12
St Christopher Nevis	46.08	123.31	103.63	130.56	120.52	218.87	195.10
Swaziland	23.07	50.69	42.98	51.61	27.90	71.72	60.23
Tanzania	177.05	95.24	200.45	194.19	188.32	353.23	257.33
Trinidad and Tobago	355.17	575.66	-327.81	319.85	289.58	646.82	392.85
Zimbabwe	-26.62	-0.48	-1.31	5.52	-2.14	15.02	31.25

For countries such as the Dominican Republic and the Philippines the costs of the policy may be considerably greater than estimated too. As pointed out earlier in discussing the effects of US policy, these countries have reduced total exports over the eighties. With the loss of access to the US market along with highly depressed world prices (due in large part to the policies of the US, EC and as will be discussed later, Japan), these countries found themselves uncompetitive on the world market and

were forced to decrease production. If higher world prices had prevailed, these countries may not have had to decrease production and exports as much.

Although the available estimates of welfare effects of EC policy are not as comprehensive as those calculated for the US, many of the broad effects are likely to be similar. For instance, the depressing effects on world price confer a benefit on importing countries, and USSR, China and Japan, as the largest importers, are the main beneficiaries of the policy. However, overall there will be a reduction in world welfare because the pattern of production, consumption and trade will be distorted (see Koester and Schmitz, 1982).

c. Japan

Although Japan is the world's second largest importer of sugar, its consumption of sugar per person is less than in any other developed nation. Moreover, it has been declining, and in recent years sugar has lost market share to alternative sweeteners - in particular, high fructose corn syrup (see figure 21), the consumption of which has risen from virtually nil in the period before the 1974-75 world price peak to 20 per cent of the sweetener market by 1986-87. The decline in sugar consumption has been accompanied by a decline in sugar imports. One of the main driving forces behind these developments is the high consumer prices administered under Japan's sugar policy.

The key policy instrument is a system of fixed and variable levies on imported raw sugar. A stabilisation agency trades in both domestically produced and imported sugar. Japanese consumer and producer prices are both maintained well above the world price. Consumer prices are kept above the world price (five times as high in 1985-86) by subjecting imported raw sugar to high tariffs and a complex system of variable levies, surcharges and rebates. Producer prices are kept above world prices (raw sugar prices were eight times the world price in 1985-86) through the payment of subsidies to growers. The high prices are intended to encourage domestic production, and are set broadly in line with millers', processors' and growers' costs of production.

The very high consumer price for sugar not only reduces sugar demand directly but also allows high fructose corn syrup to be priced below sugar. Consumption of high fructose corn syrup is subject to a small tax, but maize, its major raw material, can be imported duty free. The unequal treatment of sugar and high fructose corn syrup has encouraged the production and use of the syrup in place of sugar.

Sturgiss, Tobler and Connell (1988) estimate that Japanese sugar import demand may be as much as 54 per cent lower than it would be in the absence of government intervention. They also estimate that because of Japanese sugar policy the world price is on average lower by 2-5 per cent (over the long term), and by up to 14 per cent during the depressed phase of the world price cycle. It is also more variable, being 11 per cent higher. In 1986 the price depressing effects of Japanese policy are estimated to have cost Australia between $41m to $50m (1984 dollar values); Brazil between $38 and $46m; and Thailand and the Philippines between $33m and $40m. Within Japan the policy is estimated to have provided high fructose corn syrup producers an effective subsidy of over $700m in the three years up to 1987. Over the same period, sugar millers, processors and growers together received an estimated subsidy of about $2000m. Meanwhile the cost to Japanese consumers over the period was an estimated $7000m. In pointing out the sheer inefficiency of Japanese policy, Sturgiss, Tobler and Connell (1988) indicate that for every dollar transferred to Japanese sugar producers in 1987, the cost to Japanese consumers was an estimated $2.27 and to producers elsewhere in the world it was between $2.50 and $3.40.

Joint Effects: United States, European Community, Japan.

The joint effects of US, EC and Japanese policies are not simply the addition of the separate effects. To estimate the joint effects, we ran the model of Wong, Sturgiss and Borrell (1989) assuming no intervention in the Japanese and US sugar markets and minimal intervention only in the European Community. EC consumers were assumed to be exposed to world prices and A and B quota sugar

production was assumed to be restricted to current levels of consumption. Complete removal of interventionion cannot be easily simulated with the model due to the seperate modelling of A, B and C sugar. It was assumed that high fructose corn syrup consumption grew in line with population growth in Japan and the United States.

