

DEVELOPING COUNTRIES IN SUGAR MARKETS

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CFNPP is funded by several donors including the Agency for International Development, the World Bank, UNICEF, the Pew Memorial Trust, the Rockefeller and Ford Foundations, The Carnegie Corporation, The Thrasher Research Fund, and individual country governments.

This document was prepared for the State Department Conference on Sugar Markets in the 1990s.

© 1991 Cornell Food and Nutrition Policy Program ISBN 1-56401-107-0

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FOREWORD

Many developing countries have lower production costs than sugar producers in developed countries, and in the past the developing countries as a group supplied more than 80 percent of the world sugar exports. In recent decades, however, trade protection in industrialized countries, combined with low world sugar prices in the 1980s, has resulted in a significant decline in the developing countries' export share in sugar and an increase in sugar exports from the developed countries. Some developing countries are net sugar importers, and thus they benefit from the lower import costs that result from the developed countries' trade protection. However, the developing countries as a group are net losers from these policies.

Government intervention in world sugar markets and its effect on developing countries is of immediate concern to both international donors and to development and trade economists. Many debt-laden developing countries are currently seeking ways to reorient their economies toward greater market- and export-orientation under structural adjustment initiatives supported by the World Bank and the International Monetary Fund. Yet, in the case of sugar, low prices and lack of export opportunities have forced some developing countries to reduce production of export sugar and to switch to alternative crops. Developed countries are being pressured to reform their sugar policies through the multilateral trade negotiations that are taking place under the auspices of the General Agreement on Tariffs and Trade (GATT), but the outcome of these negotiations is currently in doubt.

This paper examines the role of developing countries in world sugar production, consumption, and trade, along with the effect of both developed and developing countries' sugar policies on that trade. The paper also analyzes the effects of trade liberalization on developing countries' sugar trade according to a partial equilibrium model of the world sugar market. Results show that trade liberalization in the world sugar market could provide an important boost in income and export earnings to developing country sugar exporters.

Ithaca, New York
March 1991

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EXECUTIVE SUMMARY

Traditionally, the world sugar market has been dominated by low-cost sugar exports from developing countries. In recent decades, however, trade protection in industrialized countries has resulted in a significant decline in the developing countries' export share in sugar, while exports from the developed countries have increased. High rates of import protection in industrialized sugar importers (United States, EC, and Japan, as well as others in Western Europe), along with subsidized exports (primarily from the EC), depress world sugar prices and the export revenues of developing countries. Although some developing countries are net sugar importers, and thus benefit through lower import costs, the developing countries as a group are net losers from these policies. It is often argued that developing countries harm their agricultural sectors through direct taxation of agricultural exports, or through exchange rate misalignment and other industrialization policies. We found sugar to be a special case, however, in that developing countries' taxation of sugar is quite low.

Under U.S. and EC preferential import quota schemes, some developing countries receive higher-than-market prices for a fixed amount of sugar exports, but in general these programs do not offset the adverse impacts of developed countries' sugar policies. A sharp decline in the U.S. sugar quota resulted in reduced earnings from developing countries' sugar exports during the 1980s. In contrast to the United States, the EC maintains a floor level of sugar imports, and thus EC-quota countries have received higher export earnings under the program. At the same time, however, the EC's sugar policy suppresses the expansion of exports and development of sugar processing activities, particularly in low-income countries in Africa. Significantly, the developing country exporter with the lowest share of exports tied to these schemes, Thailand, substantially increased its share of world sugar exports over the 1980s.

Low world sugar prices in the 1980s resulted in reduced sugar exports from many developing countries, in diversion of acreage to other crops, and/or in increased domestic use. Diversification projects reduce the short-run effects of lower sugar exports and foreign exchange earnings, but they are often not sustainable without subsidies in the long run. Results from a model simulation of trade liberalization in the world sugar market show that developing countries, particularly exporters in Latin America and Asia, would gain if both developed and developing countries would agree to eliminate trade-distorting policies in the world sugar market.

1. INTRODUCTION

Sugar is produced widely in both developed and developing countries; thus world sugar trade patterns are significantly affected by the agricultural trade policies of the two groups of countries. Developed countries have traditionally subsidized sugar production and taxed sugar consumption, while developing countries often tax agricultural exports, either directly or through anti-export, import-substitution industrializing policies. These trade biases have resulted in a decline of sugar export market share for the developing countries as a group, countries that generally have lower sugar production costs than beet sugar producers in developed countries, and which at one time supplied more than 80 percent of world sugar exports. Low world sugar prices in the 1980s, combined with income growth and policies that tend to subsidize rather than tax sugar consumers, have made the developing countries a growth market for sugar consumption and imports. This paper is concerned with the role of developing countries in world sugar trade and with the effect of government intervention in world sugar markets on that trade.

Government intervention in world sugar markets and its effect on developing countries is of concern to development economists for three reasons. First, many debt-laden developing countries are seeking ways to reorient their economies toward greater market- and export-orientation under structural adjustment initiatives supported by the World Bank and the International Monetary Fund. Yet, in the case of sugar, many of these countries have been forced by developed country policies, which lower world sugar prices, to reduce production of export sugar and to switch to alternative crops. Second, some developing countries have sought alternative domestic uses for sugar, such as in ethanol production or in food and beverage industries. Diversification helps to mitigate the short-run adjustment costs to low world sugar prices; however, diversification may also result in lower incomes for developing countries as compared to a situation where developing countries were able to export sugar at free-market prices under trade liberalization. Third, developed countries' trade restrictions on sugar have historically led to world price instability, largely in the residual international market for export sugar. To the extent that this price instability reduces the ability of government officials in developing countries to plan and to forecast foreign exchange earnings from sugar, then policy reforms could result in an important benefit to developing countries' sugar exports above any direct effect on export earnings.

It has also been argued that the higher-than-world-market prices offered to developing countries under developed countries' preferential sugar import schemes have offset the effects of developed countries'

protectionism in sugar. Countries that participate in the European Community's (EC) program, which places a floor on the level of EC sugar imports, have benefited through higher export earnings, but countries that participate in the U.S. sugar quota have seen their export earnings fall because of declining U.S. imports. To the extent that both schemes limit expansion of developing countries' sugar exports and lower world prices, however, these schemes contribute to the inefficiencies that plague the sugar market. The schemes also reduce longer-run employment and earnings opportunities in developing countries.

In the following pages, we will examine the role of developing countries in world sugar production, consumption, and trade, along with the effect of both developed and developing countries' sugar policies on that trade. We will also provide a simulation of the effects of trade liberalization on developing countries' sugar trade according to a partial equilibrium model of the world sugar market.

2. TRENDS IN DEVELOPING COUNTRIES' SUGAR PRODUCTION, CONSUMPTION, AND TRADE

DEVELOPING COUNTRIES IN WORLD SUGAR PRODUCTION

Sugar is one of the most widely produced agricultural crops in the world. In 1988 more than 100 countries were producing beet or cane sugar or both. Seventy-nine were developing countries. Developing countries have increased their share of world sugar production in recent years and currently account for 57 percent of this production (Figure 1). Developing countries in Asia account for 52 percent of the developing countries' share; those in Central America¹, 25 percent; those in South America, 22 percent; and those in Africa, 9 percent (Figure 2). Sugar is also produced in most developed countries, New Zealand being the main exception.

Both climate and market factors have tended to favor sugar production in developing countries. A study of sugar production costs in the 1960s found that cane sugar exporters (that is, the developing countries, Hawaii, and Australia) had a marked absolute advantage over the beet sugar producers on the whole (Grissa 1976). A more recent study of sugar production costs over 1979 to 1986 found that, on a refined value basis, the sugar production costs for 31 beet producers ranged from 25.5 to 29.5 cents per pound as compared with 17.54 to 20.55 cents per pound for 61 cane producers (USDA 1989). Also found to contribute to the cost advantage over beet producers were cheap labor in cane-growing developing countries and the fact that tropical cane mills can operate for a much longer campaign than the temperate beet producers, which are limited to periods when cold weather prevents deterioration of the beets between harvest and processing.

Among the cane producers, production costs for raw cane sugar during 1979-1986 were lowest for the African (11.65 to 14.5 cents per pound) and South American (11.3-15.1 cents per pound) producers on average, and

¹ The Central America group includes the Caribbean countries and, when not explicitly excluded, Mexico.

