MEXICO

Integration of the North American Market for Sensitive Agricultural Commodities

Policy Notes Overview and Sugar Market - Implications for Mexican Producers and Consumers

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These notes were conceived in an environment where there was some fear that the final phase of opening under NAFTA would create pressure on local producers of corn, beans and sugar. In order to better understand and prepare for such impacts, the Government of Mexico invited the World Bank, together with the Instituto Mexicano para la Competitividad (IMCO), to analyze the potential effects on both producers and consumers of the tariff and quota phase-out on these markets. The study was highly consultative and input was sought from a number of sources including the Ministry of Agriculture (SAGARPA), the Ministry of Public Finance (SHCP), producers and entities from the private sector. The final result is a series of four publications. The first three, in English, include an overview of the policy notes for all three commodities (corn, dry beans and sugar cane) and one full length commodity policy note each. The fourth, in Spanish, gathers the executive summaries of all three policy notes.

Broadly speaking, the notes predicted that in the short term, the phasing out of tariffs and quotas would have very little impact on the trade of corn and beans, since these markets were already largely integrated. For sugar cane, the notes concluded that the industry could become competitive with the help of some policy changes.

In the event, the final elimination of tariffs occurred at a time when global commodity prices were at historically high levels. Although this was partly due to high input costs, it brought high profits for Mexican producers, while provoking a food price crisis among consumers. Both commodity and input prices have since fallen from their peaks in early 2008, but they remain high relative to levels of recent years.
While high prices may have sheltered producers for some time, now, nearly a year after the phase-out of trade barriers, we can say that the impact on producers of corn and beans has gone largely as expected. For sugar, the Government of Mexico has begun to consider policy changes. It is currently proposing to dismantle the reference price for cane, although producers have opposed this measure. At the same time many mills face unsustainable debt levels, a problem which will eventually require further government policy decisions.

Since the messages of the notes relate primarily to how to increase competitiveness and productive efficiency, they remain highly relevant in the current environment. One of the main strategic objectives now is to “make the best of a good situation” by encouraging an efficient supply response to the high prices. In the past few years, growing demand for food within the country has led imports to rise faster than exports. Measures such as increasing the productivity of the land already farmed through the adoption of new technologies and better adjusting crop selection to domestic preferences will enable Mexican producers to satisfy a greater portion of domestic demand, while also taking better advantage of export prospects (for these or other products) in the US market.

In sum, we hope that these notes will serve to focus policymaking on creating the conditions necessary to maximize current market conditions and the opportunities offered by NAFTA.

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The countdown is over. Fourteen years after the North American Free Trade Agreement (NAFTA) was negotiated, remaining tariffs and quotas on U.S. and Canadian exports to Mexico will be history as of January 2008. For three sensitive agricultural products of corn, beans, and sugar, this is not an abrupt end to trade barriers but rather the final stage in a gradual phaseout. Nevertheless, given their important role in Mexican culture and diet, as well as their contribution to the rural economy and employment (Table 1), there is general concern about the impact the NAFTA may have. This study examines the probable effects on Mexican producers and consumers of this final step.

The focus of this study is competitiveness. The analysis considers several dimensions of competitiveness of Mexican producers vis-à-vis their counterparts in the United States, market structure in Mexico and the United States, the impacts of increased import competition on consumers, and most importantly policy options for the government to support producers in responding to increased competition and in taking full advantage of opportunities opened by NAFTA.

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1 This paper synthesizes the main results and conclusions from three individual notes on the markets for corn, beans, and sugar. The work has been carried out at the request of the government of Mexico by the World Bank in collaboration with a team from the Instituto Mexicano para la Competitividad.

2 This study does not focus on poverty, as does much of the World Bank’s work in Mexico and elsewhere, including the 2005 report Income Generation and Social Protection for the Poor, which includes a special section on rural poverty. The ongoing agricultural public expenditure review for Mexico will also include equity concerns as a primary criteria for evaluation of spending programs.
The study analyzed the impact of partially reversing the policies agreed under NAFTA in these products (which is an option being proposed by some in Mexico), finding that this would on balance be quite costly to the Mexican economy. The notes also include estimates of location-specific production costs, aggregated into variable cost or “supply curves” for the nation as a whole, which can assist the government in identifying areas most at risk from competitive pressures from NAFTA or other sources.

The process of preparing these notes was highly consultative and involved numerous discussions with the government (SHCP and SAGARPA) on both technical questions and policy options. It also involved discussions with key stakeholders in some major producing areas, and their views are reflected in the notes.

### Selected Indicators of Employment and Value of Production

<table>
<thead>
<tr>
<th></th>
<th>Agriculture (primary sector)</th>
<th>Corn</th>
<th>Beans</th>
<th>Sugarcane</th>
<th>Sugar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production value, 2004 (billion pesos)</td>
<td>421.74</td>
<td>36.40</td>
<td>6.63</td>
<td>15.99</td>
<td>49.26</td>
</tr>
<tr>
<td>Percent of agricultural GDP</td>
<td>8.63</td>
<td>1.58</td>
<td>3.79</td>
<td>11.60</td>
<td></td>
</tr>
<tr>
<td>Employment / growers c</td>
<td>5,772,000</td>
<td>1,868,950</td>
<td>570,000</td>
<td>165,120</td>
<td>450,000</td>
</tr>
</tbody>
</table>


Note: Data is mainly for 2004, but includes some data for 2006 depending on availability.

- a. Including agriculture, livestock, forestry, hunting, and fishing. The primary sector accounts for 3.5 percent of national GDP, while the agricultural food sector accounts for 8.1 percent.
- b. The secondary sector in corn processing and product manufacture is valued at 195 billion pesos, more than five times the value of primary corn production. It also generates 240,000 jobs (85 percent of which are production of tortillas and nixtamal), which represents almost 60 percent of total employment in the food industry.
- c. Employment in agriculture sector is estimate of actual employment from ENOE 2007 (which accounts for about 13.5 percent of national employment. Data for corn, beans, and sugarcane is number of growers, not actual workers or employees. Number of workers for sugar is SAGARPA estimate of total direct employment in the sugar industry including growers, cane cutters, field workers, transportation, and mill workers (total mill employment is 30,775).

The final phase of implementation of NAFTA will affect each of the three product markets in a somewhat different way. For corn, the study found that the effects will be quite minimal, since the U.S. and Mexican markets have already become virtually fully integrated, as the government has not exercised its option to constrain imports over the course of the last 14 years, and in any case, the nation is self-sufficient in white corn for human consumption. In light of the current very high price of corn in the global markets, recent policy attention has focused more than in the past on consumer issues—avoiding another “tortilla crisis”—but there is still a need to make production and marketing more efficient.

For beans, an import tariff of 11.8 percent is still applied to imports, so when this tariff is eliminated there will be some effect, albeit modest due to the low level of the current rate. The impact will be further attenuated by the segmented nature of the beans market, in which U.S. exporters do not compete in a major market segment, light-colored beans, which accounts for about 48 percent of Mexico's production. But as with corn, there are a number of opportunities to improve competitiveness and even to take advantage of opportunities for niche markets in high-value domestic and export products. Most of the policy issues for corn and beans are quite similar, so they are discussed together in this Overview.
Sugar is probably the most difficult market for which to predict the effect of the final phase of NAFTA. Despite provisions in NAFTA that progressively liberalized bilateral trade in sweeteners beginning in 1994, and in fact did increase that trade, persistent trade conflicts and countermeasures between Mexico and the United States in recent years distorted the trend. However, those issues were largely resolved during 2007—including the end of a controversial tax Mexico placed on soft drinks sweetened with high fructose corn syrup (HFCS). Open bilateral trade in sweeteners between the United States and Mexico will pose additional challenges to the Mexican sugar industry because of its structural problems.

Even so, it is difficult to predict exactly how the end of tariffs will affect trade because (a) the sugar policies in both countries are quite complex; (b) the availability of substitute sweeteners creates linkages with other markets; and (c) both maize and sugar can be used as feeder stock for biofuels. For these reasons, even a seemingly straightforward issue such as the direction of net trade depends on evolving political issues, non-NAFTA trade barriers, commercial and consumer trends, and the impact of emerging biofuel markets. The sugar sector is also challenging from a policy perspective, since many of the reforms that promise the greatest results are also fraught with political and social controversy.

A major objective of the notes was to present policy options to the government. The analysis purposely did not include the major agricultural subsidy programs (e.g., Procampo, Ingreso Objetivo), which have been and are the subject of several other pieces of analytical work, including an ongoing World Bank agricultural public expenditure review. It focused instead on policy options that have a special relevance for these three products, both sectoral policies and policies that are important for these products but are not normally considered “agricultural.”

The benefits from taking action in many of these areas would extend to producers and consumers of other products as well, in some cases beyond agriculture. For such issues, it is beyond the purview of this study to undertake an in-depth analysis, but the notes attempt to lay out the issues and propose some options to be explored.

**Crosscutting Policy Issues for Corn and Beans**

**High transportation costs**

Obstacles to efficient and cost-effective transportation of corn and beans, both from production areas to markets and between different markets, increase consumer prices, decrease competitiveness of Mexican producers in markets to which U.S. producers have rail access, create excessive regional variation in prices, and prevent low-cost producers from competing in more distant consumption centers (including U.S. markets). The policy recommendations in the report regarding transport (which are explained in more detail at IMCO’s website, www.imco.org.mx) address three main problems: (a) lack of competition and the high transport costs of trucks, (b) limited use of the railroad system and problems among private rail companies, and (c) inefficiency at customs and port facilities in border areas. The notes suggest some options for both institutional reforms and public investment programs. Transport issues specific to the sugar industry are discussed later, in the product-specific policy options.

Recommendations for addressing lack of competition and high trucking costs involve (a) promoting competition in the sector, (b) renovating the cargo fleet, and (c) improving market information. The most important recommendations concerning the second
problem, rail transport issues, are to (a) create “last-mile services,” meaning the building of last mile railroad infrastructure to connect main railways to ports, warehouses, and other key locations to avoid intermediate transportation, (b) find reciprocal mechanisms to avoid disagreements between railway companies, and (c) publish tariffs for different cargos and volumes. Recommendations for the third issue, customs and port inefficiencies, involve (a) reducing paperwork, (b) improving inspection facilities and procedures, (c) better coordinating the work of different authorities in this area, and (d) improving intermodal facilities throughout Mexico.

It should be recognized that while reducing transport costs improves overall competitiveness, it could lead to price reductions in grain-deficit areas, with potential adverse effects on producers in these areas. The information on regional production costs in these notes may help to identify those areas that are both high-cost and deficit areas, which may be targeted for attention. Potential losses would of course need to be quantified to see if they are sufficient to justify intervention.

Lower barriers to imports from outside NAFTA

Under normal circumstances the United States is the lowest cost source of corn and beans imports for Mexico, implying that the risk of serious “trade diversion” from the NAFTA is low in these products. Nevertheless, the uncertain effects of ethanol demand, HFCS production, market speculation, crop shortfalls, and other factors can lead to spikes in the price of corn and tortillas that have a particularly high impact on the poor. In response to the “tortilla crisis” in early 2007, the government signed an agreement with corn producers and traders to set a maximum agreed price for tortillas and allowed more imports from non-NAFTA countries, in this case South Africa. But these sorts of ad hoc actions in response to crisis do not constitute a viable long-term policy.

One strategic option to minimize this problem in the future would be to reduce trade barriers that currently discourage the development of diversified sources of supply. (The option is probably most relevant for corn, but similar arguments would support action for beans as well.) Argentina, for example, is a very low-cost producer and major world market exporter of mainly yellow corn. Some production in that country could be switched to white corn if Mexico were an attractive market, but imports from Argentina are currently subject to a tariff of 194 percent, making them uncompetitive. Lowering this tariff or at least creating a tariff-rate quota would allow importers to buy from this source when terms are more attractive than imports from the United States and Canada. But other more comprehensive options for reducing barriers in this market might be even more effective.