The long-run price-depressing effect of the policies jointly was estimated to be 33 per cent. The policies were also estimated to increase world price variability by 28 per cent and to increase the probability of receiving very low world prices. Under current policies, 83 per cent of the time the price is estimated to be above US7.9c/lb only (in 1984 dollar values), whereas given the assumed changes, 83 per cent of the time price is estimated to be above US 12.5c/lbs.

Effects of Other Countries

Although the interventions of the United States, the European Community and Japan have a large depressing effect on the world price, other large producing and consuming countries may also be depressing the price. In particular, the USSR, China and India heavily insulate their producers and consumers from the world price, and in the case of the USSR it also provides considerable support to the Cuban industry. Studies of the separate effects of the intervention of these countries, however, are not available.

Australia and Brazil also insulate their producers and consumers from the world market to some degree. However, the main effect of intervention in these countries appears to be to restrict production and exports below their optimal levels. By limiting production, Brazilian and Australian intervention may place some upward pressure on world price, albeit at a cost to the economies of both countries. The policies also probably add to instability in the world price.

a. Australia

Though Australia is not a large producer of sugar by world standards, it is one of the leading exporters because its domestic market is small (0.8 Mt). In 1988-89 it exported around 2.8 Mt. The smallness of the Australian domestic market makes it impossible to provide high levels of support through the price system. Over the past two decades protection has on average been low or negative (Connell 1989). A greater proportion of Australian production is exposed to the world price than in any other country except possibly Thailand.

The major instruments of policy makers are quotas on area and production, and the pooling of returns from domestic and export markets. An administratively-determined domestic price operated before July 1989; however, since that time market forces have determined domestic prices - although imported sugar is subject to an import duty. All sugar produced in Queensland (95 per cent of the Australian total) is compulsorily acquired by the Queensland state government.

Quotas on area, known as 'land assignments' restrict production. It is not illegal to grow sugar cane on unassigned land, but sugar produced from such cane is compulsorily acquired by the Queensland Government at $A1/t; thus, in effect, land assignments are binding. Because of this tight restriction on area, increases in production are limited to what is possible by more intensive use of the assigned land.

Australia is a very low cost producer with a clear advantage and considerable potential to produce more sugar even at low world prices, but regulatory provisions allow certain small groups who perceive some advantage from production controls to resist calls to eliminate them (see Borrell and Wong 1986). In the absence of intervention, output could expand considerably. The work of Sturgiss, Connell and Tobler (1990) indicates that each one per cent expansion of supply could lower the world price by up to 0.2 per cent over the long term, given the existing structure of the world market. The cost to the Australian economy of maintaining its intervention is estimated conservatively at A$28.4m per year for each five per cent expansion potential foregone (Sturgiss, Connell and Tobler 1990).

b. Brazil

Brazil is by far the largest sugarcane producer, producing well over 200 million tonnes of cane annually. However, only about one third of the cane grown is used to produce sugar. The majority is used to produce ethanol - a substitute automobile fuel. Brazil is already the fourth largest sugar producer after the EC, India and the USSR. The vast quantities of cane produced potentially gives Brazil an immense capacity to produce more sugar. If all cane were used to produce sugar, Brazilian sugar output would rise from around 8 million tonnes annually to over 20 million tonnes. Currently, around 105 million tonnes of sugar are produced globally each year.

A tight net of institutional controls and interventions have long been a feature of the Brazilian industry. They strictly limit the industry's ability to switch cane between ethanol and sugar production. Nonetheless the economic incentives for the Brazilian economy as a whole to divert cane away from ethanol to sugar are great. With a border price of gasoline at around $24 per barrel ($18 Saudi crude) the shadow price of ethanol as a fuel substitute, measured in sugar equivalents, is about 4-5c/lb only. Compared to the current world price for sugar of around 15c/lb, the marginal opportunity cost of not switching is clear.