Figure 1 Developed and Developing Countries, Sugar Production, 1978 to 1988 (1,000 metric tons raw value)

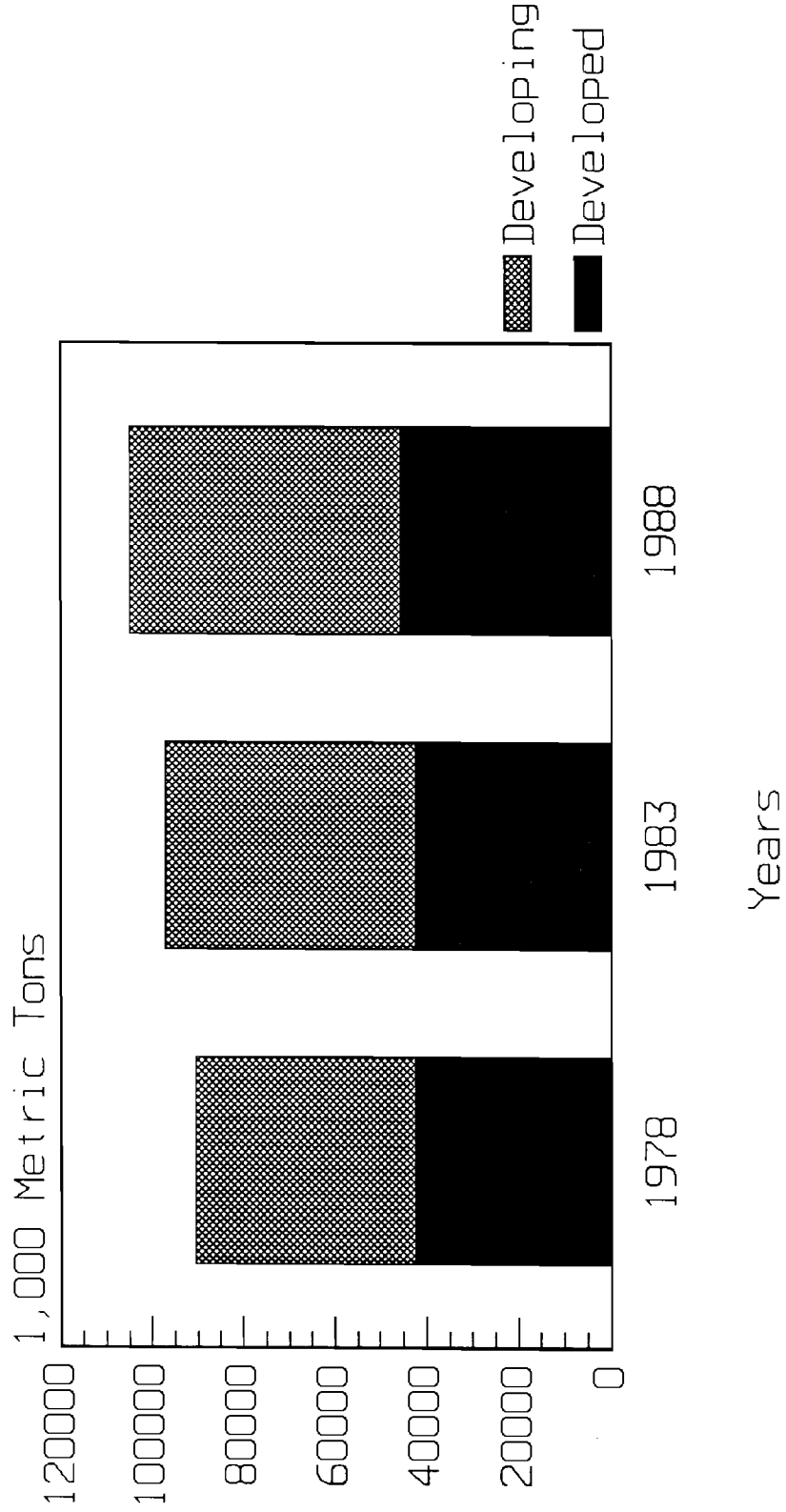
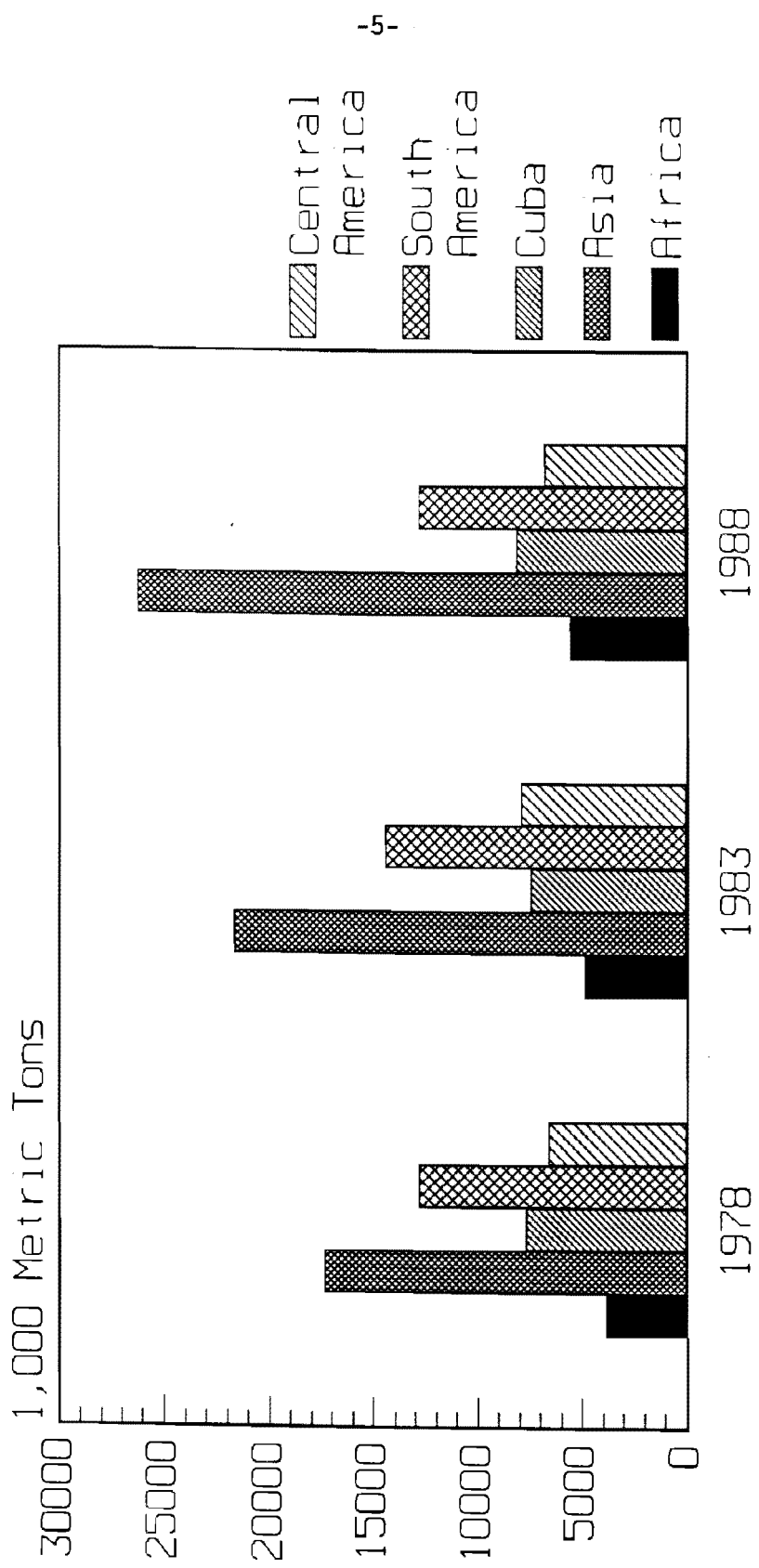


Figure 2 Developing Country Sugar
 Production by Region
 (1,000 metric tons raw value)



highest in Asia and Oceania (13.3 to 16.8 cents per pound).² The five lowest-cost cane producers were Malawi, South Africa, Swaziland, Zambia, and Zimbabwe. Production costs in the seven largest cane exporters – Cuba, Australia, Brazil, Thailand, South Africa, Mauritius, and the Dominican Republic – averaged from 10.38 to 13.07 cents/pound over the 8-year period.

