

Sugar Policy and Reform

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Interventions in sugar markets come about for many reasons. Often the consequences of these policies persist even when the circumstances that motivated them change. Or the underlying problems that motivated past interventions remain even when it's clear that current approaches have failed. Reform of sugar markets needs to go beyond eliminating failed policies—and find lasting solutions.



Summary findings

Reviewing cross-country experience with sugar policies and policy reform, Larson and Borrell conclude that long-standing government interventions—rooted in historical trade arrangements, fear of shortages, and conflicting interests between growers and sugar mills—often displace both the markets and the institutions required to produce efficient outcomes. Arrangements rooted in colonial eras still shape policies and trade in the United States, the European Union, and many developing countries.

Once policies and institutions are put in place, households and the value of investments grow dependent on them, even as their usefulness fades. Firms and households make decisions that are costly to reverse. And the result is a legacy of path-dependent policies, in which approaches and instruments are greatly influenced by past agreements and previous interventions.

The cumulative effects of these interventions are embodied in livelihoods, political institutions, capital

stocks, and factor markets—which not only dictate the starting point for reform but also determine which reform paths are feasible.

Experiments with public ownership, common in many countries, have not succeeded. So most countries have initiated some measure of market reform. And events relating to NAFTA, Lomé, and expansion of the EU may bring about significant changes in the EU and U.S. sugar regimes, with cascading effects on other countries.

Common problems in the sector include determining cane quality, finding methods for fairly sharing revenues from joint production, finding ways to take advantage of preferential trade arrangements with minimal negative consequences, finding ways to finance and encourage research and other activities with common benefits, identifying practices that facilitate equitable, sustainable privatization, and determining the relationship between sugar market reform and markets in land, water, credit, and other inputs.

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Introduction

This paper provides lessons about sugar policies and the process of sugar policy reform by selectively drawing on cross-country experiences. A general conclusion is that long-standing government interventions frequently displace both the markets and the institutions required to produce efficient outcomes. In addition, based on long-standing policies, households and firms make decisions that are costly to reverse. Consequently, the outcomes of earlier policies and events affect the pace and process of reform. This view of markets may apply generally to commodity markets. But the political economy, trade structures, and production characteristics of sugar are different enough from those found in most agricultural markets to warrant special consideration. Chief among these differences are:

- The degree to which international markets are dominated by policy interventions and the effects of preferential trade arrangements;
- The inherent tension between mills and growers created by sugar's joint-production characteristics;
- The local monopoly-monopsony relationship between growers and mills; and
- The effect of that relationship on community incomes, assets, and profitability.

Because of these factors government interventions are common. The result is a legacy of path-dependent policies, where approaches and instruments are greatly influenced by past agreements and previous interventions. The accumulated effects of these interventions are embodied in livelihoods, political institutions, capital stocks, and factor markets—elements that not only dictate the starting point for reform but also determine which reform paths are feasible.

To an exceptional level, domestic sugar policies in many countries are shaped by the policies of a few large countries. The policies of these countries have their roots in historic events. This chapter discusses at length the history and current characteristics of these

policies, related trade arrangements and the way the policies of large countries shape those of smaller economies.

The paper reviews literature that quantifies the benefits of policy reform; however the emphasis is on describing those characteristics of sugar policy, markets, and production that shape the process of reform. We draw lessons from domestically driven reforms and from reforms forced by historic events. The emphasis on reform is perhaps surprising, given that almost all countries intervene in sugar markets. However many countries began the process of domestic reforms in the 1990s, including privatizing mills and estates. And a number of developments on the international scene are likely catalysts for further reforms. These developments include the anticipated expansion of the European Union (EU), the effects of the North American Free Trade Agreement (NAFTA) on U.S. and Mexican policy, the regional effects of reform on Brazil's sugar industry, and discussions under World Trade Organization auspices.

Global Markets

Protected markets, special trade arrangements and prices that are remarkably volatile characterize the sugar trade. At the same time the market for freely traded sugar is large and deep compared with other agricultural commodities. Sophisticated and liquid financial markets (forward, futures and derivatives) supplement the physical trade. Understanding this unusual blend of free and protected markets is important for policymakers during the process of domestic market reform for several reasons. First, producer groups often base successfully arguments for government protection on the policies of other countries. Second, many market interventions are long-lived, and the accumulated results these interventions generate can complicate the reform process. Accumulated investments in land, capital and human resources are often premised on domestic policy interventions or special access to protected markets in the EU or United States. In a few countries, such as Fiji and Mauritius, export earnings from sales to protected markets are important to the economy as a whole, contributing significantly to national incomes, currency reserves and government revenues. For these countries, policy changes in destination markets can have macroeconomic consequences.

Understanding the variability in the sugar market and the secondary and derivative markets for sugar is useful as well. Government interventions to stabilize sugar prices can

crowd out international markets as risk management instruments and inhibit the development of domestic risk management practices. Conversely, the international markets for risk management offer opportunity to mitigate the consequences of volatility introduced by domestic reforms.

Government Interventions Around the World

Sugar is a basic food consumed in all countries. The Food and Agricultural Organization (FAO) reports that 133 countries produce sugar. Sugar is widely traded, with annual trade constituting around 26 percent of annual production. However, a handful of large countries produce and consume most of the world's sugar (figure 4.1.) In addition most large producers—China, the EU, India, and the United States—all intervene in the sugar trade in ways that affect international prices.¹ Many other countries intervene in one form or another in domestic markets, and only the smaller market share of these countries keeps their individual interventions from significantly affecting global markets.

In preparation for the Uruguay Round of GATT negotiations (1986-94) participants agreed on a common method of analyzing the effects of policy interventions. Although the method has acknowledged limits, it allows comparisons of policy effects across diverse interventions such as quotas, export subsidies, and interventions in input markets.² Quantitative estimates of the positive and negative effects of policy elements on producers are summed and divided by output to calculate an estimated producer subsidy equivalent (PSE) per ton. A similar process produces a consumer subsidy equivalent (CSE) that measures the effects of agricultural policy on domestic consumers. The Organization for Economic Cooperation and Development (OECD) institutionalized these calculations for industrial countries now calculates these measures annually.

Between 1982 and 1992 all sugar-producing industrial countries protected domestic sugar at the expense of consumers. Most countries did so at significant levels. On average from 1993 to 1995 producer subsidies in OECD countries were equal to about 49 percent of the world price (OECD, 1997.) The CSE measure for the same period was -46 percent—that

¹ Brazil is an exception.

² For example, this method is not designed to measure the effects of exchange rates policies. Krueger, Schiff (date) [Neither author in reference list]. Among the critics of this method are Stokov and Meyers (1996).

is, the implicit tax on consumers was equal to 46 percent of the average world price (table 4.1). Among industrial countries only Australia has chosen to dismantle its trade barriers since 1995.

The motivations and objectives of sugar policies in developing countries are more diverse and often contradictory. Some countries, such as Zimbabwe, have attempted to keep consumer prices low, and until recently Brazil used export restrictions to foster its domestic ethanol industry. Generally, however, most governments in developing countries, in pursuit of self-sufficiency, attempt to protect domestic industries, some of which are state owned. Often this protectionism results in higher prices for consumers, as it does in Chad and the Ukraine. But some countries, including China and India, use input subsidies from central or state budgets as well.

The Effects of Policies on the World Market and Domestic Welfare

What are the effects of different types of policies on international markets? The prevailing opinion is that market interventions lower international prices significantly while increasing price volatility.³ A GATT panel ruled that the regime of the late 1970s in the European Community had depressed world prices (Harris, Swinbank, and Wilkinson 1983.). Table 4.2 reports estimates of the effects of various policies on world sugar prices. Valdés (1987) and Borrell and Duncan (1992), among others, point out that sugar liberalization studies are generally not comparable. Some of the studies in the table cover a range of commodities, while others focus only on sugar. In addition the effects are measured against a baseline that differs from study to study. Yet once the effects are converted into a common measure (cents per pound, 1990 terms), average estimates from 1960 of the effects on prices do not differ significantly from more recent estimates. These similarities persist despite differences in method and the significant policy and market changes that took place in the interim.

The EU and the United States use international markets to manage domestic sugar surpluses and shortfalls, as do other large sugar-consuming and -producing countries. In doing

³ The consensus is not, however, unanimous. Hannah (1997) points out that investments and technological developments in alternative sweeteners may make supply less elastic than it is generally believed to be.

so they pass their production and demand uncertainties on to the international market, and international prices are thus more volatile than they would be under free-trade agreements. In addition to the EU and the United States, Brazil, China, and India have pursued domestic policy regimes in which shortfalls or surpluses in domestic supply were managed through adjustments in trade (figure 4.2). A few studies measure the effects of policy on market volatility; these suggest that the effects of policy on short-term price volatility are considerable (table 4.2).

The EU uses import substitution and export subsidies to protect domestic markets. The EU has the largest export subsidy program, but the EU program is not unique; Colombia, Mexico, Poland and South Africa, among others, subsidize sugar exports as well. As part of the Uruguay Round of the GATT, several countries pledged to reduce subsidized exports of sugar. The promised reductions, which are to be in place by 2004, equal 1.3 million tons—approximately the same amount as exports from the African, Caribbean and Pacific Group of States (ACP) into the EU. Nonetheless, these same countries retain the right to subsidize nearly 5.4 million tons of sugar (table 4.3)

Many of the studies on sugar policies also measure the distribution of benefits. Included are measures of transfers between producers and consumers, between rich and poor countries, and among firms.⁴ For example, in their review, Jabara and Valdés (1993) report that protection in industrial nations reduced the foreign exchange earnings of poor exporters by \$2.2 to \$5.1 billion per year in 1980 dollars. Moreover, studies that measure welfare transfers do not attempt to measure the effects of policy on factor allocation. Since many of these factors are fixed—for example, investments in milling and improvements to land—policies become imbedded in capital and other factor stock, and their effects are long lived. Prior to recent reforms, interventions put in place during the first International Sugar Agreement in the 1930s were costing the Australian sugar industry over \$200 million a year by 1990 (Borrell, Quirke and Vincent 1991). Similarly before reforms commenced in Brazil, policy interventions were costing Brazil an estimated \$2.5 billion a year (Borrell, Bianco, and

Consequently, the positive effects of reform on international prices may become evident only after a lengthy period of adjustment.

⁴ For example, see Barry and others (1990) [not in reference list] for a report on the concentration of benefits in the U.S. fructose corn syrup market and Webb, Lopez and Penn, (1990) [not in reference list] on the subsidy component of sugar producer revenue in developed countries.

Bale, 1994.) Estimates for India suggest that allowing existing policies to continue unchanged could cost the economy around the same amount(\$2 billion a year) by 2004 (World Bank 1996).

How the Policies of Large Countries Affect Those of Small Economies

The policies of countries that dominate the sugar market influence those of less important players in two significant ways. First, the pervasive interventions of the larger countries encourage others to institute protectionist policies. The influence can be indirect (through unilateral trade policy) or more explicit, especially during the negotiation of regional trade agreements such as the agreement of the Association of Southeast Asian nations (ASEAN), NAFTA, the planned EU expansion, the MERCOSUR and proposed regional agreements Africa. Second, special access agreements often result in domestic sugar industries that are dependent on externally determined policies and give rise to domestic policies designed to allocate rents from the access agreements. Examples include domestic sugar policies in Fiji, Cuba, the Philippines, and Zimbabwe.