The Brazilian Government indirectly determines the structure and behaviour of the sugarcane, sugar or ethanol industries. Annual production quotas allocated to farms, mills and distilleries regulate the location, size and distribution of the sugarcane crop. Domestic sugarcane, sugar and ethanol prices are fixed and exports are controlled. Overall, intervention and controls isolate producers and consumers from changes in world market conditions. Changes in world sugar or fuel prices therefore have no direct effect on the production or consumption of sugarcane or its derivatives.

Sugarcane, sugar, and ethanol prices for producers are fixed high enough relative to costs to ensure all available production quotas are filled. By world standards, Brazilian sugarcane and sugar producers are very low cost. Ethanol production is not cost competitive with imported oil prices but ethanol prices to producers are set sufficiently high to ensure distilleries face incentives to fulfil their quotas. Also, concessional credit is provided for investment in distilleries. Quotas, however, are the main determinants of production. Any switching which occurs between the production of sugar and ethanol occurs as the direct result of changes in quotas only. The empirical evidence (see Wong, Sturgiss and Borrell 1989) is that Brazil's capacity to switch cane between sugar and ethanol in response to even large changes in oil and sugar prices is greatly limited under current policies.

Like Australia, Brazil is a very low cost producer with a clear advantage and considerable potential to produce more sugar even at low world prices. In the absence of intervention, output could expand considerably. Using the model of Wong, Sturgiss and Borrell (1989), we estimate that for each one per cent expansion of exports from Brazil, the world price could be lowered by up to 0.3 per cent over the long term.

Overall Impact of Policy Intervention on the Sugar Market

Because it is difficult to determine accurately how much supply might increase from countries such as Australia and Brazil in the absence of intervention, estimates of the total effects of intervention on the world market provide partial insights only - but insights nonetheless. Most studies have examined the impacts on the sugar market in a generalised, static, multicommodity framework - only the work of Wong, Sturgiss and Borrell (1989) has specifically examined sugar using a dynamic framework.

The Ministerial Trade Mandate model developed by the Organization for Economic Cooperation and Development (OECD 1987) has eleven regions and fourteen commodities. The study indicates that a 10 per cent reduction in assistance to sugar producers from 1979-81 levels would lead to a 0.93 per cent increase in the world sugar price in those years.

Webb, Roningen and Dixit (1987) use the Static World Policy Simulation model developed within the US Department of Agriculture, with eight regions and twelve commodities. The framework of the model is similar to that used in the OECD study. The results of the study indicate that under complete trade liberalisation, the 1984 world sugar price would have been 53 per cent higher.

A third study done by Anderson and Tyers (1986) uses a model in which thirty countries and seven commodity groups are represented. Protection is measured at average 1980-82 levels. The results indicate that under full trade liberalisation by Western European and East Asian countries, the world sugar price (taken at its 1987 level) would have been 10 per cent higher and price variations would have been reduced by 22 per cent. Western Europe and East Asia would have increased their net imports by 3.5 Mt, this increase being mainly supplied from developing countries.

Another study by Zietz and Valdes (1986) analyses the effects on 56 developing countries of a hypothetical removal of trade barriers in 17 developed countries in a multicommodity context. Their results show that for 1983, world price would have been an estimated 13 to 30 per cent higher in the absence of trade barriers. These results, plus results from earlier work by Valdes and Zietz (1980), show that the estimated gains in export revenue from sugar to low and middle income developing countries, arising as result of trade liberalisation, are very large at up to $5b in 1980 dollar values. Moreover, they show that of gains from trade liberalisation generally, gains in sugar export revenues for developing countries are among the greatest of all agricultural commodities.

The results of these studies are not strictly comparable. The crucial factor affecting the results is the choice of the base period. Because world sugar prices were relatively high in the period 1979-82, the measured levels of producer assistance in various countries are generally relatively low. The results obtained by OECD (1987) and Anderson and Tyers (1986) can therefore be treated as only conservative estimates of the effects of protectionist policies on the world price over the longer term.

Wong, Sturgiss and Borrell (1989) using their dynamic model, study the adjustments made in the market place over time in response to policy changes. In their study a long period, 1985 to 2004, is simulated under 60 different market scenarios. Because a long period was simulated, and under many different scenarios, the results are not sensitive to the choice of base period. Their findings are that significant reductions in the variability of world prices and sizable increases in the average price could be expected even from partial (although well targeted) multilateral trade reforms.