The following actions would be ways in which the government could lower barriers to diversification of supplies, listed in decreasing order of potential benefits:

- Permanently remove non-tariff barriers and eliminate tariffs on an MFN basis for imports from all countries.
- Permanently remove non-tariff barriers and eliminate tariffs for imports from select countries (e.g., only Argentina and/or South Africa)
- Permanently open a low- or no-tariff quota for imports from select countries
- Have a contingency plan in place to quickly take one of the above actions in case of price spikes in the U.S. market.
The permanent actions would introduce more certainty and allow better planning by private sector importers and users of corn, and the more comprehensive options would allow more diversification opportunities.

Weaknesses in the warehousing system

Warehouses have two roles: (a) assisting farmers in managing their production and sales and (b) facilitating access to credit. Currently, Mexican suppliers are constrained by a cash payment system while U.S. suppliers have access to financing mechanisms that allow them to use inventories as collateral, thereby deferring payments, and offering more attractive terms to buyers.

A key policy option recommended by this report is consideration of a new law on rural warehouses. SAGARPA in 2004 proposed a comprehensive reform of the system for licensing and regulating warehouses but the reforms still have not been passed into law. The options proposed need to be further explored with the goal of (a) lowering barriers to market entry to allow more competition, (b) creating a transparent public information system on prices and inventories, and (c) allowing the issuance of negotiable, endorsable warehouse receipts as a financial mechanism for stored commodities. At the same time the law should preserve supervision that ensures the integrity of financial instruments issued by warehouses, a role currently performed by the Comision Nacional de Bancos y Valores.

A possible model for reforms is the “reportos” system in the sugar sector, which allows producers to repurchase the receipt of their inventory at a certain time, paying a premium to the buyer for holding the receipt. Mechanisms related to storage markets that have proved successful in other countries should also be considered, such as the Cedula de Productos Rurales (CPR) in Brazil, which is a bond issued by rural producers, farmers associations, and cooperatives to obtain financing for production.

Technology and biotechnology

A major factor affecting the competitiveness of Mexican producers is that yields in Mexico are low relative to those in the United States. Increasing yields will require improved technology in general and especially the incorporation of biotechnology. Some problems that have impeded the more widespread adoption of improved seeds are addressed by the new Law for Seed Production, Certification and Commerce, which was approved in April 2007. Other options to promote the use of improved bean seed varieties in Mexico are:

- Promote public-private partnerships (for example with INIFAP) to develop technologies tailored for Mexican varieties and regions, and for tapping into niche markets.
- Make agricultural public research institutions fully autonomous, with independent governing boards that include private and producer organizations. This could help increase funding from producer organizations both for research and development and for seed distribution.
- Conduct a strong information and training campaign to familiarize farmers and agribusiness owners with the purpose and use of new technology.

In addition, technology transfer could be promoted by modification of some of the rules of Alianza Contigo to:

- Improve incentives for private providers of technical services, as these are the weakest link in the implementation chain. They are
recruited on short-term contracts, have no entitlement to secure employment and receive few economic or moral incentives to do a good job.

- Change the project selection process so that funding decisions are based on quality and cost-efficiency instead of on a first-come, first-served basis and completeness-of-documentation.

Non-GMO technology may have higher potential for improving the productivity of many Mexican producers than GMOs. But many of the policy issues that in the past have presented obstacles to development of this market have been resolved by the passage of the new seed law. Policy-making attention needs now to be focused on policy towards GMOs. While acknowledging that in the case of GMOs, it is necessary to first put in place a regulatory framework that includes appropriate safeguards against the well-known risks, we argue that high priority should be placed on putting in place and making operational the regulatory process required to introduce GMOs. In particular, it would be helpful to reduce the very long lead times currently required to take genetically modified varieties through biosafety protocols and develop and distribute adapted transgenic varieties to market.

Taking advantage of economies of scale

One of the main characteristics of both corn and bean production in Mexico is its high degree of land fragmentation, owing, inter alia, to a long history of rigidities in the land market. More than 85 percent of corn farmers have landholdings smaller than five hectares and about 57 percent are smaller than two hectares. Since most producers have small landholdings and market their own crops, it is difficult for them to gain access to credit and improved production technology and to integrate into the supply chain. A fluid land market should in principle encourage efficient consolidation, but even the constitutional reforms of 1992 have had only a small degree of success in developing this market.

Although there is little analysis of the effect of increasing the size of landholding on cost of production in Mexico, a FIRA analysis of a pilot program for wheat producers in Sonora found that increasing mean landholding in irrigated areas from 2.4 to 7 hectares resulted in average cost savings of 17 percent, with economies of scale particularly high in preparation of land and control of invasives and pests.³

Apart from physically consolidating landholdings, a good starting point to help producers take advantage of scale economies is to foster producers associations that can gain better access to credit, information, and agricultural contracts. Associations of bean producers are relatively new and quite small, and many of them are more closely related to political groups than to concerns about efficiency.

To facilitate the organization and work of associations truly oriented toward member services, the Agricultural Cooperatives and Associations Organization Law (Ley para la Organización de Cooperativas y de Asociaciones Agrícolas) needs to be reviewed with an eye toward reducing red tape and loosening requirements that currently make it difficult for producers to create new associations. A draft reform of this law, which was proposed in the upper house in 2002, seeks a democratization of agricultural organizations and a more crucial role in agricultural policy and practices. It also promotes integration of supply chains to encourage investment and reduce risk for individual producers. This proposal was dismissed by the Senate's Rural Development

³ FIRA, Proyecto de compactación de Tierras para la producción de Trigo en el valle del yaqui, Tetabiate empresa social, s.p.r. de r.l, 2005
Commission without being discussed at the plenary session, and no further reforms have been promoted since then.

Reconversion

In some of the most inefficient corn and bean growing areas, reconversion to more productive crops is probably the best medium term option for many farmers. This is a complicated task, particularly in the case of subsistence agriculture, and specific recommendations are beyond the scope of this note. But when the government designs reconversion programs, the notes recommend beginning with an analysis of “economic densities”—the return obtained per hectare from different uses—as a first step, rather than only considering agro-climatic suitability, as has sometimes been the case in the past.

Because crop reconversion requires considerable amounts of investment, technical assistance, and market information, a successful reconversion plan must be based on a cost-benefit analysis that includes a register of arable land, its current use, environmental constraints, access to markets, and possible alternative land uses considering soil, rainfall, geography, technology, land tenure, demographics, and prices. These factors need to be considered in the future for all government programs to support reconversion, even if only in the form of extension advice and services.

Technology has also played an important role in reconversion, including the use of improved seeds, more resistant crops, and greenhouses, which have had a number of very successful outcomes for both producers and workers. Future research and government sponsored programs directed towards reconverting land should include a technological component.

Improving market intelligence

Integration of the North American market creates new opportunities for producers, especially in selling unique and high-value products to the Hispanic population of the United States. Mexico has tapped very little of its competitive advantage in niche markets such as blue corn, red corn, cuitlacoche (corn fungus), specialty foods such as dried tortillas and tostadas, and packaged or processed bean products. (Some important Mexican agroindustrial firms are planning on opening bean canning plants in the United States.)

But to seize such market opportunities producers need more information about consumer preferences and habits as well as knowledge on how to meet consumer demands, position a product in the global market, manage resources, minimize costs, maximize profits, and use new information technology to support efficient decisionmaking. While trying to document and find figures on niche markets for processed beans, we found that neither the Ministry of Agriculture nor FIRA has such information, either for Mexico or for the United States, nor do they systematically provide information on corn niche markets.

Market information has some characteristics of a public good, but in well-developed markets considerable information and training may be provided to producers by firms farther along in the supply chain. However, it is important to improve the public market intelligence system to provide such information and skills for small agricultural producers and agribusinesses that currently are not well integrated into supply chains. A good model for such a system is Fundación Chile, which works with both the private and public sector in Chile to develop

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4 There are two basic reasons for this: low quality of Mexican beans and cheaper transport costs to serve the Hispanic population in the United States. Both of these constraints are addressed in other recommendations in this report.
and expand foreign markets for small-scale producers.

Planning for climate change

Long-term policy-making in all agricultural markets will have to cope with many uncertainties, foremost among them the specter of climate change. Mexico may suffer especially from reduction in water availability, with serious consequences for its agricultural production overall. The implications of this for competitiveness in the NAFTA market are not clear, however, since some of the most productive areas of the United States are also expected to suffer, and the impact on global markets is just beginning to be explored. Given the huge uncertainties involved in all of these forecasts, the most prudent path for the government is probably to establish early on a consultative process with stakeholders to monitor and review the evidence on the impacts of climate change in order to stay abreast of the most recent developments and start to build early consensus on necessary policy actions and investments.

Water policy

Even though irrigated areas have much higher yields and lower financial production costs, the true social costs of production are much higher than the financial costs, given the high economic value of water in Mexico. Promotion of efficient water use is urgently needed to help avoid future water scarcity problems, particularly in the face of increasing urbanization and the effects of climate change.

Water allocation and pricing policy is a critical area for review since (a) it currently does not capture the environmental, economic, or social costs of this resource nor balance demand from agriculture with that of other sectors and (b) it is critical to both the sustainability of production and the competitiveness of producers. Appropriate pricing of water is necessary to encourage production of crops which have the greatest value added for society as a whole, which may in some cases mean encouraging producers to switch from growing low-value crops like maize or beans to growing higher value crops. Thus, appropriate pricing of water would support the reconversion effort.

The World Bank and the Mexican government have amassed a large body of analysis on options for reform in the water sector; what is needed now is an action plan. A full discussion of this topic goes far beyond the purview of this study, but in broad terms there are a number of options for placing an economic value on water. One is for the public sector to charge an appropriate price for water that comes from public investments (dams and large irrigation projects). But other options—such as the assignment (without charge to the recipient) of tradable water rights—also effectively put a price on water and encourage its conservation and efficient use, while not imposing any cost on the initial water users. In any case, a good first step is to phase out current implicit subsidies on electricity use for pumping (Tarifa 9) that encourage over-use of water.

Policy Issues in the Sugar Sector

Because of the nature of the industry and its historical importance in the economy, the government has continued to play a larger role in this sector than in most other product markets. Although most decisions regarding production, trade, and investment are made by the private sector, the government can influence outcomes by (a) modifying existing laws and regulations, (b) conditioning the sale of mills remaining under government management,
(c) conditioning the terms of debt held by the government, and (d) most importantly, using its convening power to draw on expert opinion and form consensus among stakeholders. A common element of many recommendations is the need for stakeholders at different stages of the production cycle to collaborate better in working out transparent solutions that improve the entire value chain and increase trust, predictability, and earnings rather than merely competing over how to divide profits.

Support industry restructuring

While the investments needed to restructure mills and reduce overstaffing should come from the private sector, the government could encourage this through its convening authority and helping to mitigate the burden of adjustments on local communities and smallholder growers through appropriate investments and social safety net programs.

Lower energy expenses

The government could encourage the use of bagasse to generate electricity by removing barriers that currently limit the ability of mills to sell electricity to the Federal Electricity Commission (CFE) or other industries. In addition, reconsideration of CFE’s formula for pricing the electricity it buys from mills could support development of this market for alternative energy.

Transportation

The sugar industry could also benefit from the kinds of general improvements to the transportation system discussed above in relation to the corn and beans markets. But in addition, this industry suffers from the problem of elevated costs and congestion caused by a lack of coordination in transporting cane to the mills. The government could work with the industry to improve roads and coordinate transportation to eliminate redundant vehicles, improve efficiency, and reduce both delivery delays and crowding of deliveries at the mills.