Between 1978 and 1988, several developing countries lost ground in their relative share of world production while others gained. The largest growth in sugar production (53 percent) occurred in the Asian developing countries (including the countries of the Middle East), with China having the largest increase (116.6 percent). Sugar production in the African countries as a group rose by 45 percent. Sugar production in South and Central America, excluding Mexico, stagnated or declined. With the exception of Thailand, where sugar production grew by 58 percent, production growth was generally largest in the developing countries where sugar is grown primarily for domestic consumption rather than for export.

One reason for these production shifts was the turbulence of prices in world markets. Specifically, the sharp increase in world prices from 1980 to 1981, followed by a prolonged period of depressed world prices, caused a disadvantage for many traditional sugar exporters from developing countries. These were the exporters who had to compete with subsidized exports from the EC. Developing countries also saw their export markets decline as developed countries closed their markets to sugar imports in order to protect domestic producers from low world sugar prices. Sugar producers in developing countries where sugar consumption is growing rapidly, and/or where sugar production is subsidized, were able to expand their production share.

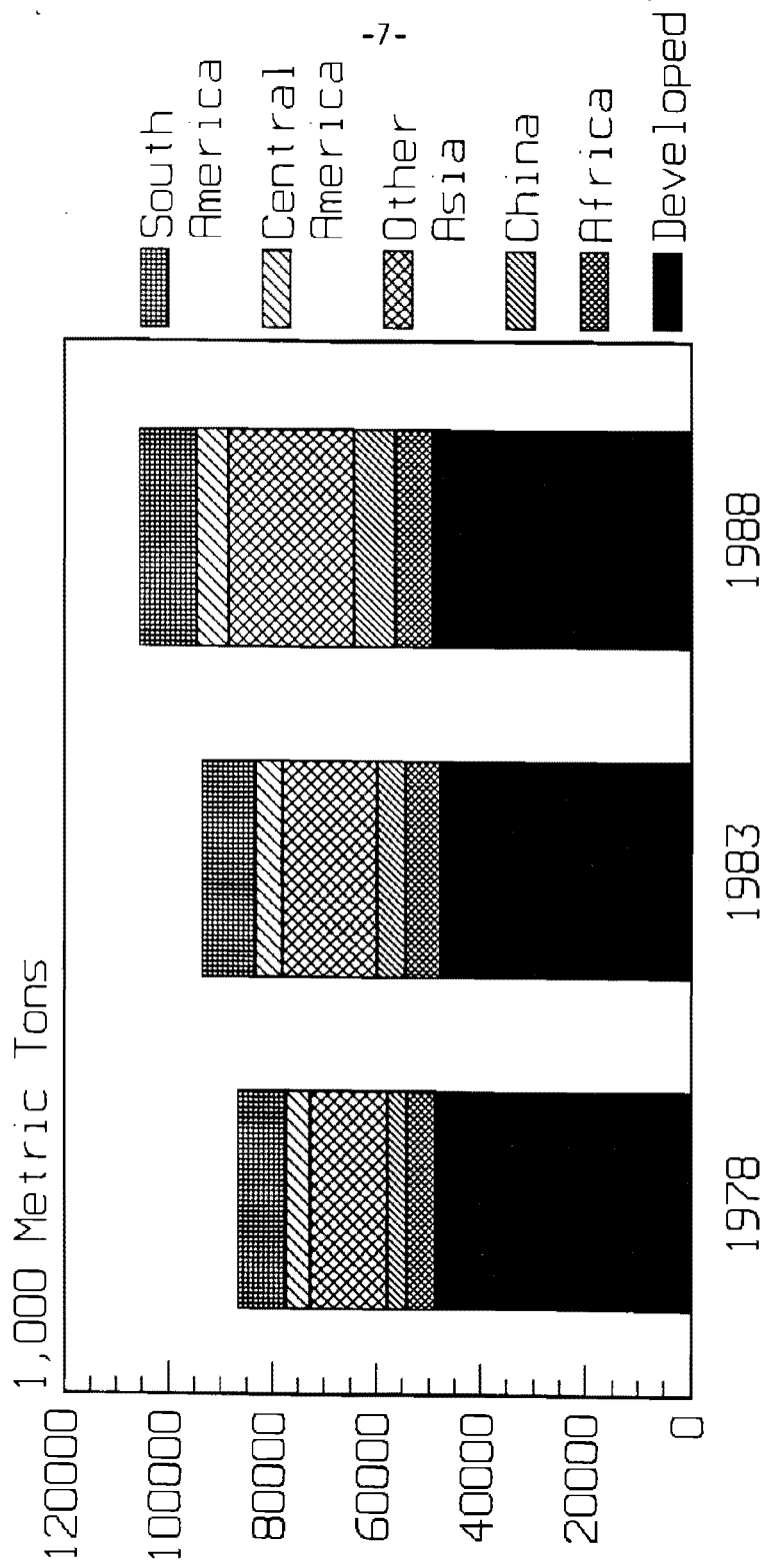
DEVELOPING COUNTRIES IN WORLD SUGAR CONSUMPTION

World sugar consumption grew at a fairly steady pace of about 2 percent per year during the 1980s to an estimated 106 million metric tons in 1988 (Figure 3). Much of this growth occurred in the developing countries whose sugar consumption, on average, increased at a rate of about 5 percent annually during the same period.³ In Western Europe, North America, and Japan, sugar consumption either stagnated or declined because of the high initial levels of per capita consumption, the sugar

² In a study of agricultural pricing policy, Krueger, Schiff, and Valdés (1990) found that exchange rate misalignment, which has tended to raise the cost of inputs used in sugar production, is much higher in sub-Saharan Africa than in other developing countries. If this misalignment were corrected, African sugar producers, on average, would probably be more competitive than sugar producers in South America.

³ The Soviet Union and Eastern Europe are also growth markets for sugar.

Figure 3 Developed and Developing
 Country Sugar Consumption, 1978 to 1988
 (1,000 metric tons raw value)



Years

policies that tend to tax sugar consumption, the emergence of sugar substitutes, and the low rates of population growth. Five developing countries, China, India, Indonesia, Brazil, and Mexico, account for roughly 30 percent of world sugar consumption. Among the developing countries, the largest increases during 1978 to 1988 occurred in China (whose sugar consumption more than doubled), other Asian countries, Central America (primarily Mexico), and Africa.

Sugar consumption in developing countries has been encouraged by higher population growth rates, by policies that tend to promote rather than tax sugar consumption, by income growth, and by low initial per capita consumption levels in China, India, other Asian countries, and Africa (Table 1). Some developing country exporters – Brazil, Mexico, and other countries in Central and South America – had higher per capita consumption levels that rival those in the developed countries. In these developing countries, sugar is an important source of food energy so that implementation of consumer taxation policies, such as those in the developed countries, would have particularly adverse effects on low-income consumers. For this reason, many developing countries that subsidize sugar producers – like Mexico and Brazil – also maintain sugar subsidies for consumers.⁴

DEVELOPING COUNTRIES IN WORLD SUGAR TRADE

Developing countries, as a whole, account for the bulk of world sugar exports, but their export share declined steadily from 1978 to 1988 (Figure 4). In 1978, developing countries supplied roughly 70 percent of world exports, but by 1988 their export share had declined to 63 percent. The stagnant nature of the world sugar market resulted in absolute declines in the level of developing countries' sugar exports from 1983 to 1988.

Developing countries as a group account for the largest share of world sugar imports – 54 percent in 1988, up from 40 percent in 1978. Thus trends in world sugar trade tend to show a reversal of the traditional trade patterns of 20 or 30 years ago, in which the developing countries supplied about 80 percent of exports, which went primarily to the developed countries. With rising consumption and stagnant exports, the developing countries' net export position (exports less imports) has eroded, while the developed countries' trade deficit in sugar has almost disappeared. The developing countries' sugar exports exceeded their imports by about 3,000 tons in 1988.