They found that by making a small volume of production (up to 2.5 per cent of world production) in low-cost producing countries such as Brazil and Australia responsive to the world price, while also charging consumers in OECD countries world prices for their sugar, sugar consumption in OECD countries increased and the average world price was 7.6 per cent higher, than in the absence of policy reform. The measure of variability of world prices was lower by 33 per cent. Price peaks were lower, but prices were higher in the trough periods. The world price effects of their particular experiment are reproduced in figure F. The 'Base' simulation shows the projected price path given a continuation of existing policies, while 'Simulation 1' shows the price path projected assuming the above reforms had occurred in 1985.

The lower price peaks they observed, resulted from low cost producers responding quickly and more directly to rising world prices, and from contractions in consumption in OECD countries in times of high world prices. Lower price peaks reduce the incentives for high cost producers in other countries to expand production in the years following a price peak. There was still an expansion in production around the world in response to the price peak, but it was lessened. As a result, the consequent price trough was less severe. Given such results the benefits to efficient exporting countries would be sizable. For instance, Australia was estimated to benefit by as much as $294m a year - which includes the gains to producers of receiving more stable prices.

Although the impact of policy intervention in all countries on the level of world sugar prices remains open to some conjecture, the impact of intervention on the variability of prices seems most definitely to have been adverse and very large. Moreover, there is little doubt that policies of the United States,

the European Community and Japan have separately and jointly, greatly lowered world prices. At the same time they have ensured a sustained misallocation of resources in the production and consumption of sweeteners worldwide, not only imposing high costs on their own economies but those of efficient exporting countries as well.

4. PROSPECTS FOR CHANGE

As reviewed earlier, cyclical price booms and slumps have long been a feature of the world sugar market. Presently, the market is in the upswing phase of its cycle. Since the large build up in production in response to the boom of 1980-81, regular growth in consumption has outpaced growth in production and stocks have been run down. World prices are not yet high enough to induce significant policy changes which would allow for significant increases in the production of sugar. With regular growth in demand likely to continue, however, importers will most likely be forced to bid up prices further over the next two or three seasons.

Exactly how high prices rise will depend importantly on random factors such as the weather. With stocks presently very low the market is especially sensitive to information about crop losses in any of the major producing regions. Taking into account the probability of below average crops in coming seasons and the present phase of the price cycle, the World Bank assesses that there is at least a 30 per cent chance of prices being above US20c/lb in each year between 1991 and 1993. As a rough rule of thumb, prices above 20c/lb can be regarded as boom prices. The tighter the stock situation becomes without inducing a significant price response, the longer the delay in an eventual supply response, and the greater is the probability that very high prices will be required to ration imports during a period of physical shortages.

Without significant policy reforms, boom prices, as in the past, are likely to set in motion political processes in many countries of the type reviewed earlier in this paper. Ultimately, boom prices are likely to act as a trigger to synchronise changes in policies which lead to expansion of sweetener production capacity in many countries, including high-cost producing countries. Worldwide, a large build up in production in excess of consumption, such as has occurred after previous booms, is likely. The continuing protection of enlarged industries around the world will cause another sustained period of depressed prices; and sugar will continue to be produced with more resources than is necessary globally.

Policy Reform

Agricultural trade reforms are presently under discussion in the 'Uruguay round' of multilateral trade negotiations taking place through the General Agreement on Tariffs and Trade. Contracting parties to the Uruguay round have agreed that there is an urgent need to overcome the policy induced distortions of agricultural trade. The most ambitious targets established were those of the United States and the Cairns Group. Both, in their opening position statements, called for multilateral elimination of protectionist agricultural policies within ten years. The position statements of other participant groups, including that of the European Community, all called for less restraint on the operation of market forces in agricultural markets. Complete free trade, however, was not considered a feasible option.

Following trilateral talks between the United States, the European Community and the Cairns Group, agreement was finally reached in April 1989 on a framework for negotiations on agricultural reform during the balance of the Uruguay round. The agreement encompassed both short-term and long-term reform measures. In the short term, participants in the Uruguay round have agreed to freeze agricultural support at current levels; they have also committed themselves to reducing support and protection levels in 1990. For the longer term, participants have agreed on a negotiating framework designed to provide for substantial progressive reductions in agricultural support and protection over an agreed time period, in order to help overcome restrictions and distortions in world agricultural markets. Of course, while this agreement on a negotiating framework is encouraging, it

remains to be seen whether the major agricultural trading blocks have the political will to act upon their proposals and to deliver major trade reforms.