Protection and Trade Agreements

Because interventions by large countries depress world prices, international prices undervalue the domestic resources employed in sugar production. To address this imbalance countries generally choose to ignore the ongoing opportunity to consume cheap sugar and instead erect protective tariffs that more than compensate domestic producers for the effects of the policies of large economies. In negotiations concerning trade, countries tend to aggressively defend their capacity to increase protection further. During the Uruguay Round of the GATT, the EU, Japan, and the United States were able to preserve their protective sugar trade policies through special annex provisions to the general agreement, while most developing countries sought to bind tariffs well in excess of applied levels.⁵ For 1995, sugar exporters on average bound their tariffs at 92 percent; sugar importers' tariff-bindings averaged 117 percent. By 2004 the tariff bindings will average 79 percent for sugar exporters and 98 percent for sugar importers (see tables 4.4 and 4.5)

⁵ Sugar was an extreme example of the way countries commonly managed the tariffication of the agricultural sectors during the Uruguay Round (Hathaway and Ingco 1996).

Regional trade agreements frequently must address differences in sugar policies. For example the United Kingdom's entry into the European Community in 1973 and its commitments under the 1951 Commonwealth Sugar Agreement significantly changed European sugar policy. The Commonwealth Agreement formalized traditional colonial sugar imports and gave Commonwealth countries preferential access to the UK and Canadian sugar markets. The UK negotiated a continuation of the agreement's preferences that ultimately resulted in the sugar protocol of the Lomé Convention. The protocol allows sixteen countries in Africa, the Caribbean and the Pacific preferential entry into the protected EU market. Two countries, Fiji and Mauritius, hold roughly half the annual quota of approximately 1.3 million tons (figure 4.3).

Generally, regional agreements tend to propagate the protectionist policies toward countries outside the agreement. Poland is an example where protectionist policies were introduced in anticipation of a regional agreement. In the early 1990s, Poland was in the process of privatizing its domestic sugar market while pursuing regional trade agreements with the EU. The legislative outcome was the September 1994 Sugar Industry Act, which established both the country's sugar marketing policy and its privatization policy. Under the act, the Council of Ministers sets domestic production quotas for the domestic market (A-quota) and for subsidized exports (B-quota). Additional sugar (C-sugar) must be exported without subsidies. Levies on A- and B-quota sugar are intended to finance export subsidies. The domestic market is protected by high tariff rates, and minimum farm prices are supported through purchases by a government agency. In addition some countries are granted special access to the Polish market under the Central European Free Trade Agreement. For example, in 1998 Romania was granted an allowance of 5,000 tons of raw beet sugar at a reduced tariff.

The terms of trade in sweeteners between the United States and Mexico embodied in NAFTA also illustrates how regional agreements can propagate protectionist policies. Following a period of increasing government intervention, the Mexican government nationalized sugar mills during the 1970s. The experiment proved unsuccessful, and by 1990, when plans for NAFTA were first announced, Mexico had completed a substantial privatization of its sugar mills. Following privatization the government put in place fixed tariffs of 10 and 15 percent for raw and refined sugar, respectively. The result was a larger-than-anticipated flow of imports, and prices fell (Figure 4.3).

In January 1991 the government intervened, setting a reference price defended by a variable tariff. The variable tariff remained in place as the terms of NAFTA were negotiated⁶ The agreed-upon terms of NAFTA called for a 15-year phased-in reduction in tariffs between the United States and Mexico that began on January 1, 1994. In addition, the governments of Mexico and the United States agreed to harmonize their tariff schedules for non-NAFTA countries by 1999. Shortly after signing the agreement, Mexico quickly moved its tariffs to near-US levels.

The NAFTA example also illustrates how new policy interventions can generate unexpected consequences and prompt policy-based irreversible investments. The Mexico-US agreement affected tariffs for sugar and other sweeteners – most notably High Fructose Corn Syrup (HFCS.) The boost to tariffs provided a boon for the Mexican sugar industry, and new investments in sugar increased. But the protection also created opportunities for the manufacture of alternative sweeteners, since tariff rates for high-fructose corn sweeteners were to fall faster than sugar tariffs. (Table 4.6) By 1996 imported sweeteners had begun to compete with domestic sugar as Mexican and U.S. firms announced new investments in Mexico. This was due in part to the fact the advantage NAFTA temporarily afforded corn sweeteners over sugar provided an opportunity for the HFCS industry to cover the high fixed costs associated with transportation systems and corn wet-milling plants. Consequently the industry was able to capture some of the benefits Mexican negotiators had expected to flow the smallholder cane producers and newly privatized Mexican sugar mills.

Dependence on the Trade Policy of Other Countries

Special access arrangements are an important component of the international sugar market. Two significant programs—the U.S. and EU programs—are especially long-lived. As already mentioned, the Lomé Agreement gives quota-based preferential access to the protected EU sugar market by number of countries in Africa, Asia and the Caribbean with past colonial ties to Europe. The US provides preferential access to developing countries as well. Tariffs for imported sugar were an early source of revenue for the United States. Preferential treatment developed later and first became an important policy instrument to

⁶ The NAFTA sweetener agreement, which covered sugar and high-fructose corn syrup, proved especially contentious. One particular point of disagreement was a side-letter that amended the language of the signed

protect US interest – especially in Cuba. From 1934 until 1974 the United States employed import quotas and marketing allotments to manage domestic output and prices (Schmitz and Christian 1993.) At this time, countries that earlier had been granted tariff preferences were granted quotas along with domestic producers. During the volatile period from 1975 to 1981 when sugar prices reached record highs, the United States experimented with several programs, including some that obligated the government to purchase sugar at a minimum price. Tariffs were managed to prevent large government outlays. In 1982 quotas were reintroduced, and a modified tariff-quota scheme remained in place in 2000⁷. The U.S. Trade Representative rather than the U.S. Department of Agriculture manages the allotment of quotas to traditional U.S. trading partners (Table 4.7).

Access to the protected U.S. and EU markets can be valuable. For example, Sturgis, Field, and Young (1990) estimate that U.S. sugar policies transferred as much as \$120 million to the small economy of the Dominican Republic in 1984. Wong, Sturgis, and Borrell (1989) estimate that the Lomé sugar protocol transferred more than \$200 million to Mauritius in 1985. The programs can also reduce the risk of price volatility for countries with special access. Herrmann and Weiss (1995) for example, calculate that 17–42 percent of the welfare benefits associated with the EU program come from stabilization effects.

While the transfer and stabilization benefits are clearly significant, the effects of special access on development are subject to debate. For example, while reviewing the effects of the Lomé commodity protocols, the EU concluded:

The impact of trade preferences has been disappointing by and large. Preferential arrangements, especially the protocols on specific products, have contributed significantly to the commercial success of some countries that managed to respond with appropriate diversification policies. But the bulk of ACP countries have lacked the economic policies and the domestic conditions needed for developing trade (European Commission, 1996.)

Similarly, the World Bank (1995) found that Fiji's preferential access to the EU and U.S. markets generated limited development impact.⁸

version.

⁷ Domestic marketing allotments were reintroduced briefly in 1990.

⁸ Prasad and Akram-Lodhi (1998) [not in reference list] challenge this view. The authors also note that challenges to special access arrangements are likely to succeed and call for an orderly transition to free markets.

Under the EU and U.S. programs the lion's share of special-access quotas go to a few countries. However, even when the share of the total quota itself is relatively small, the effect on small sugar industries in small countries can be large and the sugar industry in some countries is highly dependent on special trade arrangements. In a handful of small countries, the agricultural sector and general economy rely on sugar and special trading arrangements as well. According to data from the Food and Agriculture Organization (FAO), between 1994 and 1996 10 countries depended on sugar exports for more than 10 percent of their export earnings (figure 4.4.) All had special trade arrangements during the period.

Special trade arrangements in sugar can be profitable while they prevail, but depending on foreign policy rather than world markets can be risky. Unlike market-related risks, policy changes tend to be abrupt and impossible to hedge. The turbulent history of the Cuban sugar industry illustrates this point.⁹ The Cuban sugar industry grew fivefold between 1904 and 1925, reaching 5 million tons, which constituted 23 percent of world production. Most of the sugar went to the protected U.S. market under a special trade arrangement. At the time U.S. companies were heavily invested in Cuba. Pollitt (1988) reports that by 1927, direct U.S. interests in Cuban sugar mills, railroads, and land exceeded \$600 million, partly because U.S. banks foreclosed on several large sugar mills in 1921. Pollitt also notes that U.S.-owned mills owned or leased 40 percent of Cuba's farmland in 1926-27 and accounted for an estimated 60 percent or more of output. By 1929 Cuban exports (some 77 percent of the island's sugar production) met half of U.S. sugar consumption. The livelihood of nearly two-thirds of the Cuban population depended directly or indirectly on sugar (Braga, 1997).

In 1930, however, as the Depression hit the United States and domestic demand fell, the U.S. government moved to protect domestic producers and territorial production in Hawaii, Puerto Rico, and the Philippines. By 1932 Cuban sugar production had fallen to about 2.5 million tons and sold at much lower world prices. Workers' incomes dropped significantly, and during the 1933 revolution, farmers and workers seized many of the sugar mills. Following the revolution, the Cuban share of a much smaller U.S. market fell to 25 percent, and sugar production fell to slightly more than 2 million tons. The reduced export levels were institutionalized in the Jones-Costigan Act of 1934, which also granted the

⁹ Pollitt (1988) provides an interesting account of this "first" sugar crises.

Philippines an increased quota of 1 million tons -- later reduced to 800,000 tons. Between 1929 and 1933, 38 mills were shut down. However, because local communities were dependent on the mills for their livelihood, the government had intervened to reopen 32 mills by 1937.

Cuban sugar production recovered during World War II, reaching 6 million tons in 1947. About half of Cuba's sugar went to the protected U.S. market, while the rest entered the world market. But the Cuban Revolution of 1959 and the U.S. embargo of 1960 brought about a structural change in the Cuban economy and the sugar industry. During the next three decades, Cuba became dependent on Soviet-bloc countries not only as outlets for sugar but also (and more importantly) as trading partners for inputs, especially petroleum. (Pollitt 1988; Pollitt and Hagelberg 1994.) During the 1970s the implicit transfers grew (Early and Westfall 1996) (figure 4.5).¹⁰ This relationship affected technology choices as well as decisions about output levels. When the Soviet bloc collapsed, the second Cuban sugar crisis occurred. From 1990 to 1992 production fell from 8.2 million tons to 7 million tons. As Pollitt and Hagelberg (1994) point out, the loss of premium sugar prices and Soviet credit facilities exacerbated falling export volumes, and Cuba's import capacity fell from 8.1 billion pesos in 1989 to 2.2 billion pesos in 1992. The 1993 crop fell to 4.2 million tons, costing the country over \$450 million in lost export revenue (figure 4.6.)