Technology and improved varieties

The government and the industry could work in partnership to upgrade research and extension services related to development and diffusion of improved sugarcane varieties targeted to specific regions and growing conditions. This could increase yields in both the fields and the mills.

Plot size and fragmentation

The government could encourage growers and millers to work together in a way that takes advantage of economies of scale, either by consolidating landholdings of sugarcane growers into larger, more efficient plots, or by creating mechanisms through which growers with small plots can better coordinate their activities to increase mechanization and efficiency.

Pricing cane

The government could work with the industry to explore technologies and management procedures that directly link the quality of cane delivered to the mill with revenue received by the individual grower.
Revenue sharing

Working with industry, the government could explore alternative, transparent ways to share revenue based on the true value of the sugar and to create sharing rules that reward industry participants for improvements in field and mill efficiencies.

Vertical integration

The Mexican sugar sector would be more competitive if it were organized more in line with the prevailing model elsewhere in the world. This would require (a) modifying Mexican law to allow mills greater freedom to own land and produce their own sugarcane and (b) creating mechanisms through which growers and mills can form partnerships that improve their efficiency and link their incentives for achieving common goals.

Government ownership

In the government’s efforts to complete the privatization of government-managed mills it might reconsider some practices which did not lead to long-term solutions in the past, such as selling mills on a highly leveraged basis or in bundles. In deciding whether to close down or privatize each mill, a key decision parameter will be whether the mill will have the financial wherewithal to comply with environmental norms as well as meet its other obligations.

Costs and Benefits of Policy Options

Ideally, options for policy reform would be obvious, fast, easy, low-cost, high-impact, and face low political resistance. Realistically, of course, we have to recognize that most such options—when they ever existed at all—have been previously exercised. In making well-informed decisions going forward, the government will need to weigh the trade-offs among these various criteria. This study has tried to identify and highlight some of the most critical areas in which appropriate policy actions can enhance competitiveness of producers of these three products and improve aggregate welfare. The table below summarizes how we believe some of these options rank with respect to the criteria mentioned above, with the exception of political feasibility, which is a judgment that policy-makers themselves are best positioned to make. However, having said that, it would appear that some of the options are not likely to encounter great political opposition and at the same time promise significant benefits, with modest technical requirements and fiscal costs. While other more controversial actions (on GMOs, for example) may promise greater benefits in the longer term, these may be areas that the government could target for quick action. A list of these “low-hanging fruit” could include:

- Revising rules and regulations in the transport sector
- Passing a law on warehouses
- Investments in research to improve production technology
- Improving the environment for technology transfer by amending the rules of Alianza Contigo
- Passing a law on Agricultural Cooperatives and Associations Organization (Ley para la Organización de Cooperativas y de Asociaciones Agrícolas)
- Improving the market intelligence system
- In the sugar sector, convening a high-level stakeholder panel to consider reform options for the sector
### Summary Matrix of Policy Options

<table>
<thead>
<tr>
<th>Policy option</th>
<th>Time horizon</th>
<th>Likely impact</th>
<th>Technical difficulty/risks</th>
<th>Fiscal cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Implementation</td>
<td>Effects</td>
<td></td>
<td></td>
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<tr>
<td>Crosscutting</td>
<td></td>
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<tr>
<td>Transport</td>
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<tr>
<td>Regulations</td>
<td>S</td>
<td>M/L</td>
<td>H</td>
<td>M</td>
</tr>
<tr>
<td>Investments</td>
<td>L</td>
<td>M/L</td>
<td>H</td>
<td>M</td>
</tr>
<tr>
<td>Warehousing</td>
<td>S</td>
<td>M/L</td>
<td>M</td>
<td>L/M</td>
</tr>
<tr>
<td>Technology, general</td>
<td>M</td>
<td>M/L</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>Biotechnology</td>
<td>S</td>
<td>M/L</td>
<td>H</td>
<td>M/H</td>
</tr>
<tr>
<td>Scale economies&lt;sup&gt;a&lt;/sup&gt;</td>
<td>S/ M</td>
<td>M/L</td>
<td>M</td>
<td>L</td>
</tr>
<tr>
<td>Reconversion</td>
<td>M/L</td>
<td>L</td>
<td>M</td>
<td>M/H</td>
</tr>
<tr>
<td>Market intelligence</td>
<td>M</td>
<td>M/L</td>
<td>M</td>
<td>L</td>
</tr>
<tr>
<td>Lower trade barriers</td>
<td>S</td>
<td>S/M</td>
<td>L/M</td>
<td>L</td>
</tr>
<tr>
<td>Sugar industry</td>
<td></td>
<td></td>
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<tr>
<td>Sugar restructuring</td>
<td>M/L</td>
<td>M/L</td>
<td>H</td>
<td>M</td>
</tr>
<tr>
<td>Lowering energy costs</td>
<td>S/M</td>
<td>M/L</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>Transport</td>
<td>S</td>
<td>S/M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>Technology</td>
<td>M/L</td>
<td>L</td>
<td>H</td>
<td>M</td>
</tr>
<tr>
<td>Fragmentation</td>
<td>M</td>
<td>M/L</td>
<td>M</td>
<td>L</td>
</tr>
<tr>
<td>Pricing cane</td>
<td>S</td>
<td>M/L</td>
<td>H</td>
<td>M</td>
</tr>
<tr>
<td>Revenue sharing</td>
<td>S</td>
<td>M/L</td>
<td>H</td>
<td>M</td>
</tr>
<tr>
<td>Vertical integration</td>
<td>M</td>
<td>M/L</td>
<td>H</td>
<td>M</td>
</tr>
<tr>
<td>Design of privatization</td>
<td>S</td>
<td>M/L</td>
<td>M</td>
<td>L</td>
</tr>
</tbody>
</table>

**Implementation term:** Short (< 2 years), generally associated with changes in laws or regulations; Moderate (2–5 years), requiring some institutional changes; Long (> 5 years).

**Effects term:** Short (< 2 years); Moderate (2–5 years); Long (> 5 years).

**Impact:** High, medium, low (relative to other policy options proposed in these notes, not relative to other more general reform options).

**Technical difficulty/risks of undertaking the options suggested:** High, moderate, low.

**Fiscal cost to government:** High (large public investment programs), moderate (some public program expenditure required), low (little or no public expenditure).

<sup>a</sup> Scale economies through encouraging cooperatives.
INTEGRATION OF THE NORTH AMERICAN SUGAR MARKET: IMPLICATIONS FOR MEXICAN PRODUCERS AND CONSUMERS

EXECUTIVE SUMMARY

In 2008 the phaseout of sugar tariffs and quotas between Mexico and the United States1 under NAFTA will be complete. Despite provisions in NAFTA that progressively liberalized bilateral trade in sweeteners beginning in 1994, and in fact did increase that trade, persistent conflicts and countermeasures between Mexico and the United States in recent years distorted the trend. While those issues were largely resolved during 2007, including the end of a controversial tax Mexico placed on soft drinks sweetened with high fructose corn syrup (HFCS), the completion of the phase-out on January 1, 2008 should effectively remove remaining trade barriers.

Open bilateral trade in sweeteners between the United States and Mexico will pose additional challenges to the Mexican sugar industry. Even so, because of the complex sugar policies in both countries and the availability of substitute sweeteners, mainly high fructose corn syrup (HFCS), it is difficult to predict exactly how the end of tariffs will affect trade. This is particularly so because both maize and sugar can be used as feeder stock for biofuels. For these reasons, even a seemingly straightforward issue such as the direction of net trade depends on evolving political issues, non-NAFTA trade barriers, commercial and consumer trends, and the impact of emerging biofuel markets.

1 As the major effects on Mexico will be felt from the changes in trade relations with the United States rather than those with Canada, this note will refer only to the former.
Protectionist Policy Tradition

The sugar industry in both countries has benefited from decades of government programs to support domestic sugar producers and protect them from world markets. Under NAFTA, the trade policies of both countries have been harmonized, resulting in high and equivalent rates of protection against imports from non-NAFTA countries. These policies have mainly been driven by the interests of producers, resulting in consumer prices that typically are at least twice as high as the world price. Conservatively, current policies transfer nearly US$1 billion from Mexican consumers to the industry, compared to a policy of complete openness to imports at world market prices.

At current levels of productivity, few producers in either the United States or Mexico could survive without continuing barriers to non-NAFTA imports. In this regard it should be emphasized that the analysis and recommendations in this note are based on the presumption that Mexico and the United States will continue their policy of significantly protecting domestic producers of caloric sweeteners. This leaves open underlying issues about the benefits and sustainability of current policy objectives.

Sugar policy in the United States during the past few decades took the form of prohibitively high tariffs on imports, limited country quotas for low-tariff imports, and loans to producers that could be paid back in sugar if the market price was too low. In Mexico there have been recurring cycles of government intervention driven by often competing political, social, and economic goals. This has included both expropriation and privatization, price controls that favored consumers and production cartels that favored producers, credit programs, barriers to imported sugar, and various other government interventions on behalf of the often conflicting interests of mill owners, mill workers, and sugar cane growers. Even so, one of the most significant consequences of NAFTA has been the harmonization of U.S. and Mexican sweetener policies and the codification of a shared trade policy.

Issues for Mexico

From the Mexican standpoint the greatest concerns related to open trade with the United States are (a) high production costs and inefficiencies that could put the industry at a competitive disadvantage, (b) the likelihood of substantial increases in HFCS imports and the impact that will have on sugar, (c) quality and characteristics of Mexican sugar, especially estandar grade sugar, that may limit its penetration in the U.S. market, (d) unknowns regarding consumption trends in Mexico under more open markets, and (e) the social and political ramifications of either failing to reform the sugar industry or restructuring it to be more competitive.

Ensuring the competitiveness of the Mexican sugar industry will require political reforms, targeted investments, and reorganization of key aspects throughout the production chain. Some goals can be accomplished simply through investment, retooling, and better coordination. But others, including some that could produce the greatest gains, are also fraught with political and social controversy over landownership patterns, agricultural traditions, peasant and labor rights, globalization, and the structure of agrarian capitalism in Mexico. Moving forward, the government's ability to forge a common strategy among diverse and sometimes competing stakeholders is essential to the creation of a sustainable sugar industry.
Purpose of the Note

The World Bank undertook this study at the request of the Government of Mexico to analyze the implications of the final phaseout of tariffs and to develop recommendations for public policies aimed at strengthening the sugar industry and improving its sustainability. The study focused on six main tasks:

1. Explore the implications of opening Mexican markets to HFCS, U.S. sugar, and possibly to a more limited degree third-country sugar.

2. Review options for revising the structure and industrial organization of the sugar sector to reduce production costs (both to increase competitiveness and benefit consumers).

3. Investigate options for reforming for government regulations and policy in the sugar industry to support the outcomes mentioned in point 2 and to avoid the recurring interventions that have characterized the sector in the past.

4. Explore options for productive diversification in the sugar industry, such as generating electricity by burning organic waste products, biofuel production, and the sale of carbon of sets.

5. Analyze the impact of the current regulatory environment and possible outcomes from the debate over the controversial Cane Law.

6. Identify mills and production areas that may be most vulnerable to increased competition.

Background

Production structure. Sugar is one of the most critical agricultural industries in Mexico. According to the Ministry of Agriculture (SAGARPA), Mexican produces more than $3 billion worth of cane sugar per year, accounting for 11.6 percent of the total value of primary commodities. The sector’s 164,000 cane growers and 57 mills generate more than 450,000 jobs and direct benefits for more than 2 million people. The sugar industry is the principal economic activity in many of the 227 municipalities where sugarcane is produced and processed. While cane is grown in 15 of Mexico’s 31 states, nearly half the country’s total production is concentrated along the central coast of the Gulf of Mexico, mainly in the state of Veracruz. The Gulf region, the Northeast, and the central Pacific coast combined account for more than 80 percent of total production.