The factors which may contribute to the introduction of reform in the sugar trading system include the following:

. If reform is multilateral, this can significantly ease the burden of adjustment to freer trade for individual countries. Under multilateral reform:

  - the chances of long periods of depressed world prices would be reduced to a much greater extent than could be achieved by one or two countries or economies;
  - the world price would be less variable, reducing the average costs to government and consumers of agricultural support programs, and also reducing the costs imposed by price risk.

. The growing public awareness of the costs of current policies, including the cost of ignoring the benefits of freer trade, may in some countries act to change the political balance in favor of reform.

The following factors, however, are working against reform.

. In many countries, specific groups with vested interests - especially highly protected producer groups - have sufficient influence so that overt reductions in protection through specific policy changes will not be achieved easily. Indirect means of achieving reductions in protection and intervention may be more likely to succeed than policy changes perceived to pose a direct threat to the incomes of specific groups.

. Multilateral, multicommodity negotiations involve a large number of groups: the larger the number of groups the more difficult it is to obtain agreement.

. The presently rising world price may reduce the concern of producing countries about the adverse effects of the current trading system, and thus reduce interest in lowering the support levels to producers in high protection countries.

Specific Reforms in Particular Countries

Theoretical and empirical evidence shows that with a move away from interventionist trade policies, the welfare of exporting and importing countries alike would increase - alternative policies result in losses in efficiency through the process of redistributing income to sugar and and other sweetener producers. Nonetheless, because of vested interests a move to free trade may be difficult to achieve due to political pressures from these groups. Still, other policy reforms may provide some scope for major improvements in efficiency and welfare.

a. United States

Sturgiss, Field and Young (1990) argue that various support policies which are trade-neutral (such as direct payments) could be adopted in the United States which would be considerably less costly to the US economy and US consumers over the next five years than a continuation of existing policies. Such policies would also practically eliminate the costs of US policy on other countries, since a trade-neutral policy would not decrease the world price. Conflicts between US domestic and foreign objectives would then be resolved. Support policies which are trade-neutral in their effect provide assistance to targeted producers through direct income payments from government while leaving consumption, production and trade outcomes unchanged. The US delegation to GATT has proposed

that achieving trade-neutral policies using direct income payments be a goal for all countries in the GATT round.

In table 6, eight alternative policy options for the United States which were evaluated by Sturgiss, Field and Young (1990) are listed. In table 7 the income transfers and the impact on the world price arising from the alternative policies are given. After evaluating this range of options, Sturgiss, Field and Young (1990) conclude that, to reduce the costs of US policies, the goals of any reform should include making payment of assistance to producers direct and visible and that prices facing US sugar and sweetener producers and consumers should be exposed to world prices as much as possible.

6 Summary of simulated policy reforms in Sturgiss, Field and Young (1990)

Simulation	Producer price	Method of assistance	Consumer price	Trade
Base	Maintained	US market price	Producer price	Import quota
1a	Receive world price	No assistance	World price	Free trade
1b	Maintained	Direct income payments	World price	Free trade
2	Maintained	Deficiency payment	World price	Free trade
3	Target price reduced by 10% 1990, further 10% over 4 years	Deficiency payment	World price	Free trade
4	Target price reduced by 10% 1990, further 10% over 4 years	Deficiency payment	World price plus 10% ad valorem tariff	10% ad valorem tariff
5	Target price reduced by 10% 1990	Deficiency payment	World price plus 10% ad valorem tariff	10% tariff Similar changes to EC and Japan prices
6	Loan rate reduced by US6c/lb (nominal) over 4 years	US market price	Producer price	Import quota

The Sturgiss, Field and Young (1990) study concludes with two major observations:

- 'The coincidence of the timing of the Uruguay round, (the findings of a recent GATT panel on the inconsistency of current US sugar import quotas), and the forthcoming 1990 farm bill may provide an impetus for US reform that was missing from the farm bill debates in 1981 and 1985, and a unique opportunity both for reform of the US sugar program and participation by the United States in wider ranging multilateral reforms.'