Special trade arrangements often give rise to domestic controls that affect how the benefits are distributed. The domestic arrangements in turn lead to entitlements. The Philippine market-sharing arrangement, the *quedan*, illustrates this point. Following the U.S. takeover of the Philippines in 1898, Philippine sugar interests were granted a series of preferences, partially at the expense of Cuban interests. These preferences were formalized in the already-mentioned Jones-Costigan Act of 1934. Subsequently, the Philippine government, following guidelines set out by the U. S. Department of Agriculture (USDA), surveyed the sugar industry and established a three-part quota, comprising an allocation for the U.S. market, one for the domestic market, and one for reserves (Nagano 1988.) The three quotas were allocated to 47 mill districts and the hundreds of smallholders in each district. Conflicts over cane pricing arose, especially during the 1930s. A sugar-sharing arrangement existed in most

milling districts, but a series of surveys by the newly established National Sugar Board in the 1930s revealed large discrepancies in the percentage of sugar taken by the mill. The board instituted guidelines limiting the millers' share to 30–54 percent in Luzon and 31–52 percent in Negros.

The system has grown in complexity but remains in place. The U.S. quota of 1.7 million tons comprised 12 percent of the 1998–99 *quedan* established by the Sugar Board's successor agency, the Sugar Regulatory Agency. Domestic markets are protected with a 65 percent tariff. Current policies result in market-sharing among Philippine firms. This distorts marginal pricing – that is, production decisions are based on average revenues, in contrast to systems where marginal production is forced onto world markets at world prices and marginal production decision are therefore based on marginal profits. The system also provides distorted incentives as production levels also potentially affect the allocation of access to protected US markets. Consequently, firms that do not fare well in domestic markets may nonetheless survive because of profits from sales into the US market. In addition, fixed revenue sharing between producers and millers discourage millers from achieving better extraction rates.¹¹

Mauritius provides an example of the way in which dependence on special access can generate legislative barriers to diversification. In that country special conditions for workers, special land market regulations, and other regulations specific to the sugar industry lock in resources to ensure Mauritius produces enough sugar to meet its EU quota. As a result, opportunities for productivity-enhancing diversification are limited and most arable land is devoted to sugar production – nearly 70% in 1998 (FAO 2000).

While special access to protected markets generates potential benefits, the allocation of those benefits depend on domestic policies and domestic sugar industries do not always retain the benefits of special trading arrangements. Mlambo and Pangeti (1996) argue that in Zimbabwe governments, intent on pursuing political expedience, often set domestic prices below the cost of production during the transition to independence in 1979 (and subsequently

¹⁰ Because the ruble was not convertible, measures of implied subsidies are open to challenge. See Earley and Westfall (1996), Pollitt and Hagelberg (1994), and Perez-Lopez (1988) for further discussion.

¹¹ See Borrell and others (1994) for a discussion of the costs of Philippine policies.

throughout much of the 1980s). This policy transferred profits resulting from special access to the EU and U.S. markets from the four private estates to domestic consumers.

In Fiji, the sugar industry, dependent on special access to the EU and US markets, generates about 22 percent of GDP, 40 percent of agricultural GDP, and 40 percent of the country's export earnings. The program has brought marginal lands into sugar production and some benefits are vested in potentially higher land prices. Still, much of the land had been farmed under 30-year leases negotiated around 1970. As the leases expire, the fight over the amount of the benefits of these trade arrangements that should be reflected in land rents has been bitter. The conflict is especially acrid because Indian-Fijians comprise 75 percent of Fiji's sugar farmers, and 73 percent of Indian-Fijians lease their lands (Reddy and Yanagida 1998).

Policies, Sugar Markets, and Sugar Production

Like the international sugar market, domestic markets are characterized by extensive interventions and a complicated political economy. As mentioned earlier many of the interventions are based on special long-standing trade arrangements. Other issues important to domestic markets relate to the role of sugar as a basic food item, the physical characteristics of sugar production, and certain features of the industry's organization and of factor ownership.

Food Security

Because sugar is a basic food item and because sugar prices are volatile, governments often intervene in sugar markets with the purpose of maintaining food security. But while it is often important as a basic food item, sugar is nowhere a diet staple comparable to rice, maize, or a handful of other crops. Governments nevertheless apply similar policies to a handful of "essential" food commodities that often includes sugar. Sugar policies in China and India illustrate this generality.

Current policy in India dates back to the Defense of India Act of 1939, which aimed to limiting speculation and hoarding during World War II, and to the tragic Bengal famine of 1942 that claimed 2–3 million lives (World Bank 1996.) In 1955 the Essential Commodities Act established a wide range of policy instruments to control the storage, trade, and prices of

food crops, including sugar. Over the years both the central and state governments imposed additional controls on the industry. In India, sugar is produced by almost 5 million smallholders on plots that are generally less than one hectare. The country has more than 400 sugar mills, of which 60 percent are cooperatives, 15 percent are publicly owned, and the remaining 25 percent private. Until the end of the 1990s, when the government began to grant licenses to private traders, the State Trading Corporation monopolized imports and exports. Import levels are still set by policy. The federal and state governments also subsidize farm inputs, especially water and fertilizer, and sometimes offer soft loans to mills. Mills are restricted in the amount of land they can own and may purchase cane only from administered zones.

The genesis of China's sugar policy is harder to trace, but the 1959–62 famine that killed 15–30 million people influenced the drive for self-sufficiency in all food items, including sugar (Riskin 1995.)¹² Domestic and trade policies are not consistent, however, and provide contradictory incentives. Trade with other countries—and sometimes trade among regions—is subject to regional and central government controls, and the government owns many sugar mills. Domestic sugar prices tend to be high—around 50 percent more than international prices in 1997 (FAO 1997.)

Production Characteristics, Land and History

Sugar production has two cost components: field and processing. For most agricultural crops, production, storage, and processing are independent activities, and markets exist for both processed and unprocessed commodities. But field and factory costs in the sugar industry (from cane to raw sugar) are interdependent. Despite this, fully integrated sugar companies are unusual outside of sub-Saharan Africa.¹³ In most countries, sugar producers and processors are separate economic entities that can achieve economic efficiency only through cooperative behavior.

¹² Ironically, the food shortages resulting from the failed Great Leap Forward also pushed the government toward a heavy reliance on internal market mechanisms.

¹³ Fully integrated sugar industries frequently originated as colonial plantations and in many instances were nationalized at the end of the colonial era. Often the nationalized sugar companies retained monopolies or other special privileges. In Indonesia, for instance, the Dutch plantations were converted into government-owned “people’s plantations.” In Chad a colonial company was transformed into joint venture between the government, the private sector, and a French multinational.

Sugar cane is bulky and degrades soon after harvesting. The high cost of transporting it creates local monopolies and monopsonies. Conflicts between producers and processors are common and are often exacerbated by the need to share costs. For example, minimizing field costs often requires a planting and harvesting cycle that produces cane for processing during a relatively short period. But the increased sugar processing capacities needed during this period raise mill owners' fixed costs. Spreading deliveries over an extended period minimizes processing costs. As a result scheduling and pricing conflicts often emerge between producers and processors. Frequently, the conflicts spill over into political confrontations.

Land policies and ownership often influence sugar policies as well, for two reasons. First, policies on land ownership influence the organization of the industry, usually by limiting the scope for integrating production and processing. Second, since the value of land for sugar production and sugar producers' income levels depend on proximity to an efficient sugar mill, investment and production decisions tend to become matters of public debate in areas with many small or medium-sized cane growers. For this reason governments often intervene to take over or failing sugar mills. Governments, on the whole, are rarely good at running sugar mills, and often the acquired sugar mills are later resold to the private sector.¹⁴

The history of sugar production in Mexico illustrates these themes. Prior to the Mexican Revolution, large landowners controlled and integrated cane cultivation and processing. The revolution resulted in a restructuring of the industry. Morelos, the center of the peasant-based Zapatista Movement, was also the heart of the country's sugar industry (Crespo 1988.) By 1921 many of the country's sugar mills had been destroyed and much of the irrigated sugar-growing land transferred from the large plantations to peasant cooperatives. A new and successful structure emerged based on smallholder cane producers and private sugar mills with concentrated ownership.¹⁵ The implicit mill cartelization was formalized in 1932 with the establishment of Azúcar, SA, a miller-owned organization that

¹⁴ Although small and medium-sized producers complicate the political economy of the sugar industry, family-owned farming systems are among the world's most efficient sugar producers. Family ownership creates strong incentives toward long-run stewardship and reduces the costs of monitoring performance. In terms of efficiency, smallholder farms in Thailand compare favorably with large and medium-sized sugar farms in Australia, France, and the United States.

was granted a marketing monopoly on sugar. The association set quotas and organized exports of subsidized sugar in order to maintain domestic prices above world levels. Financing was organized through a government-subsidized bank, Banco Azucareros, SA.

Despite these changes tensions between growers and millers remained high, and in 1938 the industry was reorganized. Government ministries were allocated voting rights in the cartel. Over time the government's role in the affairs of the sugar industry grew. Because local economies depended on the sugar mills, the mills were not allowed to fail. In many instances the government took over mills that were no longer viable or that had been at the center of disputes with growers. By the mid-1980s the government owned 75 percent of the country's sugar mills, which by law could not own or lease land for cane production. Azúcar retained its marketing monopoly. The government intervened further by subsidizing cane growers, paying agricultural insurance premiums, and mandating special social security payments for sugar producers. Prices were regulated along the entire marketing stream. Producer prices were not directly linked to wholesale prices, and cane growers received a common payment regardless of the sugar content of their cane. Government-owned sugar mills were overstaffed and productivity levels declined. Despite its monopoly, Azúcar began running deficits that the treasury was forced to absorb (Telléz 1995.)

Rules on cane-pricing and revenue sharing

In the examples above governments chose to solve the conflicts between cane producers and mill owners through forced vertical integration. Another approach involves mandating revenue-sharing rules. The value of cane delivered to a mill is determined by the sugar content of the cane and the ease with which the mill can extract the sugar. High-value cane has a low fiber content, a high sucrose content, and high juice purity—that is, low levels of soluble impurities—and be free of debris. The quality of cane delivered to the mill is affected by many factors along the production chain: natural endowments such as rainfall and soil quality; production methods, such as the variety of cane that is planted and the methods used to harvest it; and the promptness with which the cane is delivered.

¹⁵ By 1934 the top six [use English word here] *ingenios* processed about 56 percent of the country's sugar (Crespo 1988.)

Unfortunately pricing systems that create the proper incentives require a degree of sophistication that is difficult to legislate and is likely to arise only from truly cooperative approaches. Poorly conceived approaches, while easier to administer, encourage misdirected efforts. For example until recently growers in Colombia were paid according to the weight of the cane they delivered to the mill. The practice encouraged cane production but discouraged attention to quality. In Mauritius, the Philippines, and South Africa, sugar revenues are shared according to a fixed rate. Consequently, a portion of the efficiency gains generated by new investments in sugar mills accrue to the cane growers. The practice effectively taxes improvements in milling efficiency. Table 4.7 provides a cross-section of various cane-pricing methods.¹⁶

More on factor markets.

As mentioned previously the political economies of land and sugar are often intertwined. But land and sugar policies can be linked in other ways as well. In the Philippines only 10 percent of sugar cane farms are irrigated, although the returns to irrigation are substantial, increasing yields by 60–70 percent. Uncertainty over land reform is perhaps the primary reason so little land is irrigated. This uncertainty limits the incentives for land improvements. In a 1990 survey by the Management Association of the Philippines 60 percent of respondents who together hold 72,000 hectares said that they had reduced or put off farming investments because of uncertainty over land reform (Borrell and others 1994).