Growers are mostly small landholders, many of whom belong to collective ejidos. More than 57 percent of growers have plots smaller than 3 hectares, only 2 percent are larger than 15 hectares, and the average size is just under 4 hectares. By contrast, the United States produces about 55 percent as much cane as Mexico but in 2002 had only 953 sugarcane farms and an average farm size of about 415 hectares. Most mills are privately owned (37 belong to 11 ownership groups and 7 are independent) and they are restricted by law from directly owning or controlling large cane growing areas, although some have found ways around these restrictions. After recurring cycles of expropriation and privatization, 13 mills, representing about one-quarter of sugar production, are currently government owned.

The Mexican sugar industry has little vertical integration of ownership and a sugarcane pricing structure that creates competition for profits between growers and mills (rather than collaboration to increase the value of production), distorts incentives to improve efficiency, and fails to allocate capital where it is most needed. Another distinct feature of the Mexican industry is that both cane crushing and sugar refining are done at the same mill. In contrast, in many other large producing countries, refining is done at separate facilities.
located near transport hubs rather than in growing areas. Mexico is also unique in that 60–65 percent of its sugar production is a type called “estandar,” which is a higher grade than raw sugar but less processed than refined sugar.

Sugarcane pricing is set by a complex national law and terms of employment in mills are similarly set by a standard national contract. This constrains the ability of the sector to respond to market incentives and adjust its cost structure and production practices. While the abrogation of the Cane Decree and passage of a new Cane Law in 2005 in theory opened the industry to nonuniform contracts, in practice both sugarcane and mill employment continue to conform to a single national standard for legal, political, and economic reasons.

Yields. Average sugarcane yields in Mexico are comparable to those in Brazil and the United States, somewhat below Australia and Guatemala, and higher than India and Thailand. Sugar yield per hectare tends to vary more, but generally speaking follows the same patterns between countries. Cane yields vary a great deal from one area to another, with higher yields, both within Mexico and internationally, tending to coincide with greater use of irrigation, mechanization, and other technological inputs. In addition, the sugar content of cane and yield of sugar extracted depend on timing of harvest and elapsed time between harvest and crushing.

Production costs. While cane yields are important, other factors affecting production costs are more promising for increasing competitiveness of Mexican production. Mexico’s costs are much higher than in almost all other countries except the United States. This is due to a range of factors that will be discussed later, including pricing policies, labor laws, mill size and structure, fragmentation of landholding, energy use, and transport costs.

Mexico and the international sugar market. Mexico is the world’s fifth largest producer of sugarcane but is dwarfed by Brazil, which accounts for about one-third of world production. Sugarcane supplies about 69 percent of world sweetener production, sugarbeets account for 23 percent (leading producers of beet sugar include the United States, Russia, Ukraine, Canada, and the European Union), and corn fructose about 8 percent (more than 70 percent of which is produced by the United States). About 93-94 percent of Mexican sweetener production is from cane and is protected from international market competition by trade barriers. HFCS accounts for the other 6-7 percent of Mexican sweeteners.

Because of its high production costs Mexico’s only profitable export market for sugar is the United States, which also has a policy of protecting its domestic producers. The two emerging issues that could most affect sugar markets, even with the context of the protected U.S.–Mexico sugar market, are HFCS consumption and ethanol production. Mexico has a small but growing HFCS industry, and with the opening of unrestricted trade with the United States, the world’s dominant producer or HFCS, some displacement of sugar is expected, particularly in the beverage industry.

Ethanol production could affect sugar both directly by creating an alternative market for sugarcane to make ethanol as well as by driving up the price of corn and diverting it toward ethanol production rather than HFCS. Unlike Brazil, where large quantities of cane are used to produce ethanol, almost all Mexican cane goes into sugar production. However, the government’s development program for the sugar sector includes plans to produce as much as 6.5 million tons of sugarcane ethanol by 2012.
Prices, costs, and competitiveness with U.S. producers. The main concern for producers in both the United States and Mexico is whether they will be able to compete in an integrated sweetener market. Historically prices have been more volatile in Mexico, largely because it lacked the carefully calibrated tariff rate quota system used in the United States to adjust imports of sugar to meet specific price targets. These targets are linked to the government’s loan program for sugar processors under which borrowers can forfeit sugar stocks to the government in lieu of repaying the loan. The target price is intended to be high enough to avoid such forfeitures so that the program has little fiscal impact for the government.

With the integration of the U.S. and Mexican sugar markets, prices in the two countries are expected to converge and volatility, particularly in Mexico, to be reduced. While data from Mexico’s government sugar commission, COAAZUCAR, shows that Mexico has regularly been a net exporter in recent years, conflicting incentives under NAFTA to demonstrate exportable sugar production clouds that picture somewhat. In any case, the analysis in the policy note shows that most Mexican producers can compete at current U.S. and Mexican domestic prices. Yet costs in the Mexican industry are still unnecessarily high and there is substantial room for greater efficiency both in the field (consolidation of farms, reducing transport costs, improved varieties, more rationale capital investments) and the mills (reducing labor costs, generating and using energy from bagasse, reducing downtime, and sharing risks with growers).

Another issue is that much Mexican sugar does not meet U.S. quality standards for color, polarity, and purity. While color and polarity are relatively inexpensive to improve, improving purity (largely reducing the iron content) is an expensive proposition that involves extensive replacement of mill machinery. Nevertheless, U.S. domestic producers seem highly concerned about competition from Mexico, and their fears could be well founded, particularly if Mexico is able to achieve its ambitious targets for expanding production, reducing costs, and improving efficiency in the sugar industry. If Mexican exports to the United States increase substantially, it could be very disruptive to the U.S. TRQ system and other policies designed to protect domestic producers.

Findings and Policy Options

As the NAFTA transition period ends, the Mexican sugar industry will face the competition and opportunities afforded by a larger integrated U.S. and Mexican sweetener market. And although most decisions regarding production, trade, and investment are made by the private sector, the government can influence outcomes by (a) modifying existing laws and regulations, (b) conditioning the sale of mills remaining under government management, (c) conditioning the terms of debt held by the government, and (d) most importantly, using its convening power to draw on expert opinion and form consensus among stakeholders. A common element of many recommendations is the need for stakeholders at different stages of the production cycle to collaborate in working out transparent solutions that improve the entire value chain and increase trust, predictability, and earnings. Moreover, if the industry is successful in achieving consensus on a common vision, it may be useful for the government to provide financial support to programs that ease the costs of restructuring. The main findings of the study are in the areas of:

1. **Mill size and structure.** There is a need for restructuring the industry to increase its efficiency of operation. Possible actions include increasing the production capacity and sugar recovery rate of existing mills,
closing mills that are too small or inefficient to be profitable, and consolidating production in larger, more efficient ones. The government could help to mitigate the burden of such adjustments on local communities and smallholder growers through appropriate investments and social safety net programs.

2. **Labor force.** Labor represents 45 percent of the processing costs at mills. A 2003 study found that current laws increase costs by an estimated 193 pesos per ton for a “typical” mill (on the order of 3-5 percent of production costs) and more importantly restrict the industry’s flexibility to respond to changing conditions. Flexibility in future agreements is likely key, as modernization takes place. As part of an overall strategy, the government could work with industry stakeholders to reform labor laws in equitable ways to improve sugar mill productivity. Safety nets and severance payments could facilitate any necessary reductions in labor force.

3. **Energy.** Energy represents around 14 percent of processing costs. There is significant potential for mills to make more efficient use of plant waste to generate energy and thereby lower their costs and even generate revenues from the sale of excess power. This can be encouraged by removing barriers that currently limit the ability of mills to sell electricity to the Federal Electricity Commission (CFE) or other industries. In particular, the Energy Regulatory Commission (CRE) should consider classifying sugarcane as a renewable energy source to help facilitate such electricity generation. Doing so also opens the door for greater revenue through the sale of carbon of sets under the Kyoto Protocol and similar voluntary programs. Reconsideration of CFE’s pricing formula for electricity it buys from mills could support development of this market for alternative energy.

4. **Transportation.** The industry’s cost structure is raised by shortcomings in the infrastructure for transporting cane to the mills and by an over-sized fleet of transport vehicles. The government could work with the industry to improve roads and coordinate transportation of sugarcane to the mills to eliminate redundant vehicles, improve efficiency, and reduce both delivery delays and crowding of deliveries at the mills.

5. **Technology and improved varieties.** Productivity could be enhanced by greater investment as well as by upgrading research and extension services related to development and diffusion of improved sugarcane varieties targeted to specific regions and growing conditions. This could increase yields in both the fields and the mills. The government and the industry need to work in partnership toward these objectives.

6. **Plot size and fragmentation.** Findings in this report suggest that many of the traditional approaches to producing sugar on smallholder plots create barriers to improving field productivity. Growers and millers need to work together in a way that takes advantage of economies of scale. This can be done either by consolidating landholdings of sugarcane growers into larger, more efficient plots, or by creating mechanisms through which growers with small plots can better coordinate their activities to increase mechanization and efficiency.

7. **Pricing cane:** The way sugarcane revenue is shared among growers creates weak incentives for individual growers to improve field efficiency. The government can work with the industry to explore technologies and management procedures that directly link the quality of cane delivered to the mill with revenue received by the individual grower.
8. **Revenue sharing.** The current method by which sugar production is valued for the purpose of revenue sharing between mills and growers does not necessarily correspond to the price at which sugar is sold; this method of pricing is not fully consistent with an integrated NAFTA-wide sweetener market. Working with industry, the government could explore alternative transparent ways to share revenue based on the true value of the sugar and to create sharing rules that reward industry participants for improvements in field and mill efficiencies. Doing so would also allow decisions about how market uncertainties should be shared among growers, millers and formal risk markets to be taken in an explicit way.

9. **Vertical integration.** The Mexican sugar sector would be more competitive if it were organized more in line with the prevailing model elsewhere in the world. This would require (a) modifying Mexican law to allow mills greater freedom to own land and produce their own sugarcane and (b) creating mechanisms through which growers and mills can form partnerships that improve their efficiency and link their incentives toward achieving common goals.

10. **Government ownership.** The government’s efforts to complete the privatization of government-managed mills will be made easier by actions that facilitate the restructuring of the industry to improve its competitiveness, along the lines of the options described in the note. It would be best to reconsider some practices which did not lead to long-term solutions in the past, such as selling mills on a highly leveraged basis or in bundles. Much of the accumulated debt in the sugar industry is due to fines for water pollution. In deciding whether to close down or privatize each mill, a key decision parameter will be whether the mill will have the financial wherewithal to comply with environmental norms as well as meet its other obligations.
BACKGROUND

Sugar and Sugarcane Production Structure

Sugarcane is produced in 225 municipalities located in 15 different states in Mexico and is the main economic activity in many of those areas. Nearly half the country’s total production is concentrated in the Gulf region, mainly in the state of Veracruz (Figure 1). The Gulf, the Northeast, and the Pacific coast combined account for more than 80 percent of total production, and smaller amounts are produced in the South, Central, and Northwest regions.

Figure 1. Cane Producing Regions and Average Cane Production, 2004/05 — 2006/07

Source: World Bank, using COAAZUCAR data
Since about 57 percent of the production is nonirrigated, much of the cane production is concentrated in areas with high average annual precipitation (above 1,000 millimeters). While this rainfall is beneficial in the early stages of plant development, too much water close to the time of harvest leads to lower sucrose content and more difficult harvesting conditions. The area most susceptible to this problem is the Gulf Coast region, which represents a large share of the country’s total crop area and which is 85 percent nonirrigated (ERS 2006). The most reliable production and highest yields are in areas that rely on irrigation, in large part because the amount of water can be better controlled throughout the growth cycle.