'There is a danger that US policies, if not reformed unilaterally or as part of multilateral trade negotiations, could follow the path taken earlier by EC sugar policies. The United States, with the development of new corn and chemically based sweeteners, could become a large exporter of subsidised sweeteners. This would raise the costs of the program and would also create a new set of unintended beneficiaries with a stake in seeing policies maintained. The tendency to perpetuate current inefficient policies would thus be increased.'

7 Change in world price, income transfers and costs to US groups resulting from alternative policies, annual averages for the period 1991-95 a In 1988 values

Simulation b	change in world price	US consumers	US sugar producers	US fructose producers	US economy	Net cost to government
	%	US$m	US$m	US$m	US$m	US$m
Simulation 1a	3.8	942	-364	-417	167	11
Simulation 1b	3.8	942	0	-417	167	375
Simulation 2	0.6	1 108	-2	-490	187	445
Simulation 3	2.2	1 025	-211	-454	175	196
Simulation 4	0.8	583	-94	-259	92	61
Simulation 5	15.4	349	-63	-155	37	90
Simulation 6	1.8	528	-207	-233	83	-1

a Transfers and costs may not cancel due to the exclusion of stockholders and to rounding. b simulation 1a: Free trade between United States and the rest of the world. 1b: Trade neutral, direct income payments, assistance to sugar producers maintained in real terms. 2: Deficiency payments, assistance to sugar producers maintained in real terms. 3: Deficiency payments, assistance to sugar producers reduced. 4: Deficiency payments, assistance to sugar producers reduced, to ad valorem tariff of 10 per cent. 5: Simulation 4 applied to the European Community and Japan. 6: Bradley plan.

Source: Sturgiss, Field and Young (1990).

b. Japan

Many of the benefits from Japan moving to free trade could be achieved by reducing consumer prices and making them more responsive to world prices. Protection to producers could be continued through the use of well targeted direct payments from government. Sturgiss, Tobler and Connell (1988) conclude that direct income supplements to farmers would provide a more efficient and equitable means of assistance than is currently provided under unit subsidies.Targeting assistance to to help inefficient farmers leave the industry or by providing incentives to establish alternative industries may be more efficient ways of providing support to various regions than by distorting prices.

In 1988, Japan introduced a number of reforms to its agricultural sector. Forces from within Japan as well as pressure from the United States may have precipitated these changes. While this may be an indication of a desire by the Japanese to reduce intervention affecting some agricultural products, reforms to the sugar industry may be of lower priority. To date the reforms have mostly affected products exported by the United States.

As in the United States, failure to reform the sugar industry could lead to the establishment of larger groups with a stake in retaining existing supports. The further technical development and market penetration of alternative sweeteners would ultimately increase the proportion of the sweeteners market being met from subsidised domestic sources.

c .The European Community

Because the EC sugar regime is largely self-financing and thereby does not impose excessive costs on the Community budget, it is regarded within the Community as being one of the less problematic aspects of the Common Agricultural Policy. Nonetheless, subsidies derived from price support have made up over half of the revenue received by producers of A and B quota sugar in recent years and high consumer prices have caused consumption to be lower than otherwise. As long as EC policy encourages the sugar industry to use resources up to a point where their cost exceeds the international value of sugar, the policy will impose a large cost on the EC economy.

Policy reforms which expose consumers to world prices and which limit or reduce subsidised production through the use of quotas will provide benefits to the EC as well as to exporters to the world market. In the past the EC has expanded quotas and or prices following booms in the world price. If prices boom some time in the next few seasons, pressures may arise again to raise these support mechanisms. For instance, if East Germany is absorbed into the EC, a period of high world prices may provide the impetus and apparent political justification to raise quotas in a United Germany. Ensuring current production quota limits and/or subsidised prices are not increased in response to high world prices may be an important policy challenge in the 1990s. Any reforms which achieve a reduction in production quota levels would represent a major increase in efficiency.