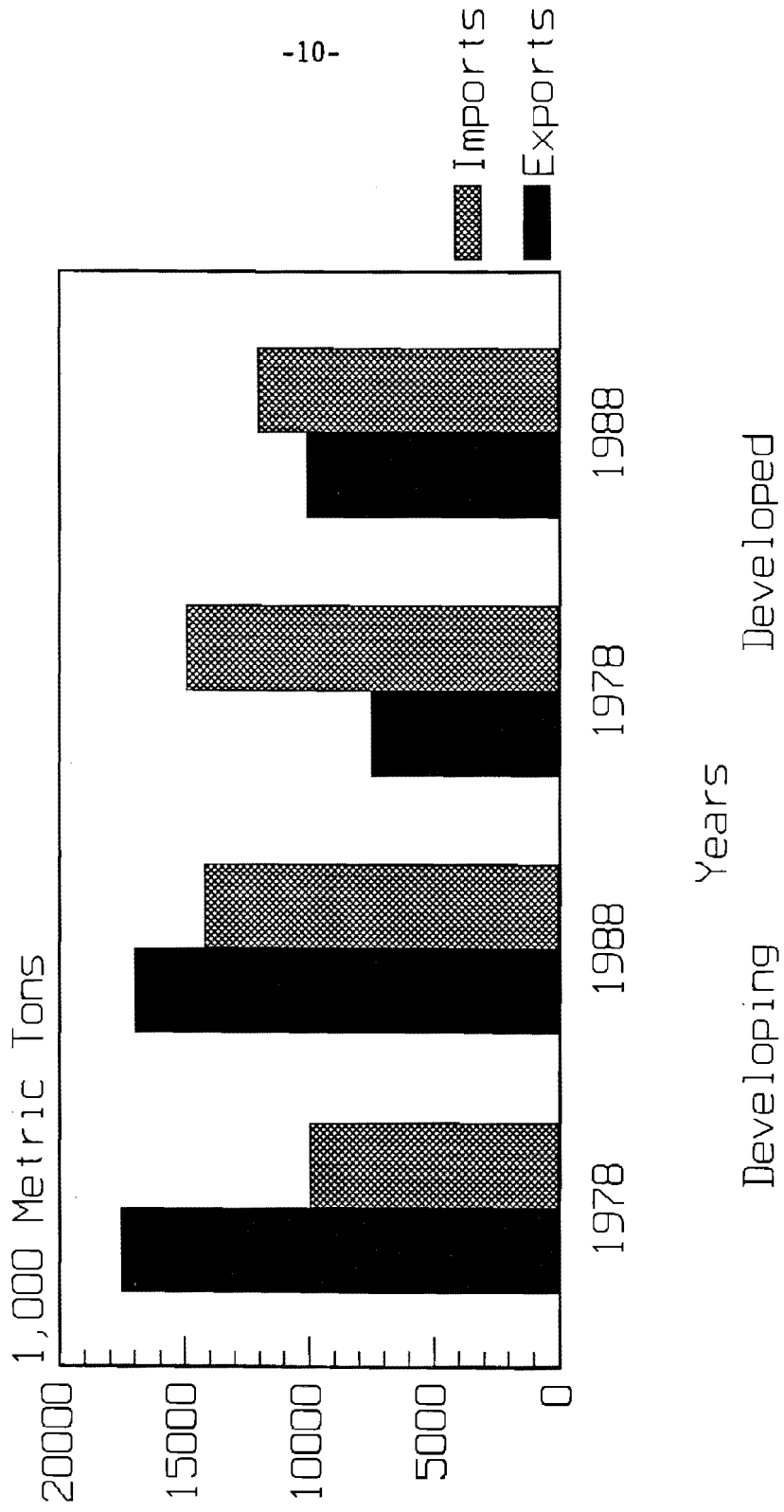
⁴ A notable exception is Thailand, which implemented a policy of taxing consumers to support producer sugar prices following the decline in world sugar prices in 1982. However, Thailand's per capita sugar consumption of about 15 kg/capita/year is relatively low compared with other sugar exporters.

Table 1 - Per Capita Consumption of Sugar, Developed and Developing Countries, 1978 to 1988

	1978	1983 (kg/person, raw value)	1988
Developed Countries:	40.9	38.73	8.3
Developing Countries:	12.2	13.3	14.9
Egypt	24.3	33.8	34.2
Morocco	33.6	34.0	31.6
Other Africa	9.8	10.3	9.4
China	3.8	5.4	7.3
India	8.1	10.0	12.8
Indonesia	11.1	11.9	14.7
Iran	38.8	22.6	21.8
Philippines	23.7	23.2	20.9
Other Asia	10.8	11.9	14.0
Brazil	46.8	45.7	43.2
Other South America	36.2	34.4	33.8
Mexico	44.7	43.2	49.2
Other Central America	50.2	51.6	50.7
Other Developing	19.3	15.5	18.6

Source: International Sugar Council *Yearbooks*, various years;
International Monetary Fund, *Financial Statistics Yearbook*, 1989.

Figure 4 Developing and Developed Countries, Sugar Exports and Imports, 1978 to 1988 (1,000 metric tons raw value)



3. DEVELOPING COUNTRIES AND TRADE PROTECTIONISM IN THE WORLD SUGAR MARKET

It is generally recognized that developed countries give significantly greater protection to agriculture than to manufacturing, while many developing countries tax agriculture and protect manufacturing from import competition (Valdés 1987). These policy biases have generally constrained expansion of temperate and tropical agricultural exports from developing countries and have resulted in agricultural surpluses in developed countries. In this section, we will examine the extent to which developing and developed countries' sugar policies have an impact on world sugar trade.

Previous studies of the world sugar economy have discussed the trade protectionism that has resulted in rising self-sufficiency in sugar production on the part of both developed and developing countries (Grissa 1976; Harris 1987). Grissa found that producer-importers from both developed and developing countries raised their levels of self-sufficiency in sugar production (defined as the ratio of production to consumption) over 1951 to 1970, but the increase was largest for sugar importers in developing countries. However, because developed countries took the bulk of developing countries' sugar exports (more than 60 percent), the rise in developed countries' production-consumption ratios was largely responsible for slowing down exports from developing countries. For example, the EC, a major sugar importer in earlier years, became a net exporter in the middle 1970s. This change has not only limited sugar import growth, but also resulted in displacement of developing countries' sugar exports.

A more recent indicator of the degree of trade openness — the net import share of domestic consumption — is shown for the major sugar importers in Table 2. Net import-consumption ratios declined among both the major developed and developing sugar importers from 1978 to 1988. However, the decline has been clearly the largest for the EC, the United States, and Japan. Those areas, import-consumption ratios declined by 101.5, 66.4, and 19.2 percent, respectively. These three areas accounted for 33 percent of gross sugar imports in 1978, but only 19 percent in 1988.⁵ Among the developed countries, only the import-consumption ratio for Other Europe, which includes Eastern Europe and non-EC countries, increased during this period.

Import-consumption ratios among importers from developing countries, particularly China, Other Asia, and Africa, also declined but at much lower rates than in the developed countries. The 1983 to 1988 decline in

⁵ The decline in the EC's import-consumption ratio is due to stagnant imports and rapidly rising exports.

Table 2 - Net Import Shares of Consumption, Developed and Developing Country Importers, 1978 to 1988

	1978	1983	1988
Developed Countries:			
Canada	86.1	90.2	84.0
EC ^a	-13.0	-24.9	-26.2
Other Europe	4.0	5.9	12.3
Japan	82.1	67.0	66.3
Soviet Union	31.3	45.0	30.0
United States	42.0	30.3	14.1
Developing Countries:			
Egypt	53.7	57.6	47.9
Morocco	41.1	31.0	36.5
Other Africa	75.2	62.6	57.3
China	36.1	30.0	46.2 ^b
Korea Republic ^c	99.9	91.0	123.6
Other Asia	59.0	50.8	41.6
South America	16.1	38.3	22.9

Source: International Sugar Council *Yearbooks*, various years.

^a Negative import-consumption ratio denotes net exporter.

^b China's sugar imports in both 1988 and 1989 were double the levels of 1986 and 1987 because of a production shortfall. China's average import consumption ratio over 1986 to 1988 was 17 percent.

^c Korea's self-sufficiency ratio in 1988 of more than 100 percent is due to stockholding. In general, Korea imports more raw sugar than it uses and re-exports the excess as refined sugar.

import-consumption ratios in the African countries reflects the impact of the region's foreign exchange difficulties, of the macroeconomic adjustment programs that responded to these foreign exchange problems, and of the declining real per capita income during the 1980s (see Mosely and Smith 1989). As a part of the adjustment programs, some African countries have raised tariffs on sugar, as well as other imports, to conserve foreign exchange earnings.