Figure 2. Sugarcane Production in Mexico by Technology (hectares and percentage, 2002/2003)

Cane is mainly grown on small family farms that are either part of collective ejidos or privately owned. Growers working plots that are 3 hectares or smaller account for more than 57 percent of all producers but less than 25 percent of total cane growing lands. By contrast, growers with plots larger than 15 hectares account for only 2 percent of producers but 16 percent of total area (Table 1 and Figure 3).
Table 1. Ownership Structure of Sugarcane Production (2005/06 harvest)

<table>
<thead>
<tr>
<th>Plot size (hectares)</th>
<th>Growers</th>
<th></th>
<th>Total area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percent</td>
<td>Hectares</td>
</tr>
<tr>
<td>0–3</td>
<td>94,692</td>
<td>57.3</td>
<td>161,446</td>
</tr>
<tr>
<td>3–6</td>
<td>44,159</td>
<td>26.7</td>
<td>191,923</td>
</tr>
<tr>
<td>6–9</td>
<td>12,232</td>
<td>7.4</td>
<td>87,777</td>
</tr>
<tr>
<td>9–12</td>
<td>8,215</td>
<td>5.0</td>
<td>76,162</td>
</tr>
<tr>
<td>12–15</td>
<td>2,305</td>
<td>1.4</td>
<td>30,292</td>
</tr>
<tr>
<td>&gt; 15</td>
<td>3,517</td>
<td>2.1</td>
<td>107,487</td>
</tr>
<tr>
<td>Total</td>
<td>165,120</td>
<td>100.0</td>
<td>655,087</td>
</tr>
</tbody>
</table>

Source: COAAZUCAR

Harvesting and transportation of cane to the mills is the responsibility of the growers. In the great majority of cases cane is cut by hand, loaded mechanically onto trucks, and transported to the mill by road. Mills are privately owned except for 13 that were expropriated in 2001 and still remain under government management (about 26 percent of Mexican production). Eleven ownership groups control 92 percent of private production (37 mills) while the rest are independent. There is substantial variation between ownership groups in size and efficiency of mills, but most have sugar conversion rates comparable to mills in other major producing countries though with lower milling capacity on average.

Prices paid by mills for sugarcane are set by a national formula under the Cane Law and the terms of employment and compensation of mill workers are controlled by a nationwide Contrato Ley. While current law allows alternative contracts in both cases, in practice the national norms are applied almost universally.

Historical Development

A very good account of the history of the sugar sector up to the 1970s was written by Susan Kaufman Purcell (1981) and later
developments are detailed by Suárez (1999). However, there are very few serious research efforts on recent developments in the sugar industry. The following matrix is largely based on the work of Purcell and Suárez as well as the authors’ own experience.

**History of the sugar sector**

<table>
<thead>
<tr>
<th>Year</th>
<th>Events / Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1910 to</td>
<td>Oligopoly licensed by government in which mill owners acted as middlemen or caciques who in effect controlled peasant populations that were dependent on the mills.</td>
</tr>
<tr>
<td>late 1950s</td>
<td>1932: Creation of Azucar S.A. (later renamed the National Union of Sugar Producers S.A., or UNPASA). This association of mill owners sought to create an industry cartel, and became the sole provider of refined sugar in the country. Prices were revised every two years to reflect government-authorized wage increases.</td>
</tr>
<tr>
<td></td>
<td>1940: Government control of the mills by means of (a) regulated sugar price; (b) discretionary issuance of export permits; (c) taxation of sugar export profits by appropriation of 90 percent of the difference between international and domestic prices.</td>
</tr>
<tr>
<td></td>
<td>1943: Financiera Nacional Azucarera S.A. (FINASA), a bank for mill owners, is created by UNPASA with the authorization of the government.</td>
</tr>
<tr>
<td></td>
<td>1943: First Decreto Cañero issued tying cane prices to sugar price received by the mill.</td>
</tr>
<tr>
<td>1958–70</td>
<td>Increased government involvement in the sugar industry to mitigate the effects of unregulated cartels on the economy in general and the poor in particular.</td>
</tr>
<tr>
<td></td>
<td>1958: President Lopez Mateos freezes several commodity prices, including sugar, in an effort to address labor unrest. Pro-labor reforms made to Constitution and Labor Law.</td>
</tr>
<tr>
<td></td>
<td>Fixed “political price” rather than market price characterized sugar sales until 1970. Price controls were an important element of the government’s national development strategy, called Desarrollo Estabilizador.</td>
</tr>
<tr>
<td></td>
<td>Government regulation made the industry relatively unattractive for investment.</td>
</tr>
<tr>
<td></td>
<td>The crowding-out of private capital forced the government to redefine and modify its system of political control in the sector.</td>
</tr>
<tr>
<td></td>
<td>1960s: In response to increased sugar exports to the United States after cancellation of Cuba’s quota, and growing domestic sugar demand, government adopts policy of providing cheap credit to the sugar industry (which also leaked into other sectors).</td>
</tr>
<tr>
<td></td>
<td>1960s: Direct government intervention in the Executive Council of UNPASA.</td>
</tr>
<tr>
<td></td>
<td>1966: Government acquires FINASA from the mill owners.</td>
</tr>
<tr>
<td></td>
<td>1968: Increasing indebtedness and default.</td>
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<tr>
<td></td>
<td>1969: Government controls 19 mills (30% of production), bought from private owners, mainly because of social issues.</td>
</tr>
<tr>
<td></td>
<td>Sugar price freezes stimulate domestic consumption. By the 1970s, Mexico consumed 40 kilograms per capita, far above the world average of 18 kilograms per capita.</td>
</tr>
<tr>
<td>Year</td>
<td>Event</td>
</tr>
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<td>------</td>
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</tbody>
</table>
| 1970–81 | Creeping nationalization of the industry and creation of new mechanisms to link peasant populations directly to the government.  
1970: Creation of ONISA (Operadora Nacional de Ingenios), a new agency that operated all the government-owned mills.  
1970: Government buys out remaining private interests in UNPASA. All financing previously done by UNPASA is moved to FINASA while UNPASA retains its original function of marketing sugar and derivatives both domestically and for export.  
Sugar price increases.  
Government launches large-scale construction effort to expand production in impoverished areas despite their unsuitability for growing cane.  
Creation of trust funds to finance installation of electricity, potable water, schools, union housing and stores, and health and sanitation facilities for cane cutters.  
1975: 31 mills under public control.  
1973-75: Mill productivity and production decline under government ownership, which in turn leads to lower cane prices and production.  
1975: Price of cane is pegged to maize, beans, rice, sorghum, and soy.  
Collectively farmed agroindustrial units created in effort to address problem of underscaled farming operations in small-size plots.  
1975: Cane grower credit decoupled from the mill and distributed directly through FINASA.  
1975: Growers in areas far from designated mill are allowed to sell cane to other mills.  
1975: Creation of local, tripartite commissions (mills, growers, and government) to plan for the crushing season. Growers were represented through organizations that were controlled and/or outvoted by government officials.  
1980: Government policies fail to achieve goals: subsidies grow twenty-fold since 1976, Mexico goes from net exporter to importing as much as 800,000 tons per year, and sugar prices increase 60 percent despite government assurances that they would not. |
| 1982–88 | Increase in nominal prices as a result of hyperinflation.  
Continued government administration of the sugar industry.  
Recurrent macroeconomic crises affecting all sectors of the economy.  
1987–88: First “Pacto” with the main economic sectors to control inflation. |
1988–94: Pacto para la Estabilidad y Crecimiento Económico: Price increases for basic staples to control inflation agreed in roundtables with all relevant sectors of economy.  
1991: New Decreto Cañero that sought to link sugar prices to market values.  
Increasing competition from high fructose corn sweetener (HFCS). |
Attempt to make structural reforms in the cane sector.  
2004: Court reverses expropriations of Grupo Azucarero México mills. |
2005: Congress passes a Cane Law that was essentially meant to revive and strengthen the provisions of the Cane Decree. Despite various legal challenges to the law (some of which are still unresolved) that leave it only partially in force, the de facto situation is still much the same as under the Cane Decree.  
Unusually high international sugar and corn prices.  
2005: record season, 5.8 million tons produced.  
2006: Reversal of expropriations of Grupo Machado and Grupo Santos  
2006: important exports to the United States, in excess of 500,000 tons. |

Source: Information through 1981 is from Purcell, Susan Kaufman (1981).²

The considerable variation in Mexico’s sugar production is partly due to variations in precipitation, particularly the problem of having too much rain close to the harvest season, as mentioned previously.

In Figure 4 it is important to note the steep increase in production after the Cuban revolution, when Mexico gained a significant share of the U.S. quota formerly assigned to Cuba. In addition, many of the best Cuban cane and mill technologists fled to Mexico as exiles. These increased exports corresponded with greater domestic demand driven in part by the 1958 freeze of Mexican sugar prices. During the same period the government adopted a policy of providing cheap credit to the sector to help to meet both domestic and foreign demand.

While yields per ton of sugarcane stagnated somewhat during this period of high demand and cheap credit, since the early 1970s five-year average yields have progressively improved and beginning in the 1980s they also became much more consistent from year to year.

The 2005/2006 crushing season had 57 mills in operation, in contrast with the 1987/1988 season when there were 65. This means that on the average, during these 18 years, a mill has closed every 2.25 years, though total production has steadily increased.

### Trade Policy

Sugar is featured in Mexico’s commitments to the World Trade Organization (WTO) trade agreements and in the three-way North American Free Trade Agreement (NAFTA)
between the Canada, Mexico and the United States. Of the two agreements, it is NAFTA that shapes current policy and, to some extent, codifies many aspects of current policies.

Current Import Tariffs and WTO Commitments on Import Tariffs

Mexico’s commitments to the WTO following the Uruguay Round negotiations is remarkable in the amount of protection that is afforded the sugar industry relative to other parts of the economy. Like the United States, Mexico agreed to convert quantitative restrictions to tariff systems; however the tariff commitments or “bindings” are set at extremely high rates to 156% (ad valorem) by 2004/05. Minimum access to the Mexican sugar market is pledged, increasing from 110,000 to 183,000 tons. In addition, Mexico pledges to subsidize no more than 270,000 tons of sugar. In practice, the commitments are not especially restrictive (table 2).

NAFTA

In contrast, NAFTA plays a central role in shaping the Mexican sugar industry. The treaty establishes a common customs union between Mexico and the United States so that the sugar markets of both countries share a common tariff against third party countries. Fundamentally, the most important aspect of the agreement is that it permits unfettered trade in all sweeteners between the United States and Mexico beginning in 2008. Since 1994 there has been a gradual decline in tariffs between the countries.

During the 14-year transition period, NAFTA of ered increased access by Mexican producers to the U.S. market on two fronts (a) a duty-free quota that expanded with time; and (b) unlimited above-quota access associated with declining tariffs. While the second window has become increasingly important in recent years, the first window was at the center of a longstanding dispute between the two countries.

Up to 2000, the duty-free quota for Mexico was 25,000 metric tons. However, the two governments differed on their interpretation of Mexico’s duty-free access from 2000. This resulted in a series of disputes, centered on HFCS. The U.S. government maintained that Mexico’s duty-free access to the U.S. market was governed by the “side letter” agreement reached between the two countries in order to safeguard the passage of the NAFTA through Congress. Under the side letter, Mexico’s duty-free access to the U.S. market from 2000 until 2008 was set at 250,000 metric tons a year if Mexico achieves the status of net surplus producer (defined in this case as sugar production exceeding the sum of sugar consumption plus HFCS consumption).