Sugar cane production in St. Kitts and Nevis occupies almost half the islands' arable land. The sugar enters into the United States and the EU under preferential trade arrangements. In 1975 the government intervened to nationalize the failing sugar industry, acquiring 52 privately owned estates and one sugar factory. As a result the government became the largest property owner in St. Kitts. In 1992 the government began leasing out land under 35-year agreements.

Water policies are often linked to sugar policies as well. Mlambo and Pangeti (1996) provide a step-by-step account of the efforts made by Zimbabwe's governments to provide water to the country's sugar-growing area. In 1970 the government of Senegal signed a

¹⁶ See LMC (1997) for a more complete discussion of the details, benefits, and drawbacks of the various cane-pricing methods. [LMC not in reference list]

special agreement with the Compagnie Sucrière du Senegal the firm that provided with a free 99-year lease on land near Guiers Lake, with guaranteed free access to irrigation water (up to 20,000 m³/ha). The agreement also granted the company production and trade monopolies that were protected by quotas and tariffs. The arrangement remained in place for nearly 25 years, effectively immobilizing regional irrigation and land assets (World Bank 1995.) And in India states and the national government provide farmers with access to subsidized water, power, fertilizer, and credit. Because producing sugar requires more of these inputs than most other crops in India, the policies favor sugar over other crops. Because rainfall and soil conditions differ across regions, the subsidies also favor some geographic areas over others (World Bank 1996.) Sugar processing is capital intensive, requiring large fixed investments. Mills must acquire working capital to cover the period between the harvest, when mills buy cane, and the eventual sales of processed sugar. When governments direct credit to mills and farmers, sugar market reforms depend on the ability of mills, farmers, and financial institutions to forge new structures. During times of economic hardship, the new structures can be severely tested and sometimes fail. The Mexican experience again provides an effective example. During the privatization of the country's mills in 1990, many facilities were purchased using leverage buyouts, with the mill serving as the collateral. When the financial crises hit the Mexican market and interest rates rose dramatically, the highly indebted mills were unable to raise working capital. In September 1995 a debt-restructuring package worth 8.2 billion pesos was offered through Financiera Nacional Azucarera (FINASA), a Mexican development bank -- a move that meant FINASA's entire portfolio would be tied up in sugar-related assets.¹⁷

Sugar Market Reforms: Why and How

Policy interventions are pervasive in sugar markets, affecting global and domestic prices, incomes and investment decisions. Sugar markets were largely exempted from the trade reforms negotiated during the Uruguay Round of the GATT. However, a number of countries began the process of freeing domestic markets in the 1990s. As with other commodity markets, external events forced changes in some countries (see chapter 1). Often sugar reforms come as part of a broader agenda of economy-wide reforms, sometimes a

¹⁷ In some instances smallholder debt can burden local or even national banking systems as well. Reddy and

consequence of changing regimes and sometimes with the encouragement of multilateral lenders.

Governments that collectively and individually intervened to manage commodity prices and price volatility began dismantling those instruments and looking to private markets and market instruments to manage risk during the 1990s (Larson, Varangis and Yabuki 1998.) Sweeping changes brought about by the break-up of the Soviet Union markedly altered the trade patterns of the former republics and their trading partners. Most countries, like Bulgaria, Poland, Hungary, Latvia, Russia, and Ukraine took the first tentative steps toward creating private markets for sugar behind protective tariffs. Similarly, in Indonesia the East Asian economic crisis triggered trade liberalization for several commodities, including sugar, although the government remains a significant owner of sugar mills and plantations.

Broad policy changes affecting the role of government, often the result of new electoral mandates, sparked domestic reforms in sugar industries in Brazil, Mexico, and Peru. Changes in the policy approaches of international institutions to agriculture in development and the role of government in commodity markets also influence market reform—indirectly through policy debate and directly through policy-based lending. Finally, the demise of the commodity agreements in coffee and cocoa brought commodity-market reform to several countries (for instance, Brazil and Uganda), generating concurrent reform of the domestic sugar markets.¹⁸ Often reforms are less sudden, motivated partly by a growing recognition of the failure of the public sector to perform and partly by the urging of donors and multilateral lenders. In Africa—for example in Chad, Côte d’Ivoire, and Kenya—the sugar industry is undergoing a slow process of privatization.

Many of the factors that motivated government intervention remain, however. In particular special trade arrangements still dominate exports from several countries, tensions between producers and processors are inherent in the organizational structure of many sugar industries, and conflicts remain over how to manage and price scarce water resources. And sugar reforms often take place amid reforms in factor and other markets. Thus while the motivation to reform is often present, opposing forces can slow down the reform process.

Yanagida (1998) point out that Fijian banks depend heavily on sugar.

Australia: Freeing Markets

Before Australia reformed its sugar policies, it maintained stringent production and marketing controls. These were first implemented in the 1930s to comply with the first International Sugar Agreement. Imports were restricted and regulations established a two-tier pricing worked to the disadvantage of domestic consumers. In Queensland, where most of the country's sugar is grown, the Queensland Sugar Board set annual limits on the amount of sugar each mill could provide to the higher-priced "number 1 pool." Amounts above quota were sold into the lower-priced export market. Farmers and processors discovered that they could profitably compete, even at international prices and production expanded. Despite the implicit transfer from consumers to producers via the "number 1 pool", marginal investment decisions were based on international prices. The industry, especially in Queensland, grew less dependent on domestic markets. Gains in milling efficiency flowed to millers, and farmers captured increases in field productivity because of well-structured cane pricing rules.

Reforms began in 1989-90, when an import tariff replaced the import ban. The Australian and Queensland Governments reviewed the country's sugar policy in 1996. The review process itself was considered integral to the reforms because it established a broadly accepted factual basis for discussion. As a result of the review, the government eliminated that import tariff in July 1997 and converted the sugar board to the Queensland Sugar Corporation. The new corporation retains its monopoly on sugar marketing but sells to local refiners at export-parity prices. In general the industry received the changes well. The reforms attracted new investments, and both production and milling capacity expanded. Nevertheless adjustment difficulties occurred in the smaller New South Wales industry, which was more dependent on domestic markets. In response, the Australian government initiated a study examining ways the government can assist the industry during transition.

Brazil: Unwinding Cross-Subsidies

In the 1990s Brazilian policymakers began reforming long-standing policies that originated during the oil shocks of the 1970s (Borrell, Bianco and Bale 1994). Brazil is one of the largest and most efficient sugar producers in the world, but for two decades up to two-

¹⁸ Earlier agreements on sugar were unsuccessful as well. See Gilbert (1985, 1987, 1996) for a brief history of

thirds of its output was devoted to producing ethanol for the country's subsidized alternative fuel program, PROALCOOL. The government managed domestic supplies, allocating quotas allocated to each of the more than 370 sugar mills and distilleries. The quotas were earmarked for the domestic sugar and ethanol markets, and above-quota production was eligible for export (and subject to export taxes). However, quotas were reallocated annually, and production above quota was frequently rewarded with a larger quota the following year. Domestic prices for sugar and ethanol were set to encourage the use of sugar for ethanol and, for most years, the world price of sugar exceeded the domestic price. Further, regional producers faced differential tax rates on sugar and on ethanol purchase prices. Beginning in 1995 steep export taxes replaced licensing as the primary instrument for managing sugar trade, ushering in the first of many reforms.

Part of the reform process involves disentangling the interrelated controls on Brazil's sugar and ethanol markets. In 1996 the government took several important steps in this direction by reducing and then eliminating the export tax on sugar and deregulating the market for anhydrous alcohol (a sugar cane-based alcohol blended with domestic gasoline). In addition the government transferred the alcohol subsidy from fuel distributors to alcohol producers and moved toward establishing a uniform tax on sugar production.¹⁹ The reforms aim in part to limit subsidies to a fixed quota per mill, so that additional alcohol production will be sold at market prices. The government also began looking at alternative ways to finance the program, including a "green-tax" on gasoline.²⁰ By 1999, the deregulated sugar industry remained dependent on policies toward domestic alcohol and fuel policies. Related is the composition of Brazil's vehicle fleet. Cars produced in Brazil are of two types: cars that run on alcohol alone and others that run on a blend of alcohol and gasoline. During the 1980s most new Brazilian cars were alcohol powered (96% in 1986). This level dropped sharply in the 1990s and by 2000 99% of new Brazilian cars ran on blended fuel. The changing composition of the vehicle fleet translates into lower demand levels for alcohol. To stimulate demand, the government mandated government purchases of cars powered by renewable

commodity agreements.

¹⁹ Prior to October 1997 the government taxed producers in high-cost production areas at lower rates.

²⁰ Brazil's reforms to its sugar-ethanol market began at a time when markets in "green energy"—usually wind or hydro-based—were developing in Australia, Canada, and the United States. Further, the Clean Development

energy sources and offered incentives to taxi drivers to buy alcohol powered cars. In addition, the government uses alcohol inventories to manage alcohol prices, affecting the decision by sugar mills on whether to produce alcohol or sugar from cane. In 1999, the government also temporarily boosted the required alcohol content of blended fuel (from 20 to 24%) in order to boost demand.

Thailand: Limiting the Distortions from Preferential Prices

Although costly to consumers, Thai sugar policies are designed so that marginal production decisions are based on world prices.²¹ Under the Thai program imports are banned in order to raise domestic consumer prices. Sugar is produced under three categories: A quota (for domestic consumption), B quota (for export under long-term contracts), and C quota (for export at world prices). Around 60 percent of Thailand's sugar is produced as C-quota sugar. The A and B quotas are fixed each year, so the industry knows any additional production will command only world prices. Thus, while the program transfers income from consumers to producers and millers, the transfers do not affect marginal production decisions.

Net revenue from the three types of sugar sales is split 70:30 between producers and millers, based on the average recoverable sugar content as determined by sampling. Averaging the sugar content discourages individuals from improving cane quality, but millers benefit by improving extraction rates and are penalized if extraction rates fall below 70 percent. Consequently, the system encourages millers to maintain their facilities. Thailand's approach can be useful for countries receiving preferential access to either EU or U.S. markets. The Thai system contrasts sharply with the approach taken in the Philippines, where preferential access to the U.S. market distorts marginal incentives.

Pricing Cane: Cooperative Strategies from Jamaica and Mexico

Well-conceived cane pricing systems reward farmers for delivering high-quality cane to mills in an orderly fashion without penalizing farmers for the inefficiencies of the mills themselves. Jamaica, which has many smallholder producers, developed a sophisticated set of

Mechanism established under the Kyoto Protocol should have facilitated this process. See Jacoby, Prinn and Schmalensee (1998.)

²¹ Borrell et al. (1994) provide a useful contrast between the incentives established by the Thai and Philippine sugar policies.

incentives by continually improving its cane pricing system. The country had a tradition of paying cane growers that dated back to 1943. The system—based on individual measures of quality—was modified over the years. Factory efficiency entered the payment formula in 1972, and reforms in 1991 put in place a revenue-sharing scheme based on relative performance. In the Jamaican system, revenues are shared according to a 62:38 ratio when growers produce cane of average quality and millers achieve average efficiency. But growers receive higher prices for higher-quality cane, and millers earn more when efficiency improves, so the revenue shares differ from mill to mill. Sampling techniques and incentives to monitor can are also more sophisticated (LMC 1997.) The system ensures that, at the margin, increased revenues from improvements in cane quality accrue to the grower, while millers capture any gains from milling efficiency.