TRADE EFFECTS OF DEVELOPED COUNTRIES' SUGAR POLICIES ON DEVELOPING COUNTRIES

Trade restrictions in major sugar-importing developed countries (the United States, Japan, and the EC) are based on variable import levies or restrictive import quotas, which allow domestic sugar prices to be maintained above world market levels. The EC, in addition, uses export subsidies to dispose of surplus sugar production on the world market. These policies lower world prices by artificially raising domestic production and reducing domestic consumption. Price and volume effects together translate into a loss to developing-country exporters of foreign exchange and welfare. On the other hand, the developing countries that are net importers of sugar have benefited from trade restrictions because protection has led to lower world prices of imports. By insulating their sugar producers from changing world market conditions, policies of developed countries also promote instability in world sugar markets.

Studies of developed countries' protection in the world sugar market have generally assessed the static effects of this protection on the world sugar market, on export earnings, on import costs, and on the resulting income gains and losses. In one of the earliest studies, Snape (1963) found that raw sugar prices in the major import markets of the developed countries were 60 to 105 percent higher than the free-market level. Snape found that if importing countries had protected their producers with deficiency payments,⁶ rather than through high tariffs and excise taxes, the free-market sugar price would have risen in 1959 by about 16 percent, world sugar consumption would have increased by about 30 percent of net world trade, and developing countries' export earnings would have risen by half a billion dollars (1.4 billion in 1980 dollars). In a later study, Johnson (1966) found that if all support to sugar producers in developed countries were ended, free trade in sugar would increase the export earnings received by developing countries from the following seven developed countries: West Germany, the United States, Italy, France, the United Kingdom, Belgium, Luxembourg, and the Netherlands. These seven

⁶ A proposal for a deficiency payment scheme to replace the current U.S. program for sugar producers was prepared by the Reagan Administration in 1987. However, the administration was unable to find the support it needed to introduce the proposal as a bill for consideration by the Congress.

alone increased developing countries' earnings by three quarters of a billion dollars (2.1 billion in 1980 dollars).

More recent studies, summarized in Valdés (1987), indicate that world sugar prices would increase from 5 percent (Tyers and Anderson 1986) to 29 percent (Zietz and Valdés 1986) under trade liberalization (Table 3). These results are not strictly comparable because (1) they estimate rates of protection and trade flows in different years, and (2) they apply different liberalization scenarios – total removal of protection versus partial liberalization, and unilateral (EC) versus multilateral (the United States, the EC, and Japan).

Zietz and Valdés (1986) found that foreign exchange earnings of exporters from developing countries exporters were reduced between 2.2 and 5.1 billion in 1980 dollars per year as a result of the protection to sugar producers in industrial countries. This range of results reflects different assumptions about the domestic supply elasticities (see Table 4). The increase in the developing countries' import bill was considerably smaller, ranging from about 300 to 480 million in 1980 dollars per year in additional imports.

These estimates may be conservative, however, because trade liberalization modeling efforts do not capture all of the potential long-run gains that could result from a permanent reduction in trade barriers in industrial countries. Such a policy reform would probably encourage developing countries to direct more resources toward increasing agricultural production, to develop new export products and expand their processing operations, and, more generally, to help break the current climate in developing countries of "export pessimism" that inhibits the adoption of export-oriented policies in agriculture, as well as in other sectors.

SUGAR POLICIES IN DEVELOPING COUNTRIES

Government intervention in developing countries' sugar sectors is widespread. Many governments in developing countries intervene in both agricultural and nonagricultural markets to support specific development objectives. Some specific sugar interventions are designed to counteract the price instability that characterizes the world's sugar market, although trade and domestic price interventions may not be the first-best way to achieve this. In developed countries' preferential import schemes offer higher-than-free-market prices for fixed amounts of sugar exports. These schemes invite government intervention and often promote

Table 3 - Estimated Trade Liberalization Effects on World Sugar Prices from Various Studies

Study and Year	Commodity	Effect on World Price (percent change)
Valdés and Zietz (1980)	Sugar	+ 6-8
	Confectionery	+ 9
Koester and Schmidt (1982)	Sugar	+ 12
Roberts (1982)	Sugar	+ 7-11
Matthews (1985)	Sugar	+ 11
Zietz and Valdés (1986)	Sugar	+13-29
Tyers and Anderson (1986)	Sugar	+ 5 ^a
	Sugar	+ 3 ^b
Wong, Sturgiss, and Borrell (1989)	Sugar	+ 8 ^c

Source: Valdés (1987).

^a Liberalization in industrial market economies only.

^b Liberalization in all developing economies only.

^c Relaxation of production controls to allow more sugar production to respond to world prices, combined with liberalization of Organization of Economic Cooperation and Development consumer prices.

Table 4 - Changes in Prices, Export Revenues, and Welfare Caused by Trade Liberalization in Sugar: Varying Domestic Supply Elasticities

Country Supply Elasticity	Percentage Change		Absolute Change (billions of 1980 dollars)			
	World Price	World Exports ^a	Developing Countries ¹			
			Foreign Exchange Earnings	Exporters Welfare	Import Bill	Net Welfare
0.60 for all countries	16.7	12.4	2.75	0.60	-0.33	0.08
0.06 for EC Members	13.6	10.4	2.19	0.46	-0.31	0.03
6.00 for All EC and 4.0 for All Other Developed	29.4	31.3	5.11	1.25	-0.42	0.39
1.20 for All Developing	12.9	16.8	3.04	0.49	-0.48	0.09

Source: Valdés (1987).

^a The sum of net exports of all net exporting countries.

inefficiency among sugar companies that divert resources to gain access to the preferred exports.⁷ Many developing countries use the higher prices of the preferential markets to support producer's sugar prices at above-free-market levels. It has been found that, at the official exchange rate, protection for sugar in developing countries is often high, particularly in comparison to other agricultural commodities, but the intervention is much less than in developed countries (see Krueger, Schiff, and Valdés, 1990).

Agricultural and trade policies of developing countries affect incentives for sugar production and consumption in two ways.⁸ First, direct agricultural price interventions specifically affect the price of sugar and create a wedge between the producer or consumer price and the (world) border price (converted into local currency at the official exchange rate). As shown in Table 5, developing countries that import sugar – illustrated by Egypt, Morocco, Pakistan, and Turkey – tend to implement sugar policies that support producer incentives above world market levels, except in a year like 1980 when world sugar prices were exceptionally high. Estimates of the direct nominal protection rates (NPRD) provided to producers at official exchange rates in these countries ranged from 14 percent to 1,296 percent in 1970 and 1984. These rates were comparable to nominal rates of protection for raw sugar of 222, 188, and 542 percent in the United States, the EC, and Japan, respectively, in 1986 (USITC 1990). The NPRDs were negative for the importing countries in 1980, which indicates that the price spike was not fully passed through to sugar producers in that year.

Second, economywide or indirect interventions, such as exchange rate misalignment and industrial protection for inputs and other goods along with services used by farmers, affect agricultural incentives, but more so in developing than in developed countries. Estimated total nominal protection rates (NPRT) shown in Table 5, which include the direct price interventions plus the economy wide or indirect interventions, indicate that economy wide interventions have tended to tax sugar producers in the importing developing countries. While still positive in some years, the level of total support in most of the import-competing countries is substantially lower than when only the direct interventions are considered. For example, in Pakistan, the nominal rate of protection declined from 241 percent to 95 percent in 1970, and from 18 percent to -12 percent in 1984.

⁷ While most multilateral and bilateral donors are promoting free markets and private enterprise in developing countries, developed countries' sugar policies tend to undermine these efforts.

⁸ Details on the methodology used to compute the various measures of intervention can be found in Krueger, Schiff, and Valdés (1988).