The Mexican government maintained that the side letter had no validity, because while it was signed by the Mexican Minister of Commerce and Industrial Development, it was not discussed in the cabinet nor submitted to congress. The Mexican government’s view was that the original NAFTA conditions governing Mexican access to the United States after 2000 still applied. Under these terms, Mexican access was to increase to 150,000 metric tons in 2000, growing by 10% a year when Mexican sugar production exceeded sugar consumption – irrespective of other sweeteners. Moreover, should surpluses continue for consecutive years, access was to be set to equal to the surplus.

A point not disputed between the two sides was the rate of decline in the tariff levied on sugar imports from Mexico into the United States under NAFTA. This tariff has declined significantly in recent years and disappears entirely in 2008 (Table 3), effectively ending the relevance of the side-letter controversy.
HFCS

Under NAFTA, no quantitative restrictions were imposed on the flow of HFCS between the United States and Mexico. Instead, HFCS, as a category C good within NAFTA, was subject to a progressive reduction in import tariffs over the first ten years of the agreement, from an initial level of 15% in 1994 to a level of zero in 2003 (Table 3).

In February 1997 Mexico’s Secretariat of Commerce (SECOFI) initiated an investigation of HFCS imports from the United States, responding to claims that these imports entered the country at “dump prices” and that this in turn represented a threat of damage for Mexican sugar producers. In June 1997, having found, in its opinion, substance to these allegations, the Mexican Government imposed preliminary anti-dumping duties on HFCS imports from the United States, ranging from $55.73 to $175.50 per metric ton, dry basis, depending upon the product in question and the U.S. company supplying it. These preliminary duties were placed on a permanent basis in January 1998.

U.S. exporters contested these duties since their imposition, and sought rulings under the dispute mechanisms of the WTO and NAFTA. The WTO appellate body made an initial ruling in June 2001, stating that Mexico’s methods of implementing the anti-dumping duties were “inconsistent with Mexico’s obligations under the WTO anti-dumping agreement”. In its ruling, the WTO found that although dumping of HFCS had taken place, it didn’t threaten the local sugar industry. An earlier ruling (in August 2001) from a NAFTA dispute panel also ruled against Mexico’s HFCS import duties.

In response, the Mexican government dropped import tariffs on fructose. The issue reemerged in the fall of 2001 when the Mexican Congress levied a consumption tax on soft drinks containing fructose. Though the administration initially declined to implement the tax, the tax was eventually levied and has proved controversial. The tax will be removed at the start of 2008.

| Table 2. Mexico’s Commitments to the WTO on Tariffs, Access, and Export Subsidies |
|-----------------------------------|-----------------|-----------------|
| **Current Tariff Rate***           | US$396/mt       | US$396/mt       |
| **WTO Commitments**               |                 |                 |
| **Tariffs**                        |                 |                 |
| Base rate                         | 173%            | 173%            |
| Final rate                        | 156%            | 156%            |
| Minimum access (metric tons)      | 110,000 rising to 183,800 |
| Export subsidy reductions          |                 |                 |
| - volume (metric tons)            | 270,000         |                 |
| - expenditure (%)                 | 26%             |                 |
| End of transition period          | 2004/05         |                 |

1. There are no nontariff barriers to imports. Import tariffs are waived to holders of quota certificates issued under the country’s Temporary Export/Re-Import Program if there is an internal sugar deficit.
2. Export subsidy commitments were defined using the base period 1990-91, rather than the normal base period of 1986-90.
Table 3. NAFTA Schedule for Tariffs on HFCS and Out-of-Quota Sugar Imports

<table>
<thead>
<tr>
<th>Year</th>
<th>U.S. rate of duty on out-of-quota sugar imports from Mexico (US$/metric ton)</th>
<th>Mexican tariff on imports of HFCS from the U.S. (cents/lb) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>365</td>
<td>16.5</td>
</tr>
<tr>
<td>1995</td>
<td>355</td>
<td>16.1</td>
</tr>
<tr>
<td>1996</td>
<td>346</td>
<td>15.7</td>
</tr>
<tr>
<td>1997</td>
<td>336</td>
<td>15.3</td>
</tr>
<tr>
<td>1998</td>
<td>327</td>
<td>14.8</td>
</tr>
<tr>
<td>1999</td>
<td>318</td>
<td>14.4</td>
</tr>
<tr>
<td>2000</td>
<td>282</td>
<td>12.8</td>
</tr>
<tr>
<td>2001</td>
<td>247</td>
<td>11.2</td>
</tr>
<tr>
<td>2002</td>
<td>212</td>
<td>9.6</td>
</tr>
<tr>
<td>2003</td>
<td>177</td>
<td>8.0</td>
</tr>
<tr>
<td>2004</td>
<td>141</td>
<td>6.4</td>
</tr>
<tr>
<td>2005</td>
<td>106</td>
<td>4.8</td>
</tr>
<tr>
<td>2006</td>
<td>71</td>
<td>3.2</td>
</tr>
<tr>
<td>2007</td>
<td>35</td>
<td>1.6</td>
</tr>
<tr>
<td>2008</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Note: The tariff on imported HFCS was raised to 12.5 percent in 1996 by Mexico as compensation for U.S. implementation of broomcorn safeguards; in 1997 Mexico imposed compensatory anti-dumping duties on imports of HFCS from the United States, ranging from US$55/metric ton to US$175/metric ton.
I. MEXICO AND THE INTERNATIONAL SUGAR MARKET

I.1 Overview of the Mexican Sugar Industry Compared to other Countries

Mexico is the world’s fifth largest producer of sugarcane but is dwarfed by Brazil (Figure 5), which accounts for about one-third of world production and nearly as much as the rest of the top 15 countries combined, not including India (the second largest producer).

All Mexican sucrose sugar is produced from cane and is protected from international market competition by trade barriers. Unlike Brazil, where large quantities of cane are used to produce ethanol, almost all Mexican cane goes into sugar production. Because of its high production costs Mexico’s only profitable export market for sugar is the United States, which also protects its domestic industry from world prices. Mexico's trade balance has shifted from net exporter until the mid-1970s to net importer from the mid-1970s through most of the 1980s and early 1990s, and back to exporter in all but a few years since the mid-1990s. The advent of open trade in sweeteners with the United States will be a test of Mexico’s ability to compete with U.S. sugar producers and particularly with HFCS. Mexico also has a small but growing HFCS industry with current production equal to about 6–7 percent of sugar production. HFCS imports from the United States already are nearing the level of Mexican production and may increase substantially in the future.

A distinctive feature of the Mexican cane sugar industry is that there is very little vertical integration of cane growing and sugar milling, which is the prevailing model in many other countries. This is due to a combination of land ownership, labor, and commercial constraints that prevent mills from owning
cane fields and tend to create adversarial rather than cooperative relationships between groups of stakeholders at different stages of the production chain. The government has intervened extensively in managing the relationship between cane growers and the mills, including determining the price the mills pay for cane, and for a long period specifying to which mill a grower could sell. Though under current law the price formula is no longer mandatory and growers can sell to any mill, in practice neither of these aspects of the mill-grower relationship has changed.

Another unique characteristic of the Mexican industry is that milling and refining are done at a single facility. In the United States and most other countries, mills located near the growing areas crush the cane and produce raw sugar, which is then either exported in raw form or transported to separate refineries near shipping, industrial, or commercial hubs often located far from the fields.

Figure 5. Leaders in World Sugarcane Production, 2005 (thousand tons)

<table>
<thead>
<tr>
<th>Country</th>
<th>Production (thousand tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>422,926</td>
</tr>
<tr>
<td>India</td>
<td>232,300</td>
</tr>
<tr>
<td>China</td>
<td>87,768</td>
</tr>
<tr>
<td>Pakistan</td>
<td>47,244</td>
</tr>
<tr>
<td>Mexico</td>
<td>45,195</td>
</tr>
<tr>
<td>Thailand</td>
<td>43,665</td>
</tr>
<tr>
<td>Colombia</td>
<td>39,849</td>
</tr>
<tr>
<td>Australia</td>
<td>37,822</td>
</tr>
<tr>
<td>Indonesia</td>
<td>29,505</td>
</tr>
<tr>
<td>United States of America</td>
<td>25,308</td>
</tr>
<tr>
<td>South Africa</td>
<td>21,265</td>
</tr>
<tr>
<td>Philippines</td>
<td>20,795</td>
</tr>
<tr>
<td>Argentina</td>
<td>19,300</td>
</tr>
<tr>
<td>Guatemala</td>
<td>18,500</td>
</tr>
<tr>
<td>Egypt</td>
<td>17,091</td>
</tr>
</tbody>
</table>


I.1.1. Production Growth

Growth of the cane sugar industry in Mexico has been on par with the world average and greater than the United States, but well behind sugar giant Brazil, smaller regional producers such as Guatemala and Colombia, or major exporter-oriented producers such as Australia. One probable reason, in addition to high production costs, is the structure and legal constraints on the sugar industry compared to countries that can more easily expand cane production in large holdings either owned or directly linked to large-scale milling operations. It is also worth noting that rapid expansion of sugarcane production in some countries involves high environmental impacts, displacement of other agricultural activities, or both. In Brazil the growth of sugarcane production is in large part driven by demand for ethanol.
I.1.2 Yields

Mexico's average yield of sugar per hectare is very close to Brazil's but lower than in Australia, the United States, and Guatemala. However, it is twice as high as in India and is also higher than in the other countries that round out the top 15 producers (in most cases substantially higher). Most variation in final yields is due to differences in yields of cane per hectare and in the recoverable sugar content in the cane rather than variation in the effectiveness of the mills at extracting sugar from the cane.

One challenge to determining actual consumer demand is that in the past government policies have artificially restricted supply and controlled prices. For example, price freezes during the 1960s and part of the 1970s resulted in substantial growth in per capita consumption. One public official at the time commented that “60 million Mexicans consume more sugar than 800 million Chinese.”

Although not well-documented, it is safe to say the current consumption is well over 50 kilograms per capita.

---

Most Mexican sugar is consumed domestically. Since 1994, sugar consumed per capita is well above 40 kilograms and since 1998 it has oscillated around 55 kilograms. The variability in production and way in which both Mexican import quotas and sugar stocks have been managed has resulted in greater volatility in the availability of sweeteners per capita than in the United States, as shown in Figure 7. While the United States has not had an open market either, its two-tiered tariff and quota policy is actually designed to provide a fairly stable and predictable domestic supply (and therefore price).

![Figure 7. U.S. and Mexico Sweetener Availability (kg per capita, dry basis)](image)


### I.1.3 Prices

The volatility in availability of sweeteners, described above, may largely explain why Mexican price averages and volatility are higher than in the United States, as reflected in Figure 8 and in the calculation of the mean and variance of prices in both countries in Table 4.
Integration of the North American Sugar Market

Figure 8. U.S. and Mexico Monthly Sugar Prices, 1994-2007 (U.S. cents per pound)

Table 4. Price Volatility, Mexico and the U.S., 1994 to 2006

<table>
<thead>
<tr>
<th>Price (U.S. cents per pound)</th>
<th>Estandar / raw</th>
<th>Ref ned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mex. estandar</td>
<td>U.S. raw</td>
</tr>
<tr>
<td>Mean</td>
<td>22.46</td>
<td>21.44</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>3.63</td>
<td>1.28</td>
</tr>
</tbody>
</table>

Source: IMCO, with USDA data

The standard deviations in Table 4 indicate that prices are much more volatile in Mexico than in the United States. Although average prices for refined are slightly lower in Mexico, the price of Mexican estandar sugar is slightly higher than U.S. raw sugar, but this is mainly because the purity of estandar sugar as measured by its chemical polarity (99.4 degrees) is higher than most raw sugars (98 degrees).  