Developments in Mexico show how improvements in incentives can be introduced even in a constrained environment. As part of a set of economy-wide reforms, the Mexican government began the process of reforming the sugar industry. Two important legislative changes affected land ownership and cane pricing. In 1992 changes to the Mexican constitution allowed mills to enter into leasing arrangements with smallholders, although in practice large-tract leasing by sugar mills is rare. More significant in the short run, a presidential decree introduced a new cane payment system beginning with the 1991–92 season. The decree established a revenue-sharing system that divides the proceeds of sugar sales between cane growers and millers. Cane from many smallholders is assembled at the mill in group loads. Mill officials and growers' representatives monitor the cane deliveries. Penalties established by a committee of mill owners and growers are applied based on debris content and on delays in delivering the cut cane. Growers are paid based on average quality levels and a set amount based on the efficiency of the mill (EBF), which provides a theoretical rate of recovery for the mill. When the system was first introduced, mills were assigned individual EBFs, but by the 1994–95 season all mills had been assigned a common EBF of about 82 percent. On average mill efficiency in Mexico is closer to 80 percent. The system encourages mills to make efficiency gains, since any improvements accrue to the mills—and indeed several mills have exceeded the official EBF. Once the sugar content has been established, an average price for standard sugar is used to value it, and this calculated

value is split according to annual government directives. In 1996–97, the growers received 57 percent (LMC 1997).

The Mexican example also shows how initial conditions and practical limits shape changes in pricing schemes. Because of the traditional government practice of setting pan-Mexican sugar prices, wholesale markets for domestic sugar are not well established and setting an average price for standard sugar is difficult. Consequently the price is negotiated rather than established by market indicators. In addition, the system still prices sugar based on average cane purity and fiber content, penalizing growers who delay deliveries following cutting and growers that deliver debris. The system encourages some easy-to-measure improvements in quality but not a more sophisticated arrangement that also provides incentives for growers to deliver cane at off-peak times. However the presidential decree allows mills and growers to negotiate alternative systems that are mutually beneficial. At San Cristobal, the largest sugar mill in Mexico, growers agreed to temporarily price their cane according to actual factory efficiency rates when the mill owners promised to invest \$50 million dollars to improve the plant's efficiency.

Privatizing Sugar Mills

Privatization is a common component of domestic sugar reforms. Most countries have concluded that the state is ill suited to running sugar mills. The process of privatization often reveals conflicting policy objectives, however. One goal of liberalization is to bring the benefits of a more efficient sugar industry to sugar consumers. But the need to generate treasury revenues, or quickly eliminate drains on treasury resources can also encourage governments to seek quick privatization solutions. Moreover, governments often face considerable pressure to ensure that privatization does not result in mill closures. As a result, government's often boost protection in order to improve the value of the mill and speed privatization. Governments also face a number of other issues during privatization, including how to cope with often large accumulations of debt and how to provide potential investors with the information they need to make wise investment decisions.

Using trade protection.

In practice most countries provide— high levels of protection to newly privatized sugar mills, at least temporarily. In providing this protection governments implicitly tax future consumption to finance the current government budget. Alternatively governments can fix low rates of protection that are reflected in the value of the mills and in the prices bid during privatization. In some cases, however, state-owned mills deemed viable in the long run are so poorly maintained that they fail to cover variable costs at low rates of protection. For political and budgetary reasons, governments are reluctant to subsidize the purchasing firms directly and instead choose to tax future consumption in order to protect producers and workers

In Poland, for example, one purpose of the 1994 Sugar Industry Act was to provide a stable and profitable environment for the sugar industry (albeit at the expense of Polish consumers) during the privatization of the industry.²² High protection rates and even export subsidies were used to boost the attractiveness of the mills to potential buyers. Nonetheless, the government still owns most of the industry.²³ In Côte d'Ivoire the government, although bound by its GATT pledge to limit sugar tariffs to 33.3 percent, chose to provide added protection while privatizing its industry. The government provided this added protection by basing its 33.3 percent tariff on a reference price that included prices from protected EU and U.S. markets. In effect the system provided a tariff in excess of 100 percent for sugar imported from world markets. The government of Burkina Faso chose lower average rates of protection but established safeguard mechanisms based on a moving average of world prices to protect the newly privatized industry from sharp price declines.

Writing off debt.

Resolving debt issues is often a key component of the privatization process. The question of how to resolve large accumulations of debt can slow the privatization process, as it has for Muhoroni, a sugar parastatal in Kenya. Firms that would otherwise find the company attractive are unwilling to bid after considering the on-going cost of servicing the debt that was accumulated during government management. In Brazil, sugar mills borrowed heavily

²² The sugar industry was privatized as part of the economywide privatization begun in 1989.

²³ Of the 76 sugar refineries in Poland, 13 are completely privatized, and all but 2 have issued shares. Foreign companies have significant investments in 10 of the mills and controlling interest in at least 4.

from the Sugar and Alcohol Institute Sugar Export Fund during the creation of Brazil's alcohol-fuel program. By 1996 the Bank of Brazil had been forced to renegotiate the debt, then valued at \$4.5 billion. Several Brazilian firms remained burdened by the earlier program to provide ready access to credit.

Some governments are more willing than others to write off debt early in the privatization process. This approach provides a direct incentive for private investment and may leave newly privatized firms in a better position to raise working capital. And, as the earlier example from Mexico shows, failure to resolve debt during the privatization process may result in new interventions later.

The handling of debt was central to the Peruvian privatization process.²⁴ In 1969 the military government launched a sweeping agrarian reform program that began with the expropriation of the sugar plantations. Cooperatives were established and charged with running the mills, but in 1975 conflicts developed between the management of the cooperatives and sugar cane growers. The government experimented with several different kinds of controls as the financial integrity of the sugar mills crumbled. In the early 1990s legislation freed cooperatives to dismantle or reorganize their structure, and four of the smallest sugar cooperatives chose to do so. By 1995 the eight largest sugar mills had amassed \$538 million in debt to three government agencies and an undisclosed amount to other creditors, traders, and workers. In 1996 the newly elected government issued a legislative decree, the *Extraordinary Program of Tax Regularization* (PERTA), offering cooperatives three options for repaying their debt to government agencies:

- a. Cash payment of 40 percent of the debt (the other 60 percent would be forgiven;
- b. Capitalization of 30 percent of the debt, which would be converted to shares, with the balance forgiven; and
- c. Installments of 20 percent up front, with payments extended over six years following a two-year grace period (Chullen 1996).

²⁴ The government of Uganda took a similar approach when privatizing its cotton industry. See Baffes (1998). [Not in reference list]

At the government's urging, almost all cooperatives voted to choose the second option. Private capital was, in general, available; however early on it became clear that the poor management that often prompts privatization is also reflected in the firm's financial information management systems. We take up this topic next.

The role of information in privatization.

During the initial stages of the privatization process in Peru, the procedures for making and responding to private investor offers were unclear. As investors sought to line up majority stakes, one company, the Kimberley Group, took to the street offering to purchase shares of the medium-size sugar company Paramonga from workers and to pay social benefits to retired workers. The ploy worked, and the firm bought about 55 percent of the workers' shares for approximately \$20 million. But the process raised concerns about whether workers knew the value of their shares and were aware of alternative offers. The National Supervisory Commission on Companies and Securities (Conasev) then intervened and issued a month-long suspension of share trading at Paramonga.

Investors faced difficulties of their own as well. First, a lack of financial and business information, symptomatic of poor management practices, slowed decision-making. Firms interested in purchasing shares found it difficult to value the firm because of poor record keeping.²⁵ Cooperative members faced similar difficulties in evaluating offers. Early on, Conasev took an active role in getting information to the marketplace by requiring the sugar companies to file audited financial reports. In addition the government established transition committees at each estate to facilitate the privatization process. The interventions slowed the privatization process, but by 1998 shares in all 12 of the sugar estates had been distributed. Two of the estates were fully privatized in 1997.

Reforms, Research and Public Services

Pricing systems, as we have seen, create the incentives needed to improve the quality of cane. The improvements generally come from enhanced management and the application of existing technologies. The development, adaptation, and testing of new technologies are common goods that can benefit all members of the industry, a fact that has long been

recognized. Most sugar-producing countries have an established history of research—for example Taiwan, which established the Sugar Cane Nursery and Trial Farm at Ta-mu-jiang (Hsinhwa) in 1900. Similarly Egypt's sugar research institute dates back to the 1930s.

In many countries where the government owns the sugar industry, the role of research becomes bundled with market activities. In some cases governments and industry participants fail to find a way to jointly fund research during the privatization process. Before privatization in Mexico a single organization managed the research agenda for the sugar industry. With privatization research became much more dispersed. Some is conducted at El Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias (INIFAP), some at universities such as the Unidad de Inversiones, and some at a research station in Chiapas. In addition almost every mill in the country conducts some research.

While the benefits of research are a common good, the government does not necessarily need to finance it. Since the industry benefits directly from new research, industry members are often willing to provide financing themselves—for example through a consumption or export levy—if they also have a voice in setting research priorities. The Mauritius Sugar Industry Research Institute is organized along these lines.²⁶ Following recommendations made by the Mauritius Economic Commission in 1947, the sugar industry decided to conduct its own research. It founded the Mauritius Sugar Industry Research Institute in 1953. The institute is financed by a cess on sugar production and is governed by a Board of Directors with 10 members: seven representing millers, growers, and the Chamber of Agriculture, and three representing the government.

Nationalized sugar mills sometimes provide services to local communities. During privatization governments must be careful to ensure that appropriate institutions take on these tasks. Before privatization the sugar estates in Peru had provided electricity, education, and health care and other social services to the community. And while the estates employed around 35,000 workers, up to 215,00 family members and retirees were also directly dependent on the services the estates provided. Although the process was slow and expensive,

²⁵ Inadequate record keeping is a common problem when sugar mills and estates are being privatized. For example in Kenya the government was unable to establish clear title for several of the sugar parastatals.

²⁶ Visit <http://www.cgjar.org/isnar/hosted/msiri/msiri.htm> to learn more about the Mauritius Sugar Industry Research Institute.

in Peru the government managed to transfer responsibilities to other organizations and agencies. For example by 1996 Paramonga had transferred nine schools valued at \$US 2.1 million to the Ministry of Education.

Lessons and Policy Recommendations

Unlike trade policies for coffee or cocoa, sugar policies are generally designed to subsidize producers at the expense of consumers. Often the benefits are dissipated through inefficient public ownership, captured by competing sweetener producers, or lost to rents on land. Yet the accumulated effects of such policies also give rise to well-defined groups that are dependent on continued interventions. Often these groups include entire communities that depend on the continuation of existing policies in general and on the continuation of the local mills in particular. Since reform usually means structural changes, including at least some mill closings, the political and social costs of reform are high. Consequently even though the economic benefits of reform are significant, especially relative to costs, governments have been reluctant to pursue reforms in sugar markets as readily as reforms in other commodity markets, such as coffee and cocoa.