Table 5 - Sugar Price Intervention Measures for Selected Developing Countries, 1970, 1980, and 1984 (in percentages)

Country	NPRD			NPRT			NPRDc			NPRTc			
	1970	1980	1984	1970	1980	1984	1970	1980	1984	1970	1980	1984	
Importers													
Egypt ^a	25.0	-79.0	1296.0	-53.0	-81.0	52.0	18.0	-47.0	90.0	-17.0	-52.0	5.0	
Morocco	66.0	-37.0	14.0	23.0	-58.0	-1.0	136.0	-25.0	19.0	117.0	-40.0	11.0	
Pakistan	241.0	-58.0	18.0	95.0	-71.0	-12.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Turkey ^b	n.a.	192.0	172.0	n.a.	10.0	16.5	n.a.	-94.9	-87.5	n.a.	n.a.	n.a.	
Exporters													
Dominican Republic	(1) ^c	-44.0	-56.5	-30.7	-60.0	-70.9	-72.4	-18.5	-66.2	-64.7	-35.1	-76.4	-81.7
	(2) ^c	19.8	-55.3	77.4	23.3	-70.2	48.2	29.4	-65.2	-42.7	3.1	-75.8	-70.3
Philippines	(1) ^d	-24.0	-23.0	-6.7	-37.0	-42.0	-24.0	-32.4	-31.6	10.6	-44.2	-48.2	-13.1
	(2) ^d	48.0	-54.0	37.3	22.0	-65.0	11.6	31.6	-59.0	62.7	8.6	-69.0	27.0
Thailand	(1) ^e	23.8	-2.8	53.1	9.0	-13.0	34.0	68.6	55.6	161.3	48.5	38.6	128.4
	(2) ^e				1.0	-21.0	23.0				37.5	26.0	110.7

Source: Krueger, Schiff, and Valdés (1990).

NPRD = direct nominal protection rate at the producer level; it measures the difference between the domestic producer price and the border price evaluated at the official nominal exchange rate as a proportion of the border price; (+) = subsidy, (-) = tax.

NPRT = total nominal protection rate at the producer level; it includes direct protection measures in NPRD and indirect measures such as exchange rate misalignment and other industrial protection policies; the NPRT measures this protection relative to the nonagricultural prices that would prevail in the absence of trade intervention; (+) = subsidy, (-) = tax.

NPRDc, NPRTc = direct nominal protection rate and total nominal protection rate at the consumer level; (-) = subsidy, (+) = tax.

Notes:

^a First year of the study is 1972.

^b NPRDc is the nominal rate of protection on consumer prices relative to wheat prices; last year is 1983.

^c (1) Border price equivalents are calculated using a weighted average f.o.b. export price for Dominican raw sugar sold on the world and U.S. quota markets.

(2) Border price equivalents are calculated using the f.o.b. export price sold on the world market.

^d (1) Border price equivalents are calculated using the f.o.b. export unit price.

(2) Border price equivalents are calculated using the spot price set by the International Sugar Organization Agreement.

^e (1) The equilibrium exchange rate is computed ignoring the current account deficit.

(2) The equilibrium exchange rate is computed taking into account the current account deficit.

Estimates of the direct and total nominal protection rates for consumers (NPRDc and NPRTc) in the importing countries suggest that sugar consumers, in contrast to those in developed countries, have been spared much of the adverse effects of direct sugar price interventions. The estimates of NPRTc are negative or very low, indicating that sugar consumption is generally taxed at very low rates or is even subsidized in these countries.

Sugar-exporting countries, such as the Dominican Republic, the Philippines, and Thailand, also protected sugar producers relative to the residual world market price, except in 1980. For the Philippines and the Dominican Republic, estimated NPRDs and NPRTs are generally positive relative to the world free market (see footnotes c(2) and d(2) in Table 5), but negative in relation to average f.o.b. export prices (see footnotes c(1) and d(1) in Table 5), which include sugar exports made under preferential arrangements. These countries were able to protect their farmers from low world sugar prices through the higher export prices offered in the preferential markets, but part of the quota's proceeds were taxed away by their governments.

The data in Table 5 reveal, in general, that while sugar consumption may be subsidized in selected developing countries, taxation of sugar producers is relatively low. Thus, most of the distortion in world sugar trade patterns appears to be caused by the excessive protection in developed countries.

The data also reveal that among the developing countries considered, Thailand represents a unique case. In contrast to the other exporting countries, sugar consumers are heavily taxed rather than subsidized. In 1982 to protect its sugar sector from the precipitous drop in sugar prices that occurred in that year, Thailand implemented a two-price policy that effectively taxed sugar consumers to support a stable sugar price for producers. Moreover, as shown by its very low NPRD in 1980 (-2.8 percent), Thailand was the only country that allowed the price spike of 1980 to pass through to sugar producers. In effect, Thailand's sugar policies resemble those of developed countries, rather than those of other developing country exporters, which may explain much of its success as a sugar exporter during the 1980s.

DEVELOPING COUNTRIES AND PREFERENTIAL SUGAR MARKETS

Preferential sugar import schemes are maintained by the EC, the United States, and the Soviet Union (the latter for imports from Cuba). Under these arrangements, beneficiary countries – primarily in Africa, Central America, South America, and the Pacific – export fixed amounts of sugar at prices well above free market prices. The preferential schemes provide a product-tied income transfer to the beneficiary countries whose size depends on the prices paid in the preferential market, the amount allowed

for delivery, and the world market price. In 1988, about 50 percent of developing countries' exports were sold to preferential markets.

Studies of the effects of the EC and U.S. preferential schemes on developing countries have shown that, while some individual countries may benefit from receiving high prices for a portion of their exports, developing countries as a group would benefit far more from free trade in sugar. For instance, Koester and Schmitz (1982) found that, with the exception of India, countries that participate in the EC's preferential system have generally benefited from this program in terms of increased sugar export earnings. The countries that participate in this scheme are primarily small African and Caribbean producers, and some of these countries would not be able to compete in the world sugar market under free-market conditions. Koester and Schmitz, however, did not examine the long-term effects of the program on inhibiting export expansion (particularly in some of the African countries), or its effect on suppressing investment and employment opportunities in sugar refining capacity.⁹ In another study, Roberts (1982) calculated that the developing countries as a whole could expect an increase in welfare of between \$370 million and \$570 million from the EC's trade liberalization in sugar, compared with a loss of \$170 million to the EC's beneficiary countries.

The U.S. program, on the other hand, has not only adversely affected the developing countries as a group, but also most of the countries that benefit from U.S. preferences. In contrast to the EC's sugar import policy of stable imports, U.S. sugar imports declined steadily over 1983 to 1988. Thus, despite receiving higher-than-world-market prices for their sugar exports under the U.S. quota, sugar export earnings of U.S. trading partners fell because U.S. sugar imports declined more than prices have increased. Countries in Central America, South America, and the Philippines have been affected primarily by this decline. For instance, the Caribbean Basin countries alone have lost more than \$300 million per year in export earnings since 1986 because of sugar quotas, and their total losses from 1982 to 1989 have amounted to about \$1.8 billion (Overseas Development Council 1989).¹⁰ Net export losses of developing countries from U.S. policies in 1989 are estimated at \$700 million in

⁹ The adverse effect on the African countries is noted because more than 50 percent of these countries' sugar imports are supplied by the EC in refined form.

¹⁰ These estimates of earning losses from gross exports assume that in the absence of U.S. quotas, developing countries' exports to the United States would be the same from 1975 to 1981 (the pre-quota period) at a free-market price of 15 cents per pound. The estimates do not account for export earnings that have been generated by developing countries through diversion of sugar resources into other export-earning activities.

1989, despite the gain of about \$135 million from higher preferential prices.

GOVERNMENT INTERVENTION IN THE WORLD SUGAR MARKET AND EXPORT TRENDS IN DEVELOPING COUNTRIES

The effects of both developed and developing countries' intervention in sugar markets during the 1980s can best be summarized through an analysis of changes in the export market shares of individual sugar exporters. As the price of sugar fell to around 5 to 8 cents/pound, raw basis, during this period and as few, if any, countries have production costs that low, the ability to survive in the sugar market during the 1980s basically depended on a country's sugar policies. The trend in export market shares from 1978 to 1988 is shown in Table 6.

Sugar exports became more concentrated among sugar exporters in developed countries, particularly the EC and Australia, during the 1980s and among the top three exporters among developing countries exporters – Cuba, Brazil, and Thailand. The average export share in developed countries rose from 31.4 percent in 1978 to 1980, to 38 percent in 1986 to 1988, while the share of the top three developing countries rose from 38.5 to 40 percent. However, Brazil, Cuba and Thailand's combined share of total developing countries' sugar exports rose from 56 percent in 1978 to 1980 to 64 percent in 1986 to 1988.