I.1.4 Mexico: Deficit or Surplus Producer?

In recent years Mexico has usually produced more sugar than it has consumed. Nevertheless, it is not clear whether it is a structural deficit or surplus producer, and since price is sometimes out of step with market conditions it is even harder to determine at what price supply and demand are in balance. Despite this lack of reliable data, Mexican sugar producers tend to think, correctly, that all the sugar produced will be sold at a later time, no matter what the price.

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5 Polarity is a measure of bonding properties of electrons within and between atoms and molecules that affect their solubility and other characteristics. The more refined a sugar the higher its polarity.
If we assume that sugar consumption in Mexico is distributed normally with a mean of 50 kilograms per capita and standard deviation of 10 percent, that number multiplied by the population\(^6\) and subtracted from the probable production (which is known in average and standard deviation for recent years),\(^7\) it is possible to model the deficit/surplus status of Mexico and the probability of every surplus/deficit scenario, as shown in Figure 9, which depicts a series of Monte-Carlo experiments made with the aforementioned assumptions.

As seen in Figure 9, the probability of the sugar industry being self-sufficient or producing a surplus is fairly large—31.68 percent. The probability of that surplus being larger than 1 million tons is less than 2 percent, so the phenomenon occurred in the 2004/2005 season, that had a surplus of a magnitude close to a million, is a rare event.

However, the mean value of the experiment is -302,500 tons—so on average, and under the assumption of 50 kilograms per capita consumption, Mexico sugar production will not be enough to cover domestic consumption.

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\(^6\) Population assumed at 106 million.

\(^7\) The production of the last 10 years was used, with a mean value of 4.99 million tons of production and a standard deviation of 359,454 tons.
Another series of Monte Carlo experiments was conducted with a hypothetical mean per capita sugar consumption of 45 kilograms. This could, for example, model a scenario in which consumers reduce demand for sweeteners or in which increased HFCS use in the beverage industry displaces 5 kilograms of sugar consumption. This is still substantially higher than the world average consumption (23.9 kilograms per capita) but well below the estimated 64.5 kilograms of sweeteners per capita consumed in the United States, of which 28.6 kilograms is refined cane and beet sugar (ERS 2007).

The results of that experiment found that the probability of producing a sugar surplus is 64.55 percent and the probability of producing a surplus larger than 1 million tons is 9.91 percent, a very large chance that makes the 2004/2005 record season seem not so improbable. In this scenario, mean value occurs at 224,000 tons, which would be the exportable surplus if this was the case.

It is important to note that in both exercises, the probability of Mexico being in a sugar deficit is considerable—35.45 percent in one case and 64.55 percent in the other.

To clarify the experiment:

- Assuming 50 kilograms per capita domestic consumption, Mexico will generate a surplus of sugar in 3.4 out of every 10 years.
- Under the assumption of 45 kilograms per capita domestic consumption, Mexico will produce an exportable surplus in 6.4 out of every 10 years.

I.2. Sugarcane Costs and Prices

Sugarcane production cost statistics are not easy to find. The best source is the Comité de la Agroindustria Azucarera (COAAZUCAR). Technology and inputs used differ widely across regions and producers.

COAAZUCAR data does not provide a breakdown of field costs, only the total costs for the producers that supply each mill. Cane is transported to the mill at the growers’ expense and COAAZUCAR does not provide data on these costs. The transport costs shown in Figure 10 were estimated by IMCO based on the distance of each of the 255 cane producing municipalities to the closest mill. The lower bar in the graph shows the field cost, the higher bar provides the estimated transport cost, and the green line on top is the price paid for cane in each of the mills.

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8 Using FAO information of 157,828,000 metric tons consumed worldwide yearly in the 2001-03 period and assuming World population at 6,602,224,175 persons, according to CIA, a US government agency (https://www.cia.gov/library/publications/the-world-factbook/print/xx.htm).

9 www.coaazucar.org

10 These field costs apply only to those growers that obtain credits through the mechanisms established by the mill, using the technological package suggested by the mill.

11 These calculations assume that there are no significant infrastructure differences between mills, which leads to the under/overestimation of some of these transport costs. The transport cost curve used comes from a study that A.T. Kearney produced for IMCO, and refers to the Veracruz-Acapulco corridor.
Both in the field and in transportation there are serious excess costs that stem from (a) favorable cane prices and low risk, which encourages regional crowding into the sugar sector, (b) inefficient field technology, and (c) lack of other similarly profitable activities in cane producing areas. Since even inefficient or high-cost cane growing operations can be profitable there is less incentive to cut costs.

In the case of transport, local transport companies for sugarcane are typically operated by the growers themselves, who divert capital or family labor away from cane growing itself and into a related but peripheral activity which is often not an optimal use of resources or not as efficient as the service that could be provided by an independent or cooperative venture. Growers also impose external cost on one another by adding additional trucks to the transport effort, leading to crowding of roads and a backlog of trucks waiting to unload at the mill. In countries with more vertically integrated industries, such as Australia, the transport to the mill is done by rail or by using a limited number of trucks that pick up bins of cane at the roadside. Several options for improving transport efficiency in Mexico include hiring private contractors, letting the mills operate their own fleets of trucks, or coordinating transport efforts through growers organizations.
I.3. Current Ownership Structure

Table 5. Ownership Structure of Mexican Sugar Industry

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of mills</th>
<th>Estimated cane 2006/2007 season</th>
<th>Estimated sugar 2006/2007 season</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEESA (public mills)</td>
<td>13</td>
<td>12,559,105</td>
<td>1,392,044</td>
</tr>
<tr>
<td>AGA</td>
<td>2</td>
<td>2,494,009</td>
<td>268,355</td>
</tr>
<tr>
<td>Beta San Miguel</td>
<td>5</td>
<td>4,848,058</td>
<td>509,608</td>
</tr>
<tr>
<td>Garcia Gonzalez</td>
<td>3</td>
<td>1,393,702</td>
<td>129,257</td>
</tr>
<tr>
<td>Grupo Azucarero Mexico (GAM)</td>
<td>4</td>
<td>3,570,006</td>
<td>362,682</td>
</tr>
<tr>
<td>Machado I</td>
<td>3</td>
<td>2,584,930</td>
<td>296,301</td>
</tr>
<tr>
<td>Machado II</td>
<td>2</td>
<td>1,703,255</td>
<td>181,194</td>
</tr>
<tr>
<td>Porres</td>
<td>2</td>
<td>1,624,061</td>
<td>171,105</td>
</tr>
<tr>
<td>Piasa</td>
<td>2</td>
<td>3,287,667</td>
<td>379,442</td>
</tr>
<tr>
<td>Saenz</td>
<td>3</td>
<td>3,348,482</td>
<td>377,003</td>
</tr>
<tr>
<td>Santos</td>
<td>6</td>
<td>3,558,001</td>
<td>370,347</td>
</tr>
<tr>
<td>Zucarmex</td>
<td>5</td>
<td>4,329,069</td>
<td>470,598</td>
</tr>
<tr>
<td>Azturementex (Tenosique)</td>
<td>1</td>
<td>224,933</td>
<td>19,201</td>
</tr>
<tr>
<td>El Molino</td>
<td>1</td>
<td>653,959</td>
<td>81,484</td>
</tr>
<tr>
<td>Independencia</td>
<td>1</td>
<td>131,672</td>
<td>10,672</td>
</tr>
<tr>
<td>La Concepcion</td>
<td>1</td>
<td>120,453</td>
<td>11,071</td>
</tr>
<tr>
<td>La Gloria</td>
<td>1</td>
<td>1,360,440</td>
<td>155,834</td>
</tr>
<tr>
<td>San Jose de Abajo</td>
<td>1</td>
<td>631,459</td>
<td>66,001</td>
</tr>
<tr>
<td>San Nicolas</td>
<td>1</td>
<td>602,343</td>
<td>61,881</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>57</strong></td>
<td><strong>49,025,604</strong></td>
<td><strong>5,314,081</strong></td>
</tr>
</tbody>
</table>

Source: COAAZUCAR
I.4. Determination of Sugarcane Payments

Growers in Mexico are paid based on the percentage of recoverable sugars, or pol, in the sugarcane. The sugar content is determined in the mill laboratory after the cane is crushed, in the presence of chemists from the mill and the growers’ unions. Each grower is paid on the basis of the average sucrose content of the entire cane supply delivered to the mill, which weakens the incentive for individual growers to improve the sugar content of their crop.

Since the 1940s the formula for sugarcane prices has been set through supplementary regulations or Cane Decrees (Decretos Cañeros) issued by the executive branch of the federal government. The latest Cane Decree, issued in 1991 and modified in 1992, was abrogated under the Fox administration in 2004, but largely resurrected by a new Cane Law passed in 2005. The Cane Decree and the cane law had a set of rules for determining sugarcane prices, with a formula, commonly known as the Fórmula Harvardiana. The core of this formula is the equation:

\[ Pr = a \ P_n + (1-a) \ P_{ex} \]

where \( Pr \) equals the projected wholesale price of a kilogram of sugar, estandar base, to be used as reference for establishing the price of sugarcane; \( a \) is the expected consumption to production ratio; \( P_n \) is the actual national wholesale sugar price from two years before; \((1-a)\) is the expected surplus with respect to the season's production; and \( P_{ex} \) is the expected price for sugar exports.

The cane growers receive 57 percent of the cane reference price (\( Pr \)) multiplied by the average recoverable sugar at each mill (kilograma de azucar recuperable base estandar, or KARBE), which is based on actual sugar content of the cane and the mill’s extraction efficiency.

The formula is presented by growers' leaders and public officials in charge of these negotiations as a transparent method for objectively negotiating prices. In theory the formula predicts a new wholesale price for sugar based on the share of projected production expected to be sold at domestic and international prices. However, it has several problems:

1. The agreement indicates that the Secretaría de Economía (formerly SECOFI), determines the expected production and consumption and that in doing so it should consider the arguments provided by SAGARPA, COAAZUCAR, CNIAA, as well as the growers' unions CNC and CNPR. Therefore, even if price determination is unambiguous once these figures are agreed, there is still a national negotiation that does not consider local or regional differences.

2. The accord also indicates that when projected consumption exceeds production, coefficient \( a \) is set at 1. This makes the second part of the formula, which deals with export prices (\( P_{ex} \)), irrelevant in practice. Therefore, to isolate the formula from the influence of market prices in the rest of the world, stakeholders in the industry need only to determine that domestic production will fall short of demand. Thus, the second part of the formula has never been implemented.

3. In the implemented formula, the Secretaría de Economía has historically used a two-year lag for setting the reference price \( P_n \). The result is that reductions in the price of sugarcane are mathematically impossible, unless there are two years of continually falling prices, a scenario that has never occurred.
As with sucrose content, penalties for extraneous matter are made pro rata to all growers based on the average for the mill. As a result, clean cane with zero extraneous matter and high sucrose content is paid at the same price as dry cane mixed with leaves, dirt, and rocks. This not only reduces incentives to produce better cane, but actually gives growers an incentive to add extraneous matter to the cane they deliver to the mill.

Furthermore, Mexican Of cial Norms for measuring lower-value reducing sugars in the cane juice and determining the amount of extraneous matter have wide allowances that provide higher payments to the grower.

Worldwide, the best practice for accurately determining the sucrose content and extraneous matter of sugarcane is by use of a mechanical arm that takes a sample from each truck arriving at the mill and immediately feeds it into a measurement system. This allows individualized payment for each grower. However, attempts to introduce this system in Mexico have largely been unsuccessful.