In general the benefits of domestic reforms accrue primarily to consumers and the economy at large through productivity increases that result when resources flow to optimal uses. Recent experience suggest that sugar reforms are more likely when governments include them in a package of overall market reforms designed to spur lagging economies (as occurred, for instance, in Brazil, Mexico and Peru). Moreover governments will pursue true trade liberalization when the costs of reform are relatively low for the industry and the benefits more apparent, as was the case in Australia and Brazil.

Because sugar policies generally tax consumers to subsidize producers, the policies do not directly affect the government budget. In fact import taxes often raise revenue. As a result budgetary crises do not necessarily trigger reforms of sugar policy (grain subsidies, however, are sensitive to budget constraints). However public ownership of sugar mills also places the burden of new investment in the plants on the public ledger, and public funds are generally limited and their availability unpredictable. As machinery depreciates and the efficiency of such mills to decline, a crisis emerges. Soon the need to raise capital spurs privatization. This

experience has been repeated in much of Africa and Latin America, including Chad and Kenya, Mexico and Peru.

Trade regimes and preferential trade agreements give rise to their own distortions, as they did in Fiji, Mauritius, the Philippines, and St. Kitts. And reliance on the policies of other countries can prove risky in the end. When governments join or prepare to join regional trade agreements, new distortions are often introduced, as happened in Mexico and Poland. In contrast, the potential gains from multilateral trade liberalization are significant, and they would accrue primarily to developing countries.

Because the consequences of reform differ from country to country, and because of differences in initial conditions, no single blueprint exists for sugar market reforms. But research overwhelmingly suggests that developing countries would benefit not only from multilateral reform but also from unilateral reform. Realizing the potential gains from reform requires establishing a framework that puts in place the proper incentives for both domestic industries and international trade. Finding the political support for sugar reform requires lowering the cost of the transition for those countries and groups most likely to bear a disproportionate share of those costs, especially the loss of income and wealth. Lessons from earlier experiences suggest that a successful reform strategy has several components:

For multilateral reforms to sugar markets to succeed, developing countries will need to push large sugar-producing and –consuming countries to change their domestic sugar regimes. During the Uruguay Round negotiations, neither the EU nor the United States was prepared to make significant changes to its domestic regime. In the end the round had a limited effect on the global market.

The handful of countries that depend on special access to protected sugar markets will require assistance during the reform process. When protected markets are lost, the governments of these countries will not have the resources to soften the impact on the industry, as Cuba's experience illustrates.

Even when subsidies exist—either to protect consumers or because of preferential trade agreements, countries must take unilateral action to limit the distortionary effects, as Thailand's experience shows.

Sugar market reforms may entail reforms in other markets as well. The mix of Brazil's sugar and energy policies is one example.

Clear analysis that identifies and quantifies the direct and indirect economic and welfare impacts of policy changes can provide a consistent and objective framework for negotiating change. Australia's experience supports this notion.

Mills slated for privatization are often burdened with debt, or require large initial capital improvements. Governments provide added trade protection in order to improve the profitability of domestic sugar firms, hoping to entice private investors and speed privatization. This approach taxes consumers and may support competing industries such as corn sweeteners. Peru's experience shows that debt relief is a less distortionary alternative.

Information about asset values must be available during privatization. Investors need accurate and timely information in order to make wise investment choices. As we saw the Peruvian government addressed this issue by putting in place uniform reporting rules that provide information to both buyers and sellers during privatization.

Services provided by large estates before privatization must be transferred to another provider. Sometimes large government-owned estates provide workers common goods such as education and health care. Peru's experience shows that careful planning will minimize disruptions in public services. In Mauritius the government also plays an organizing role in privately financed research.

Governments must play a constructive role in resolving conflicts between producers and mill owners. The physical characteristics of sugar production can lead to conflicts that often prompt poorly devised government interventions. To avoid such problems, governments can follow Jamaica's example in setting cane-pricing rules, which create the proper economic incentives.

Conclusions

Public interventions are commonplace in domestic and international markets for sugar. The interventions are long-lived and rooted in historic trade arrangements, fears of shortages, and conflicting interests between growers and sugar mills. Arrangements rooted in colonial eras still shape policies and trade in the US, EU, and many developing countries. Responses

to key events are frequently layered on old policies or sometimes give rise to new policies. Over most of this century, most key events as well as economic thought on the role of agriculture in development have encouraged accumulated interventions. Once put in place, households and the value of investments become dependent on policies and institutions that remain in place even as the usefulness of the policies and institutions fade. Still, experiments with public ownership, common in many countries, have not been successful and most countries have found public ownership of sugar-producing estates and mills untenable. Further, successful experience with market liberalization in other commodity markets has encouraged several countries to rethink existing sugar policies. As a result, most countries have initiated some measure of market reform.

In addition, anticipated events related to NAFTA, Lomé and the expansion of the EU may bring about significant changes to the EU and US sugar regimes with cascading effects for other countries. Countries dependent on the policies of other countries should learn from Cuba's turbulent history and begin the difficult process of gaining independence.

Positive and complete lessons for sugar market reforms are not to be found in any single country experience; however, successful solutions for each of several common problems associated with sugar market reform can be found by drawing selectively on country experiences. Common problems include: the determination of cane quality; finding methods of fairly sharing revenue from joint production; finding approaches to take advantage of preferential trade arrangements while limiting negative consequences; identifying practices that facilitate equitable and sustainable privatization; finding ways to finance and encourage research and other activities with common benefits; and determining the relationship between sugar market reforms and land, water, credit and other input markets. Finally, the experiences of many countries shows that market interventions arise for many reasons. In some cases, the circumstances that motivated past policies has changed, even when the consequences of those interventions remain. In other instances, the underlying problems that have motivated interventions in the past may remain, even when policy makers realize current approaches have failed. Successful market reform goes beyond eliminating failed policies to finding lasting solutions.

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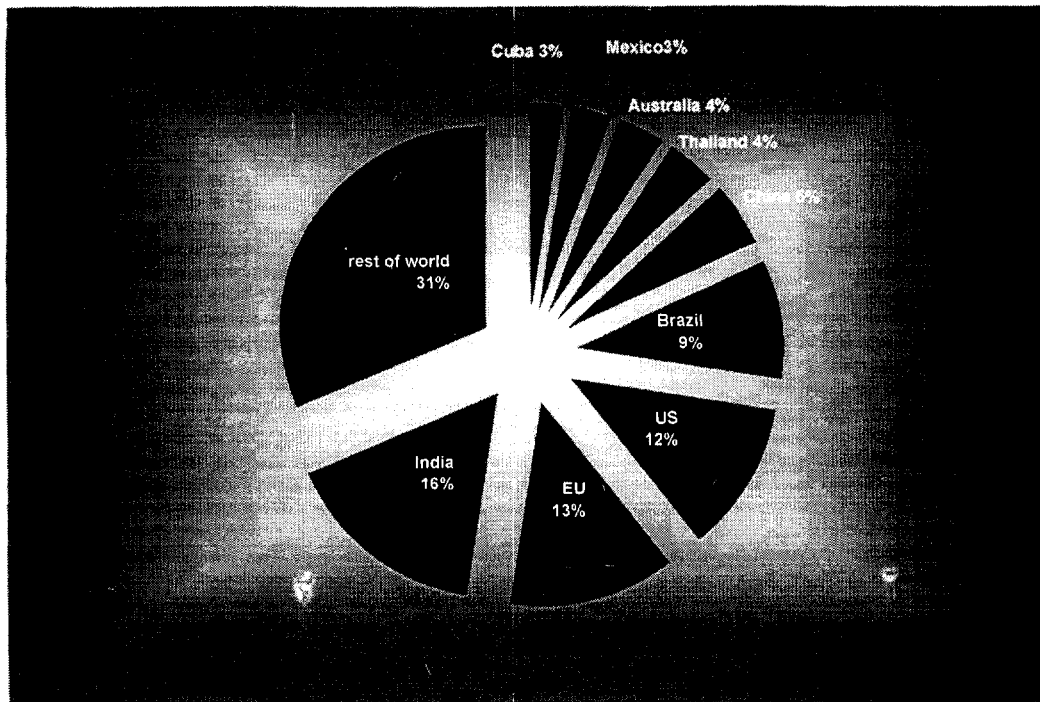
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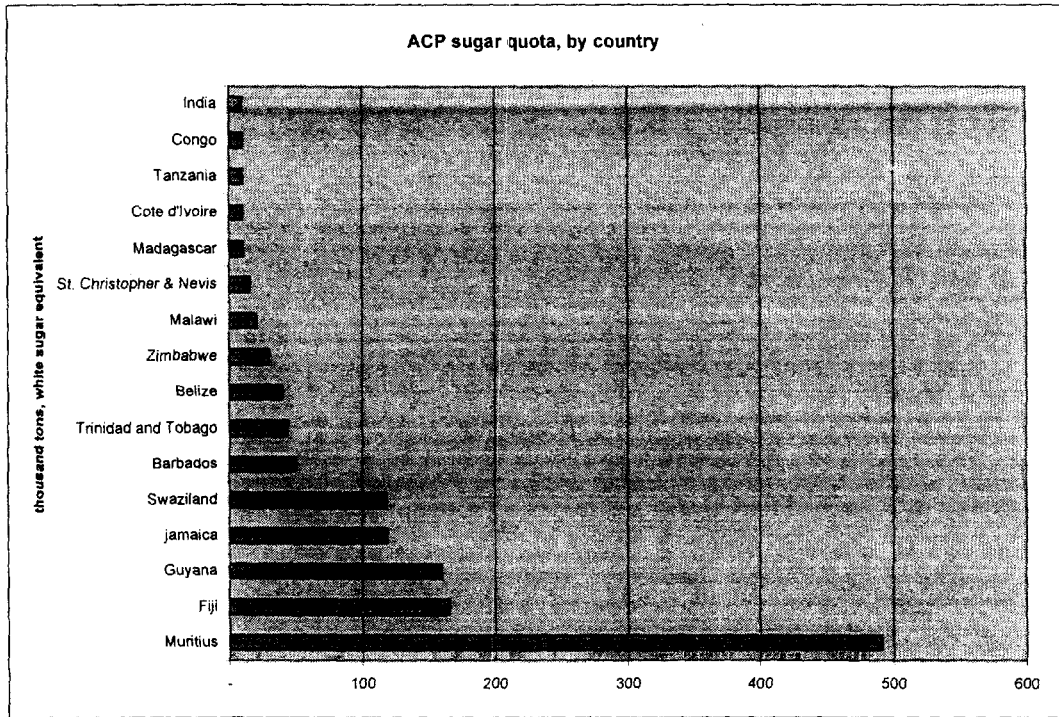
Figures and tables

Figure 4.1 Average Share of World Sugar Production for Selected Countries, 1994–98