The success of these countries in maintaining a relatively large share of the sugar market is partly due to government intervention, which cushioned their sugar producers from the low world prices during this period. More than 80 percent of Cuba's sugar cane is produced on state farms that are managed to meet production targets. Cuba has also exported more than 50 percent of its sugar exports to the Soviet Union under preferential sugar arrangements.¹¹ However, while Brazil and Cuba maintained their export shares, Thailand's export share more than doubled. In addition to its export-oriented sugar policies, Thailand is also the

¹¹ Although these trade benefits with the Soviet Union still exist, it is likely they will be reduced in the future. In the past, Cuba has sold its sugar to the Soviet Union in exchange for petroleum, other products, and rubles. The Soviets have generally paid a premium over the prevailing world price for sugar. However, Soviet and Eastern European governments plan to do business with Cuba in hard currency rather than in rubles starting in 1991. This change most likely will result in a reduction in the sugar premium, as well as in the volume of sugar purchased by the Soviet Union.

Table 6 - Export Shares of Major Sugar Exporters, 1978 to 1980 and 1986 to 1988 (percent)

Exporting Country/ Region	Year		Percent Change in Export Share
	Average 1978 to 1980	Average 1986 to 1988	
Developing Countries:	68.6	62.0	-9.6
Argentina**	1.5	0.5	-66.7
Brazil**	8.4	8.0	-4.8
Cuba***	26.6	24.4	-8.3
Dominican Republic**	3.6	1.9	-47.2
Fiji*	1.7	1.4	-17.6
Guatemala**	0.7	1.3	85.7
Mauritius*	2.5	2.5	0.0
Mexico**	0.1	2.1	2000.0
Philippines**	5.3	0.6	-88.7
Swaziland*	1.0	1.6	60.0
Thailand	3.5	7.4	111.4
Other Central America*	3.6	2.5	-30.5
Other Central America**	3.8	1.9	-50.0
Other developing	6.3	5.9	-6.3
Developed Countries: ¹	31.4	38.0	21.0
Australia	8.2	10.3	25.6
EC	14.8	17.7	19.6
South Africa	3.1	3.5	12.9
Other Europe	3.4	3.6	5.9
Other developed	1.9	2.8	52.6

Source: International Sugar Council. *Yearbooks*, various years.

¹ Includes exports of centrally-planned countries.

* Indicates countries that sell more than 10 percent of their total sales under preferential access to EC sugar market.

** Indicates countries that sell more than 10 percent of their total sales under preferential access to U.S. sugar market.

*** Sales to USSR under preferential arrangements.

only major exporter among developing countries that marginally participates in the preferential import schemes of developed countries.¹²

The export shares of other exporters among developing countries – except Swaziland, Mexico, Guatemala, and Mauritius – declined during 1978 to 1988. Mexico's increased exports followed from its sugar self-sufficiency program, which granted sugar producers large subsidies.¹³ Guatemala implemented a major investment program for exports of plantation white sugar in the mid-1980s with much of the increased exports being sold to the Soviet Union; its maintenance of a favorable exchange rate against the U.S. dollar has also promoted sales to neighboring South American countries.¹⁴

Countries that experienced the largest declines in sugar export shares were generally those associated with the U.S. quota market. These countries' collective export share declined by 30 percent from 1978 to 1988, while developing countries that participated in the EC quota maintained their collective export share at about 8 percent of the sugar market. Swaziland and Mauritius, both low-cost African sugar producers, were able to expand or maintain their export shares as a result of the stable EC market. Mauritius exports 80 percent of its sugar to the EC and Swaziland exports 47 percent. Swaziland also benefited from a 30 percent increase in its EC quota during this period.¹⁵

The decline in exports by U.S. quota countries was accompanied by substantial social adjustment costs because sugar cane is often mono-cropped in developing countries and because sugar cane involves higher initial fixed investment costs when compared to beet production in developed countries. Some countries, particularly those in Central America, attempted to diversify out of exporting sugar and into converting sugar to ethanol, either for domestic use or for export. Domestic sugar

¹² Less than 1 percent of Thailand's exports are sold to the United States.

¹³ Mexico was a net importer in 1989 and 1990 following crop shortfalls.

¹⁴ Guatemala has also benefited from quota-exempt sugar sales to the United States. Under this program, additional amounts of raw sugar can be imported into the United States provided the sugar is re-exported in another form. While the quota-exempt program does not add to net sugar trade, there is an equity effect to the extent that U.S. exports of processed sugar products promote developing countries' raw sugar exports and displace processed sugar-containing exports from the EC (for more on the trade in sugar-containing products, see Jabara [1989]).

¹⁵ Mauritius implemented a successful sugar diversification program during the 1980s. Its dependence on sugar for foreign exchange earnings declined from 60 to 30 percent in the early 1980s.

use in food and beverage industries has also been encouraged.¹⁶ Low export prices for sugar and high world petroleum prices in the early 1980s made the ethanol projects look economically sound, but this situation can easily be reversed when world petroleum prices decline. To the extent that these projects are profitable without subsidies, they mitigate the short-run costs of adjustment to reduced sugar exports and also raise income levels in the developing countries. However, to the extent that the resources used in diversification projects could yield greater output and earnings as sugar exports under free trade, then these projects (and reduced sugar exports) lower developing countries' incomes and standards of living as compared to a free-trade situation.

¹⁶ In addition to Brazil, which has long had a program to produce ethanol from sugar, those that have examined the ethanol option include Costa Rica, the Dominican Republic, El Salvador, Guatemala, Jamaica, and the Philippines.

4. SUGAR TRADE LIBERALIZATION: RESULTS FROM A RECENT MODEL SIMULATION

In this section we will present simulation results of the effects of trade liberalization in the world sugar market on developing countries' trade. The analysis is based on a nonspatial price equilibrium model of the world grain, soybean, sugar, and meat markets that is described in detail in Zietz and Valdés (1990). However, only the sugar submodel is simulated. The model, which is comparative static in nature and partial equilibrium, is built around constant elasticity demand and supply functions that are modeled in terms of percentage changes from a base period. The model is an extension of the models cited in Valdés and Zietz (1980) and Zietz and Valdés (1986), but it goes beyond these and other studies of the world sugar market in that it incorporates the latest available information on the price incentives facing sugar producers and consumers in developing countries. An important omission of the analysis, but one that is consistent with other studies of developing countries' sugar trade, is that the model does not incorporate linkages with the corn sweetener market in the United States.

The model incorporates policy information as measures of producer and consumer subsidy equivalents (PSEs and CSEs). These are the measures of protection that are currently in use in the Uruguay Round of Multilateral Trade Negotiations. PSEs for sugar are calculated by estimating the income effects of the individual policy measures that affect incentives for production of sugar. These individual measures are then added together to get an aggregate producer support measure, the PSE. CSEs are similarly calculated from individual support measures for consumers.

Scenarios. The liberalization scenarios are based on reductions in the producer and consumer subsidy equivalents (PSEs and CSEs, respectively). The 1981-83 base represents actual average sugar production, consumption, trade, and prices from 1981 to 1983. The following scenarios are considered:

1. 20-year forecast with no policy change (Base Line Run).
2. 10 percent reduction in U.S. producer and consumer subsidy equivalents.
3. 50 percent reduction in U.S. PSEs and CSEs.
4. Reduction to zero of U.S. PSEs and CSEs.
5. Reduction to zero of PSEs and CSEs for the United States and all member countries of the Organization for Economic Cooperation and Development (OECD).
6. Reduction to zero of PSEs and CSEs for the United States, all OECD countries, and all developing countries.

Assumptions. The sugar trade model was simulated under the following assumptions:

1. No link exists through cross-price elasticities or income effects to other commodities (e.g., coarse grains in the case of the United States).
2. Income growth rates for agriculture-based LDCs enter into the model exogenously and do not exceed 4 percent per year.
3. Exogenous (price independent) production growth is limited to a maximum of 1 percent per year for industrialized countries. For the United States, the value is zero.
4. The income elasticities of sugar demand are set to 0.06 for all industrialized countries. They are limited to a maximum of .3 for all LDCs (see Zietz and Valdés [1990] for more discussion).