8 Net benefits to ACP countries from EC policies, US$m 1984

	1990	1992	1994	1996	1998	2000	2002	Total (90-02)	Annual average
Barbados	4	2	-7	5	0	3	-10	-9	-1
Belize	2	0	-8	2	-3	0	-12	-37	-3
Congo	1	0	-2	1	0	0	-2	-5	0
Cote d'Ivoire	1	1	-1	1	1	1	-1	6	0
Fiji	7	-2	-36	5	-20	-4	-58	-216	-17
Guyana	16	10	-19	21	7	16	-22	46	4
Jamaica	12	8	-14	15	5	12	-17	30	2
Madagascar	1	0	-2	1	0	0	-3	-6	0
Malawi	-1	-3	-8	-3	-8	-4	-14	-77	-6
Mauritius	40	20	-74	49	-4	29	-102	-116	-9
St Christopher Nevis	1	1	-2	1	0	1	-3	-4	0
Swaziland	1	-7	-32	-3	-25	-11	-56	-259	-20
Tanzania	1	1	-1	1	0	1	-2	1	0
Trinidad and Tobago	5	3	-5	6	3	5	-5	18	1
Zimbabwe	-2	-4	-11	-4	-11	-6	-20	-111	-9

Continuation of existing EC policy has the potential to not only impose high costs on the Community itself, but also on many exporters, including some ACP exporters and the world economy more generally. As the exports from efficient ACP exporters grow through time, their ACP quota access to the high-priced EC market will decline as a proportion of total exports. The world price depressing effects of the EC policy could then tend to outweigh the benefits deriving from the quota sales to the EC itself. In table 8, estimated average annual welfare benefits, total benefits, and benefits from select years, arising from EC policy for most ACP countries over the period 1990 to 2002 are presented. The growth in production simulated in the rest of the world sector of the model of Wong, Sturgiss and Borrell (1989) has been assumed to apply to all ACP countries, since the ACP countries are not included as a separate group in the model. The price-depressing effect of EC policy is estimated using the model of Wong, Sturgiss and Borrell (1989) as the difference between:

simulated prices assuming a continuation of EC policy processes, and simulated prices assuming A and B quota production is restricted to EC consumption only. Towards the end of the period the majority of countries are estimated to receive negative net benefits from the policy - assuming no increase in import quota to the ACP countries.

d. The Cairns Group

The interests of specific groups around the world involved in the sugar market are many and varied. In many cases, opposing interests are not balanced through the political process because they are separated by national borders. Probably the main channel through which one national interest group can influence policies in another country is through its effect on the world price. The results of the study by Wong, Sturgiss and Borrell (1989) suggest that world price - and particularly its variability - has the potential to modify incentives governing policy formation in several countries.

After evaluating a number of different multilateral reform options, Wong, Sturgiss and Borrell (1989) conclude that, for greatest effectiveness, trade reform should expose both consumers and producers of marginal output to the world price. Simply reducing support prices can, to a small extent and in the short term, reduce the drop in world price during trough periods, but would not significantly reduce instability. Indeed, it could slightly intensify price peaks, which lead producers to lobby for changes which encourage production.

To achieve durable reforms, Wong, Sturgiss and Borrell (1989) argue that measures must be adopted that alter the incentives which affect the policy formation process. This will require changing the world price cycle so as to remove much of the price variability (perhaps, as a side-effect, even altering the period of the cycle). To do this, marginal production, at least, should be exposed to the world price. This already occurs in the European Community. Sugar produced for A and B quotas, which accounts for most of the EC crop, is heavily supported. Sugar produced in the C category, however, is largely unsupported and usually receives only the world price. This C production is quite responsive to the world price, as is shown by the decline of total EC production by over 2 Mt from its 1982 peak. If sugar producing countries around the world adopted similar policy instruments to the C category element of the EC policies, it could be expected that production responses to world price would occur which would tend to stabilise the price.

In a growing market like that for sugar it may be possible to make producers in several lower cost countries more responsive to the world price without imposing significant adjustment costs on producers, consumers or taxpayers in those countries. The world sugar market is expanding by around 2 per cent each year, despite inroads being made into it by some (generally protected) alternative sweeteners (Borrell, Wong and Sturgiss 1989). World production must increase in some fashion to meet this increased demand. If lower cost producers were not constrained by supply control policies, they would respond more rapidly to rising world prices by producing extra sugar. In the past they have collectively responded some time after each world price peak. In an unconstrained situation producers would have an incentive to anticipate growth in demand and to match their expansion more closely to emerging market opportunities than is possible at present. Smaller, gradual increases in production would then be likely, rather than the large, widely separated jumps in production which have occurred in the past. If oversupply occurred and world price fell, marginal production would contract, so that long periods of low world price would become less likely.