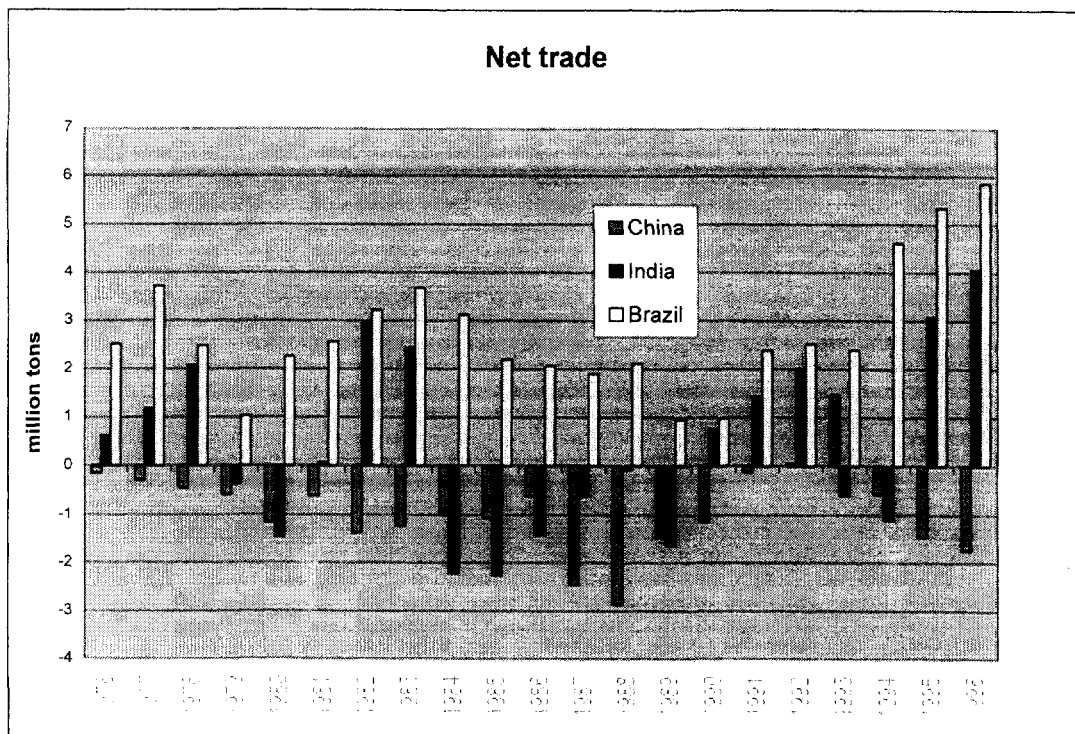
Source: FAO

Figure 4.2 EU Sugar Quotas for Preferential Imports from African, Caribbean and Pacific Group Countries



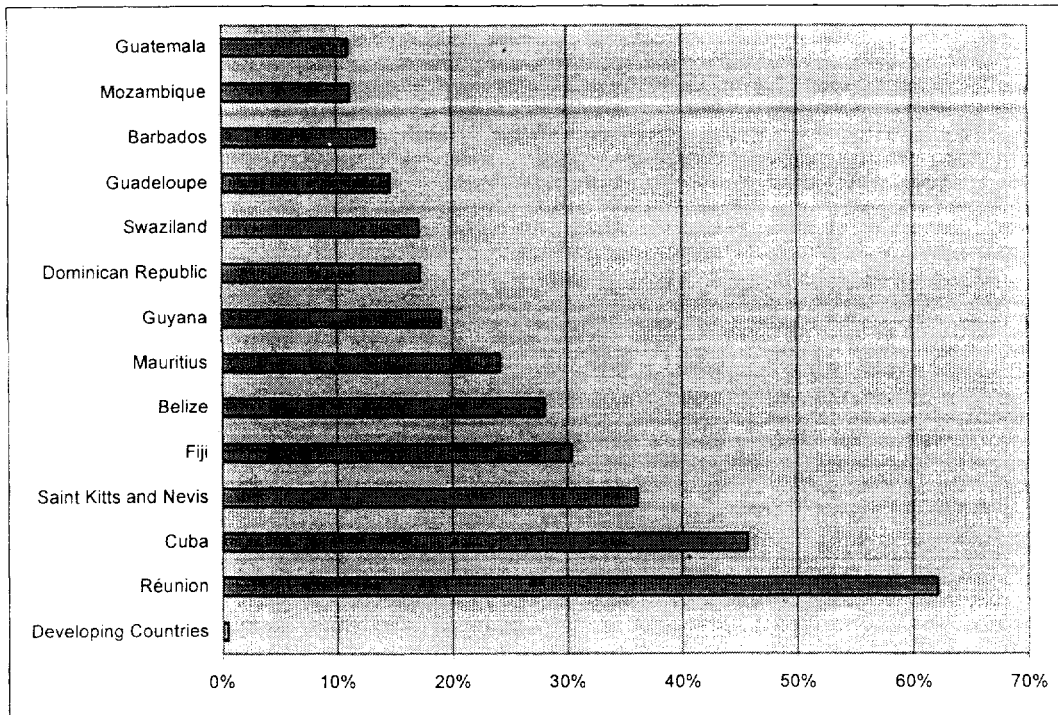
Source: Harris and Tangermann (1993)

Figure 3.2 Net Trade in Sugar for Brazil, China, and India, 1976–96



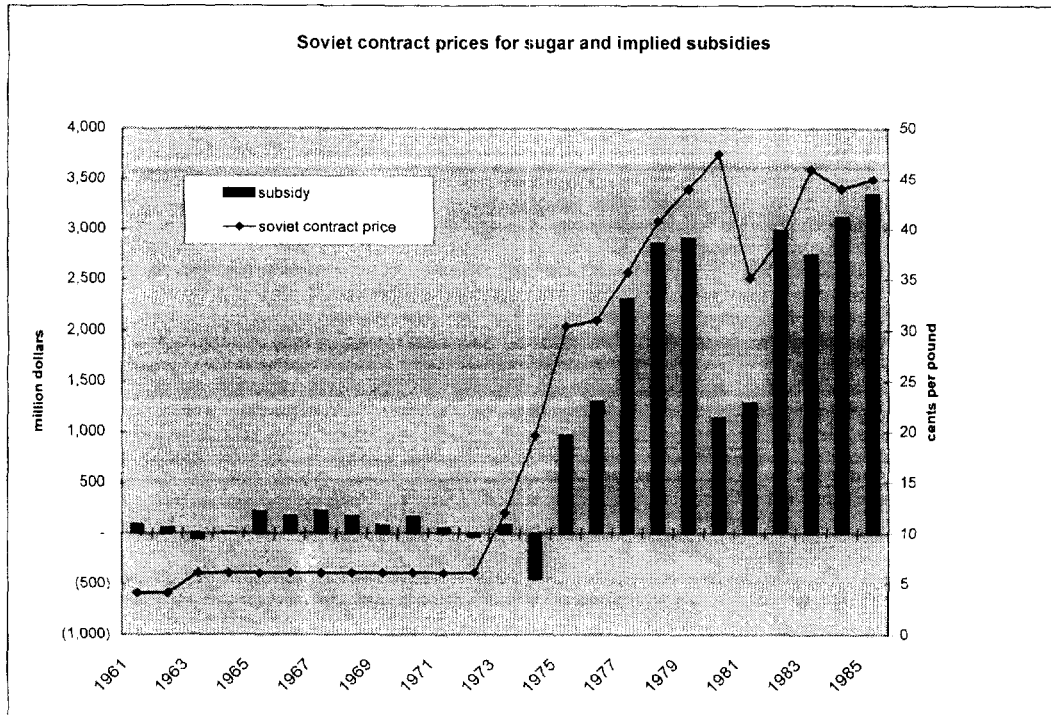
Source: Food and Agriculture Organization

Figure 4.4 Sugar's Average Share of Total Merchandise Exports, Selected Countries 1994-96



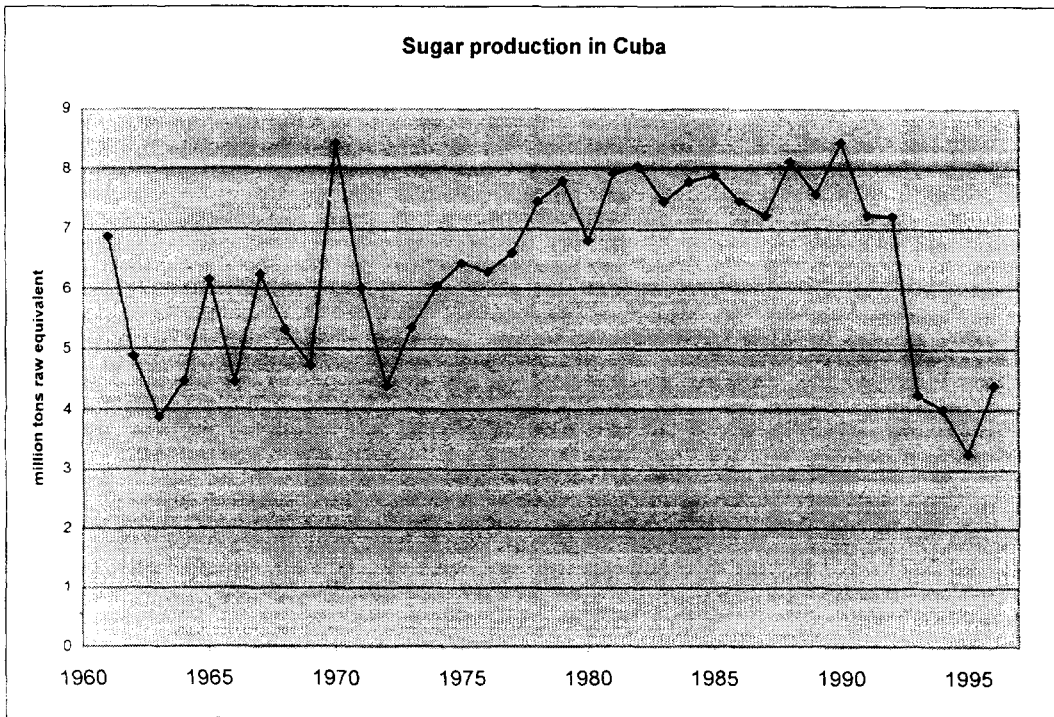
Source: Food and Agriculture Organization.

Figure 4.5 Prices Paid by the Soviet Union for Cuban Sugar



Source: Earley and Westfall (1996.)

Figure 4.6 Production Swings in Cuba, 1960–96



Source: Food and Agriculture Organization.

Table 4.1 Producer and Consumer Subsidy Equivalents for Sugar, 1982–92 (U.S. dollars per metric ton)

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
	<i>Producer subsidy equivalents</i>										
Australia		16	18	20	17	22	19	26	27		
Canada			13	10	5	20	7	8	7	9	9
Chile						150	113	12	106	127	118
Colombia			98	91	88	86	25	-26	-27	-21	-19
Czechoslovakia		-38	-59	-39	-96	-79	-17	-29			
Egypt				-77	-55	-176	-205	-332	-27	-33	55
EC	43	50	89	110	164	181	55	14			
Hungary			34	32	201	141	-40				
Jamaica	-110	-133	-14	28	-21	-31	-72	-94			
Japan	604	713	714	719	986	966	912	748	795		
Kenya	-264	15	-8	97	96	63	63	-9			
Nigeria	-310	-379	-403	-262	-221	73	73	106			
Poland		-132	-39	16	-31	-91	-136	331			
South Africa	-112	59	20	21	51	48	12	-62			
Taiwan	0	178	214	281	292	196	292	396			
United States			241	200	217	183	153	133	178	170	163
USSR					221	248	152	74	73		
Yugoslavia		52	119	139	222	69	-126				
	<i>Consumer subsidy equivalents</i>										
Canada		-25	-24	-23	-22	-23	-24	-22	-20	-18	
China			-452	-335	-216	-180	-319	-264	-137	-226	-150
European Union	-338	-317	-350	-454	-570	-605	-398	-322			
Jamaica	-55	-13	-78	-85	-54	-91	-4	77			
Japan	-611	-521	-546	-523	-709	-831	-719	-491	-589		
Nigeria	323	397	421	269	235	-66	-69	-118			
Poland		-49	-89	-67	-64	-92	-71				
South Africa	70	-125	-47	-66	-53	-68	-99	-17			
South Korea		-642	-575	-427	-393	-406	-461	-256	-268	-306	
Taiwan			-448	-533	-529	-366	-478	-604	-504	-551	-612
United States			-371	-303	-328	-275	-219	-186	-262	-252	-231
USSR					-138	-147	-81	-19	-20		
Yugoslavia		-61	-44	-44	-80	-55	-30				

Source: Earley and Westfall (1996).