The Zietz-Valdés model ignores the complexities of the adjustment path to the new equilibrium. It assumes that all long-run changes occur simultaneously at the base prices. All exogenous changes are translated into excess demands at the base period, and the model projects the price adjustment needed to eliminate these excess demands. All quantities, prices, and protection rates apply to the period of 1981 to 1983. It may be noted in this context that the average protection rate for that period matches that for the end of 1989 or the beginning of 1990 fairly closely.

The model simulation results are shown in Tables 7-10. Table 7 presents actual U.S. sugar production, consumption, and net imports in 1981 to 1983 and as predicted for 2002 under the various scenarios discussed above. For example, under simulation 4 (removal of U.S. PSEs and CSEs), U.S. net sugar imports increase from 2,843 (1981 to 1983 base) to 3,322 thousand metric tons in 2002, mainly as the result of an increase in consumption relative to the base line. The changes in the world sugar price and in U.S. quantities resulting from the various policy scenarios, as compared to the base line, are shown in Table 8. With complete U.S. trade liberalization, the world price of sugar rises by about 2 percent from the base line scenario, but U.S. imports rise by about 40 percent. Under complete OECD trade liberalization, the increase in U.S. sugar imports is less than under complete U.S. liberalization because of the greater increase in the world sugar price that follows from the reduction in sugar producer subsidies in other developed countries.

Table 8 shows that global trade liberalization, including the developing countries, would depress world sugar prices as compared to the base line. This depression would result from developing countries producing more sugar and consuming (import) less under trade liberalization.

Table 7 U.S. Sugar Production, Consumption, and Net Imports, 1981-1983, and Predicted for 2002 Under Various Scenarios (1,000 metric tons)

Simulation/Assumption		Consumption	Production	Net Imports
1981 to 1983	Actual	8,164	5,321	2,843
1	20-year forecast	8,393	6,031	2,362
2	10 percent reduction U.S. PSEs and CSEs	8,437	5,976	2,461
3	50 percent reduction U.S. PSEs and CSEs	8,606	5,768	2,838
4	U.S. PSEs and CSEs reduced to zero	8,798	5,476	3,322
5	U.S. & OECD PSEs and CSEs reduced to zero	8,574	5,664	2,910
6	U.S., OECD, & developing countries' trade liberalization	8,867	5,421	3,446

Table 8 Change in World Price and in U.S. Sugar Production, Consumption, and Net Imports Relative to Base Line (percent)

Simulation	World Price	Consumption	Production	Net Imports
2	0.2	0.5	-0.9	4.2
3	0.9	2.5	-4.4	20.2
4	1.8	4.8	-9.2	40.6
5	14.0	2.2	-6.1	23.2
6	-1.6	5.6	-10.1	45.9

Table 9 Net Imports, by Developing Country Region, Actual for 1981 to 1983 and Predicted for 2002, Under Various Scenarios (1,000 metric tons)

Simulation	Asia	North Africa/ Middle East	Sub-Saharan Africa	Central/South America
1981 to 1983	(1,413)	4,454	(299)	(11,017)
1	4,301	8,555	1,759	(13,122)
2	4,264	8,548	1,757	(13,144)
3	4,126	8,522	1,747	(13,227)
4	3,948	8,488	1,734	(13,334)
5	1,718	8,076	1,573	(14,668)
6	(361)	7,753	1,374	(15,320)

Note: Parentheses stand for net exports.

Table 10 Decrease (-) in Imports or Increase in Exports by Developing Country Region, Relative to Base Line (percent)

Simulation	Asia	North Africa/ Middle East	Sub-Saharan Africa	Central/South America
3	-4.1	-0.4	-0.7	0.8
4	-8.2	-0.8	-14.0	1.6
5	-60.1	-5.8	-10.4	11.8
6	-108.4	-9.4	-21.9	16.8

Tables 9-10 show the effects of the various trade liberalization scenarios on the developing countries. The base line shows that without any policy change, two regions (Asia and Sub-Saharan Africa) containing developing countries that were net sugar exporters in 1981 to 1983 will benefit importing regions in the year 2002 because of rapidly growing consumption. U.S. trade liberalization would result in greater net exports from Central and South America, as well as a reduction in net imports of the other regions (Asia, Sub-Saharan Africa, and North Africa/Middle East). With additional trade liberalization by other OECD members, however, the effect on the world sugar price and on developing countries' trade position is much greater: this simulation results in a 14 percent increase in the world sugar price from the base line and in larger increases in developing countries' exports and/or reductions in net imports. Despite reduced U.S. imports under this scenario, as compared to the scenarios of U.S. trade liberalization only, net exports from Central and South American countries rise by 12 percent (compared to the base), and net imports in Asia decline by 60 percent from the base line.

With trade liberalization by the developing countries as well as by the OECD countries, the world price declines by about 2 percent as compared to the base world price (scenario 5). The developing country regions experience a further increase in net exports or a decrease in net imports. The most notable change is in Asia, which becomes a net sugar exporting region in this scenario. The change in Asia's net sugar trade is due to a reduction in sugar consumption subsidies, as well as a relaxation of price policies that tax sugar producers in those countries. The 1.6 percent decline in the world sugar price from the base line and the magnitudes of the changes in trade flows indicate that all developing countries would benefit from a situation of complete trade liberalization in sugar. Exporting countries would benefit through increased export volumes and earnings — despite the decline in the world price — and importing countries would benefit from the lower import price.

5. CONCLUSIONS

Traditionally, the world sugar market has been dominated by low-cost sugar exports from developing countries. In recent decades, however, trade protection by industrialized countries has resulted in a significant decline in developing countries' export share in sugar, while exports from developed countries have increased. High rates of import protection in industrialized sugar importers (the United States, the EC, and Japan, as well as others in Western Europe) and subsidized exports (primarily from the EC) depress world sugar prices and developing countries' export revenues. Although some developing countries are net sugar importers, and thus benefit through lower import costs, the developing countries as a group are net losers from these policies.

It has often been argued that developing countries' taxation of agriculture is an important factor inhibiting agricultural export growth; however, we did not find this to be necessarily the case for sugar. Many developing countries have supported sugar producers, particularly during periods of low world prices, but this protection is much lower than in developed countries. We do show that developing countries would gain in general from removal of the anti-export bias that taxes agricultural products, but they would have a greater incentive to do this if developed countries would eliminate their sugar protection and allow more export opportunities.

Contrary to supporters of U.S. sugar policies, some recent studies have found that developing countries have not benefited from the U.S. sugar quota. Since 1981, U.S. sugar imports have declined sharply, along with sugar export earnings of U.S. quota countries. Moreover, the large difference in profits between world and U.S. quota sugar sales often promotes government intervention and inefficiency in quota countries because of the need to allocate the declining quota rents among different exporters. The EC, on the other hand, maintains a floor on its sugar imports, and export earnings of the EC beneficiary countries have increased under its preferential program. The EC's program, however, suppresses long-run export expansion and development of sugar processing activities, particularly in low-income countries in Africa.

From 1978 to 1988 sugar exports became more concentrated among the developed countries and the top three developing country exporters – Cuba, Brazil, and Thailand – countries that do not depend to a large extent on the U.S. sugar market and that also subsidize sugar production. Thailand, whose sugar export market share more than doubled, relies the least on preferential import schemes of developed countries. In 1982 it implemented a policy of taxing sugar consumers to subsidize sugar producers – a regime that follows the ones commonly adopted in developed

countries. Developing countries that have traditionally depended on the U.S. market for a large part of their sugar sales (the Philippines and countries in Central America) experienced the largest decline in export market share (30 percent), while the export share of developing countries that traditionally sell to the EC remained constant.

Low world sugar prices and high petroleum prices in the early 1980s stimulated the interest of many developing countries in diversification from exporting sugar to converting sugar into ethanol. These kinds of diversification projects reduce the short run effects of lower sugar exports and foreign exchange earnings when world petroleum prices are high, but they are often not sustainable without subsidies in the long run. On the other hand, our results from a model simulation of trade liberalization in the world sugar market show that developing countries as a whole would gain if both developed and developing countries would agree to eliminate trade-distorting policies in the world sugar market. Such gains would come from higher export earnings as well as from lower prices for sugar imports. Both developed and developing countries would gain from improved resource allocation.

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