In a rising world market, producers in low-cost exporting countries have an incentive to support - either unilaterally or multilaterally - policy changes which would allow them to respond directly to the world price. Multilaterally, a group of countries may be able to influence substantially the variability of world price. The results reported by Wong, Sturgiss and Borrell (1989) suggest that a small amount of price-responsive production can substantially stabilise the world price. Intervention currently applying to existing volumes of sugar should be strictly limited to that output, and where possible reduced.

The Cairns Group consists of Argentina, Australia, Brazil, Canada, Chile, Colombia, Fiji, Hungary, Indonesia, Malaysia, the Philippines, New Zealand, Thailand and Uruguay. The sugar exporters of this group constitute the majority of the world's low-cost producers. Collectively, this group has the potential to reduce the volatility of world price (see reference to figure F). To do this, they would have to implement policy changes which would leave their producers free to make their own marginal production decisions in light of expected world prices.

The Cairns Group exporters have a common interest in reducing price volatility and in supplying more sugar to the growing world market. In a buoyant market such as is likely to prevail over the next few seasons, concerted action by members of this group may improve the trading environment of each member. Currently production in these countries is highly regulated although lightly protected.

As pointed out by Wong, Sturgiss and Borrell (1989), a Cairns Group initiative designed to prevent boom prices on the world market could be undertaken by low-protection nations independently of the reform problems of high-protection nations. Such an initiative would be consistent with the Cairns Group's first aim: that is, it would head off a buildup in protection by removing the incentive for new demands by vested interests in higher-cost countries. At the same time, such an initiative is not likely to jeopardise other moves by the group toward a more open trading system. Indeed, it may strengthen the position of the group. By reducing the probability of low prices it would lessen the perceived need for policies such as those operated in the United States and the European Community. The more substantial and widespread the reforms undertaken, and the greater the proportions of production and consumption that are exposed to world price, the less variable the price will become. Despite the incentives for low cost countries to free up their markets, political constraints remain which make such countries cautious to change

Of the Cairns group members, Australia and Brazil are the two countries with the greatest potential to influence world price variability if reforms are introduced. While there has been some relaxation of production controls in Australia in recent times, they have been small only and controls still greatly restrict the responsiveness of Australian supply. And in Brazil, in the past two years instead of increasing sugar production, sugar quotas have been reduced to allow for the expansion of ethanol output. Although pressure has been exerted by Brazilian producers for relaxation of production controls on sugar, it has not yet resulted in any significant liberalisation.

Best Bet Scenario

Without concerted action by low-cost exporting countries to immediately reform their policies in ways which allow their producers to respond directly to world prices, supply shortfalls and an eighteen month to two year price boom are likely to occur sometime before 1995. The attention given to the disruptive policies of the United States, the European Community and Japan in recent years and agreements already reached through GATT, may create enough pressure to hold absolute levels of support in check in these countries over the 1990's - the prospects for durable and worthwhile reform of these policies however, remains very much in doubt given the vested interests already established. Nonetheless any reforms in these countries which increase the exposure of their producers and/or consumers to the world price would allow for significant benefits from trade to be achieved.

Even if protection in highly supported OECD countries is held in check, without policy reform in OECD or Cairns group nations to alter and substantially reduce the amplitude of the sugar price cycle, the prospects for an increase in production of highly subsidised sweeteners in other parts of the world seems to be a clear possibility. In particular, the Soviet Union, other parts of Eastern Europe, China and India, may increase production in response to booming world prices. China and the Soviet Union for instance, with their very large imports, are countries which may seek to diversify their supplies of sweeteners if the world price booms and greatly raises the foreign exchange costs of sugar. Sharp expansions in corn syrup production occurred in the United States and Japan following the price peaks of 1974-75 and 1980-81. In the United States and Japan use of

high fructose corn syrup has reached saturation levels. High world prices in the world market may, for instance, give high fructose corn syrup companies in the United States and Japan an incentive and perceived justification for engaging in joint ventures to establish and run plants in the Soviet Union and China. It is possible such joint ventures could be negotiated based on some understanding about price stability in the domestic market. Ultimately such developments would displace imports. Along with other increases in sweetener supplies coming from other regions following a boom, the world price could become highly depressed again in the second half of the 1990s.

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