Table 4.3 Reductions in Sugar Export Subsidies Pledged during the Uruguay Round

	Base	Reduction	
	'000 tons		%
Brazil	1,714	240	14
China	250	35	14
Colombia	257	36	14
EU	1,619	340	21
Hungary	165	134	81
Mexico	1,500	270	18
Poland	170	68	40
Romania	179	25	14
Slovak Republic	5	1	20
South Africa	890	187	21
Total	6,750	1,336	20

Source: Earley and Westfall (1996)

Table 4.7 U.S. Sugar Quota Allocations, 1996–97

Country	Allocation (tons)
Argentina	87,236
Australia	168,387
Barbados	11,359
Belize	22,198
Bolivia	16,229
Brazil	293,482
Colombia	48,690
Congo (Brazzaville)	7,258
Costa Rica	30,374
Cote d'Ivoire	7,258
Dominican Republic	357,060
Ecuador	22,275
El Salvador	52,747
Fiji	18,258
Gabon	7,258
Guatemala	97,229
Guyana	24,062
Haiti	7,258
Honduras	20,287
India	16,229
Jamaica	21,478
Madagascar	7,252
Malawi	20,287
Mauritius	24,346
Mexico	25,000
Mozambique	26,375
Nicaragua	42,604
Panama	58,833
Papua New Guinea	7,258
Paraguay	7,322
Peru	83,179
Philippines	273,881
South Africa	46,199
St. Christopher-Nevis	7,258
Swaziland	31,981
Taiwan	24,396
Thailand	28,404
Trinidad-Tobago	14,020
Uruguay	7,691
Zimbabwe	24,223
<i>Subtotal raw cane sugar</i>	<i>2,097,121</i>
Mexico (NAFTA)	25,000
Specialty sugars	1,656
Other refined sugars	20,344
Subtotal refined sugars	47,000
Total	2,119,115

Source: USDA

Table 2.2: Results of Selected Studies on Sugar Trade Liberalization.

Authors	Study period	Price effect		Change in price volatility	Scenario
		% change	Cents/lb. US\$ 1990	% change	
Snape (1963)	1959	16	3.04	n.a.	Subsidy through deficiency payments
Valdes and Zietz (1980)	1975-77	6-8	2-3	n.a.	Liberalization by developed countries
Koester and Schmitz (1982)	1975-77	12	4.18	n.a.	EU Liberalization
Roberts and others (1982)	1968-81	7-11	2-3.5	n.a.	EU Liberalization
Matthews (1985)	1981	11	3.31	n.a.	EU Liberalization
Zietz and Valdes (1986)	1979-81	13-29	4-9	n.a.	Multicommodity trade liberalization for 17 industrial countries
Tyers and Anderson (1986)	1987	10%	0.78	-22	Liberalization by East Asia and Western Europe
OECD (1987)	1979-81	1	0.31	n.a.	Ten percent reduction in assistance to OECD sugar producers
Webb, Ronigen and Dixit (1987)	1984	53	4.45	n.a.	Complete trade liberalization, 12 commodities
Huff and Moreddu (1990)	1982-85	25	4.5	n.a.	Multilateral trade liberalization
Martin and others (1990)	1980-83	60	9.1	n.a.	Multilateral trade liberalization
Lord and Barry (1990)	1990	10-30	1-4	n.a.	Multilateral trade liberalization
ABARE (1993)	2000 baseline	5.30	n.a.	n.a.	i-Implementation of Uruguay Round agreement
USDA (1994)	2000 baseline	2-5	n.a.	n.a.	Implementation of Uruguay Round agreement
UNCTAD (1995)	2000 baseline	5	n.a.	n.a.	Implementation of Uruguay Round agreement
Wong, Sturgis and Borrell (1989)	1985-2004 simulation	8	n.a.	-33	OECD price liberalization
Wong, Sturgis and Borrell (1989)	1985-2004 simulation	33	n.a.	-28	Liberalization of EU, Japanese, and U.S. markets

Sources: Borrell and Duncan (1992); Gardner (1993); Harris and Tangerman (1993) UNCTAD (1994); Jabara and Valdès (1993);

Table 4.43: Promised Reductions in Tariff Bindings for Raw Sugar (importing countries)

Country	Ad valorem equivalent ^a	
	1995	2000 (2004)
Algeria	35	n.a.
Canada	C\$24.12/T	8.24
Cyprus	25	25
Egypt	20	20
Finland	n.a.	316
Indonesia	110	95
Iceland	350	175
Japan	337	287
Kenya	100	100
Korea RP	23.7	18
Kuwait	100	100
Macao	100	100
Malaysia	17	15
Mexico	120	96
Morocco	221	168
New Zealand	0	0
Niger	200	200
Nigeria	150	150
Norway	6	2
Pakistan	150	150
Peru		
Romania	200	180
Senegal	30	30
Singapore	27	27
Suriname	20	20
Sweden	132	112
Switzerland	211	184
Tanzania	120	120
Tunisia	190	100
Uganda	80	80
USA	176	151
Uruguay	60	35
Venezuela	50	40
Average (%)	117	98

a. All figures are in percent unless otherwise indicated.

Table 4.5: Promised reductions in Tariff Bindings (exporting countries)

Country	Ad valorem equivalent (%) ^a	
	1995	2000 (2004)
Antigua & Barbuda	100	100
Argentina	35	35
Australia	43	21.6
Austria	38	32
Barbados	160	122
Belize	60	60
Bolivia		
Brazil	85	35
China	100	78
China TW		
Colombia	117	117
Congo	30	30
Core d'Ivoire	15	15
Cuba	40	40
Czech Republic	70	59.9
Ecuador		
El Salvador	92	70
EU	221	176
Fiji	40	40
Gabon	60	60
Guatemala	100	100
Guyana	100	100
Honduras	35	35
Hungary	86	68
India	150	150
Jamaica	100	100
Madagascar	30	30
Mauritius	122 (+17%)	122 (+17%)
Nicaragua	120	100
Paraguay	35	35
Philippines	100	100
Poland	120	96
St. Vincent & Gran.	170	130
South Africa	124	105
Swaziland	124	105
Thailand	104	99
Trinidad	100	100
Turkey	150	135
Ukraine		
Zambia	125	125
Average in %	92	79

a. Figures are percent unless otherwise indicated.

Source: UNCTAD (1997).

Table 4.6 Selected Policy Variables for the Mexican-U.S. Agreement on Sugar Trade.

Year	tariff rates for Mexican sugar exports				Duty-free quota		Mexican tariff rates		Common U.S.- Mexican import duty for Third-party countries	
	Within quota		Above quota		Guaranteed	Potential	for high-fructose corn syrup		Cents per pound	
	Raw	Refined	Raw	Refined	Raw equivalent		percent	NAFTA year		
1994	0	0	15.60	16.53	7,258	25,000	15.0	1	n.a.	n.a.
1995	0	0	15.20	16.11	7,258	25,000	13.5	2	n.a.	n.a.
1996	0	0	14.80	15.69	7,258	25,000	12.0	3	n.a.	n.a.
1997	0	0	14.40	15.26	7,258	25,000	10.5	4	n.a.	n.a.
1998	0	0	14.00	14.84	7,258	25,000	9.0	5	n.a.	n.a.
1999	0	0	13.60	14.42	7,258	25,000	7.5	6	n.a.	n.a.
2000	0	0	12.09	12.81	7,258	250,000	6.0	7	15.36	16.21
2001	0	0	10.58	11.21	7,258	250,000	4.5	8	15.36	16.21
2002	0	0	9.07	9.61	7,258	250,000	3.0	9	15.36	16.21
2003	0	0	7.56	8.01	7,258	250,000	1.5	10	15.36	16.21
2004	0	0	6.04	6.41	7,258	250,000	0.0	11	15.36	16.21
2005	0	0	4.53	4.81	7,258	250,000	0.0	12	15.36	16.21
2006	0	0	3.02	3.20	7,258	250,000	0.0	13	15.36	16.21
2007	0	0	1.51	1.60	7,258	250,000	0.0	14	15.36	16.21
2008	0	0	0.00	0.00	7,258	250,000	0.0	15	15.36	16.21

Table 4.7 Payments Systems for Cane

Country	Basis for sampling & testing		Cane Analysis			Relative payment scheme	Basis of payment ^a	Valuation of Cane ^a
	Individual growers	Average of growers	Direct	Indirect	Extraneous matter			
Argentina		✓		✓	✓		TRS	Negotiated TRS
Australia	✓ ^b			✓	✓	✓	CCS	Variable RS
Colombia: traditional							Weight of cane	Fixed RS
Colombia: new	✓ ^c			✓			TRS	Fixed RS
Fiji				✓			Weight of cane	Fixed RS ^d
India					✓		Weight of cane	Fixed cane price ^e
Jamaica	✓		✓ ^f			✓	TRS	Variable RS
Mauritius	✓ ^g		✓ ^f			✓	TRS	Fixed RS
Mexico		✓					TRS	Fixed RS
Philippines	✓ ^h			✓	✓		TRS	Fixed RS ⁱ
South Africa	✓		✓ ^j	✓	✓		Cane sucrose Content	Fixed RS ^k
Thailand	✓ ^l			✓	✓	✓	CCS	Fixed RS ^m
US: Florida	✓			✓	✓		Cane sucrose Content	Fixed RS
US: Louisiana	✓		✓ ^f	✓	✓		TRS	Fixed RS

- Notes:
- a. TRS = theoretically recoverable sugar; CCS = commercial cane sugar; RS = revenue share.
 - b. Individual samples of first-expressed juice, factory average fiber for particular cane variety.
 - c. Individual samples of first-expressed juice. This system is operating in several mills but not industrywide.
 - d. Fixed each year according to the industry average.
 - e. Fixed in some states regardless of factory recovery, in others determined by factory recovery.
 - f. By core/press method.
 - g. Cane testing for groups of growers when individual cane production is less than 500 mt per season.
 - h. Individual samples of first-expressed juice, factory average fiber.
 - i. Fixed according to the mill's total sugar output.
 - j. Sample taken after cane preparation and before milling.
 - k. From 1994–95 based on proceeds from two pools; from 1998–99 based on a single average sugar price for domestic and export sales.
 - l. Individual samples of first-expressed juice, factory average fiber.
 - m. Fixed at the industry level at 70:30 grower:miller. However, the cane price earned by individual growers takes account of individual CCS.

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