However some mills, such as the Santa Rosalia mill (expropriated) in Tabasco, have relatively sophisticated systems that combine GPS technology with cane juice sampling to determine the sucrose content of cane from diferent plots. This has allowed the Santa Rosalia mill to consolidate the number of cane varieties growers plant, organize the harvesting ef ort to maximize sucrose content, and provide specif c feedback to growers regarding cane quality and extraneous matter.

While some local producer unions, especially those representing large and highly productive growers (such as in the northeast) favor such a system, the national unions (CNC and CNPR) do not. A plausible explanation is that the national unions’ political power largely depends on the number of its af liates, many of whom would be adversely aected by individualized prices.

Another reason the growers support a single price at each mill is that the sugar content of the cane varies substantially during the course of the milling season and nonuniform prices would penalize growers whose cane delivery is scheduled for non-peak periods of the season. The Australian pricing system addresses this issue by comparing the sugar content of cane from growers delivering the same week but applying this diferential to the average sugar content for the whole season. This rewards better producers regardless of when the cane is delivered.

I.5. Sugar Costs and Prices

Sugar in Mexico is relatively expensive by world standards and is often higher than even U.S. prices. At the risk of oversimplif cation, the price of sugar in Mexico falls somewhere between the U.S. prices for #14 sugar and Midwest Refined. The #14 price is the New York Board of Trade (NYBOT) futures price of U.S. domestic raw sugar for ref ning, delivered at one of seven specif c ref nery ports (including imports under the U.S. quota system). The Midwest Refined price is not a commodity board price but rather the cash price of a high-quality refined sugar for industrial consumption that is usually published in Milling and Baking News. Both Mexican and U.S. sugar prices are well above the world price for sugar, which is represented in figures 14 and 15 by the #11 futures contract for raw sugar delivered free-on-board (FOB) at the producer’s port.

12 Reducing sugars include dextrose, glucose, and fructose, which cannot be crystallized and end up in the molasses, but are not distinguished from sucrose for payment purposes.

13 Switching pricing rules would not af ect the Union’s income, since the national unions receive about 0.5 percent of the total value of cane harvested in the country. There are also local fees.
The two main classifications for sugar in Mexico are refinada, which is comparable to U.S. refined sugar, and estandar, which is higher quality than most raw sugar but not as pure as refined sugar. Standards are set for polarity (solubility), color, humidity, and various other characteristics.

Both estandar and refinada sugars are typically sold in 50 kilogram bags, whereas in the world market raw sugars are sold in bulk and higher polarity sugars are sold in 1 or 1.5 metric ton totes. Many industrial customers would prefer totes rather than 50 kilogram bags, but such a change would not save money for the mills because labor union restrictions prevent them from laying off stevedores.

In general, quotes for the Mexican market (FORMA prices) are FOB at the mill or at a warehouse near a main consumption center, which is different from NYBOT #14 contracts that specify delivery at designated refinery ports. In recent years, largely due to high energy costs and competition from alternative sweeteners in the soft drink industry (which accounts more than half of Mexico’s refined sugar demand), increased production at Mexican mills has been mainly in estandar sugar while production of refined sugar has changed relatively little.

COAAZUCAR has published cane costs and prices through the 2005/06 season. INEGI’s 2004 Industrial Census provides processing costs for the 2002/03 season, which were updated to provide 2005/06 estimates based on various cost and inflation assumptions. The resulting cost data reflecting the competitiveness of Mexican sugar are shown in figures 9 and 10.

14 Sugar standards in Mexico are governed by normas mexicanas (NMX) issued by the National Standardization Commission (CNN). NMX-F-084-2003 sets specifications for estandar sugar and NMX-F-003-2003 for refined sugar. Small quantities are also produced of a white sugar known as blanca popular and a high polarity raw sugar called mascabado that is usually sold at estandar prices and is produced by only one mill. The Mexican standards can be consulted at http://www.colpos.mx/bancodenormas/

15 The wholesale price statistic for Mexican sugar is known as FORMA, after the Fideicomiso para el Mercado de Azúcar, which acts as a chamber of commerce for the sugar industry. The fideicomiso reports two FORMA prices: the first is FOB mill, obtained directly from the mills affiliated with the fideicomiso; the second is the cost and freight (C&F) FOB price in the main wholesale supply centers (centrales de abasto). The National System of Market Information and Integration (SNIM), maintained by the Secretaria de Economia, also keeps data on C&F FOB prices in the centrales de abasto. The C&C FOB price for estandar sugar is used as the national wholesale sugar price (Pn) in the formula for calculating the reference price (Pr) when determining sugarcane payments.

16 Actual sugar produced and cane crushed for each season comes from COAAZUCAR data. Inflation was adjusted using the National Consumers’ Price Index (INPC) except for energy inputs and labor. In the case of energy inputs, prices were adjusted using the price of bunker oil. Labor cost growth is surveyed by INEGI in the Monthly Industrial Survey (EIM). The period under analysis (season 2001/02 through 2005/06) was marked by very high increases in energy costs and of costs from the sugar industry to avoid the use of electricity and bunker oil through substitution of these inputs with bagasse. The actual reach of those cost-reduction measures is unknown, and therefore, we additionally assume a nominal 10 percent reduction per year in bunker oil and electricity expenses. Finally, the COAAZUCAR data on molasses and alcohol production were reduced from the cost, valuing alcohol at 7 pesos per liter and molasses at 80 dollars per 850 brix tons. Ten mills were grouped together with another mill in the same municipality because INEGI does not publish information on specific firms, just localities. Finally, the data on the Los Mochis mill in Sinaloa reflects the fact that the mill owners grow their own cane (production is vertically integrated). Transport costs may be overestimated in this case.
Figure 12. Sugar Costs and Prices, Estandar Quality (pesos per ton)

Lower bar shows cane cost. Upper bar shows added processing and estimated transport cost to market. The #14 and #11 sugar contract prices include estimated freight cost to central Mexico.

Source: Cost data: IMCO, with COAAZUCAR and INEGI data.
Notes: Represents 83.4 percent of estandar sugar production in Mexico. The remaining 16.6 percent is not represented due to data inconsistency between COAAZUCAR and INEGI regarding these mills. Price data: NYBOT, Milling and Baking News, and FORMA. U.S. prices assume 0 percent tariff and include estimated freight to central Mexico. FORMA prices are the C&F price at the centrales de abasto. Cost data also includes freight costs extrapolated from the 2004 Industrial Census.

17 Transport cost to market for Mexican sugar comes from the INEGI 2004 Industrial Census and does not provide data on the consumption centers. However, sugar is an industrial product with more value added than sugarcane, which allows producers and traders to move sugar to far away locations. It is not unusual to see sugar from Chiapas in the Guadalajara market.
Figure 13. Sugar Costs and Prices, Refinado Quality (pesos per ton)

The lower bar shows the cane cost, while the upper bar shows the added processing and estimated transport cost to market. The prices of #14 and #11 sugar contracts include allowances for transportation and refining costs.

A striking point in figures 12 and 13 is that average refinado costs are lower than average estandar costs. A key reason for this is that producers of refinado sugar have been exposed to greater competition because of the entry of high fructose corn syrup (HFCS) into the soft-drink market, which has given them incentives to invest in energy efficiency and reduce costs. In addition, soda companies have also increased their use of estandar sugar when possible. These trends have reduced the size of the domestic market for refinado sugar in recent years and driven out some of the smaller or less competitive mills, resulting in a higher overall level of efficiency among those that remain.18

Soft-drink firms could substitute more HFCS for cane sugar, though this trend could be blunted by recent sharp increases in corn prices due to greater ethanol demand in the United States. This partially explains the additional demand for estandar sugar and has made it possible for even higher cost producers of estandar to survive.

In terms of processing costs, overall Mexico should have an advantage in fuel costs because while U.S. refiners are stand-alone operations (separate from the cane crushing mills) that use bunker oil for fuel, Mexican refiners are integrated with the mills and can use cheap bagasse as an energy source.

On average, processing and transport account for 36.2 percent of the total production costs in Mexico for estandar and refined sugar combined, while raw materials account for 63.8 percent. However, as reflected in the graphs, the processing and transportation costs vary dramatically from one mill to another.

### I.6. Public Debt in the Sugar Industry

#### I.6.1. Mill Liabilities

The issue of past-due debt in the sugar industry is a sensitive subject both for producers and the government. Public debt forfeitures were the reason behind the expropriation of 27 mills in 2001 (including 2 that were already held in receivership by FIDELIQ), 14 of which have since been reverted to their original owners by the courts. However, the debt write-off for many expropriated mills and the negotiation of compensation for some of the reversed expropriations are still pending.

The origins of FINA debt go back as far as the 1960s. At that time, mills received credit from the government as a mechanism to spur production while at the same time compensating owners for frozen prices. Much of this credit was diverted to other economic activities and a large portion of the debts were defaulted. Despite recurring defaults, the mills’ debts were repeatedly rolled over to avoid disrupting production and causing political unrest in the cane fields. It is not clear how indebtedness in the sugar industry evolved during the period of hyperinflation of the 1980s, but as the government expanded its control of the mills from the late 1960s through the mid-1980s, the industry became increasingly inefficient and its growth unsustainable, resulting in lower equity and greater liabilities. These problems, along with promises that the sector would be restructured, were passed on to the new owners who acquired the mills through the 1988 privatization.

The administration of President Carlos Salinas de Gortari (1988–94) instituted substantial economic reforms, including the introduction of Unidades de Inversión (UDIs) as a measure of credit valuation to preserve the real value of obligations. After the 1994 peso devaluation the real value of debt restructured in UDIs grew so much that many mills carried debts greater than the value of the mill itself. This created an incentive for mill owners to continue restructuring government debt and extracting cash from the mills as quickly as possible, before debt rollover was no longer feasible or the government decided to intervene in the industry again, which is exactly what happened in 2001.

The 27 mills expropriated in 2001 were, at least in theory, those with the worst public sector debt problems. In 2001 a working group composed of the Presidency, Ministry of Finance and Public Credit (SHCP), National Water Commission (CONAGUA), Ministry of Agriculture, Livestock, Rural Development, Fisheries, and Food (SAGARPA), FINA, Liquidation Trust Fund for Auxiliary Credit Institutions and Organizations (FIDELIQ), and Mexican Social Security Institute (IMSS) estimated that the total debt of the sugar industry (excluding taxes) prior to the expropriation was more than 22.7 billion pesos.

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19 INEGI 2004 Industrial Census.

20 “Billion” refers to the U.S. usage, meaning thousand millions.
The 6 percent of debts classified as “other” (shown in Figure 14) included obligations owed for Social Security Institute, water, the National Institute for Promotion of Worker Housing (INFONAVIT), and workers’ and growers’ union fees. About 80 percent of the 22.7 billion peso debt was concentrated in three ownership groups: CAZE (12.6 billion), Santos (3.6 billion) and Machado (2.1 billion). These three groups, along with the Grupo Azucarero México (GAM) and FIDELIQ, had all their mills expropriated.

However, after the 27 mills were expropriated, the government did not write off their public sector debts. The norms that SHCP officials must follow are quite strict in this regard and due to the fact that most of the previous owners fought the expropriation through legal injunctions or amparos, the government decided to wait until the final court ruling on ownership of the mills before taking action on their financial liabilities.\(^{21}\)

The courts ultimately reversed the expropriation of the mills belonging to three of the groups (GAM, Machado, and Santos), and gave them back to their owners with all the liabilities they had at the time of the expropriation. GAM was already following a prebankruptcy procedure before the expropriation, which allowed it to do an efficient debt write-off. Santos and Machado are still negotiating with the government on the amount owed, arguing that the government should compensate them for the impact that the expropriation had on their business interests.

While the Expropriated Sugar Sector Enterprises Fund (FEESA), the government agency that operates the remaining 13 expropriated mills, pays current obligations (those affecting day-to-day operations), it has barely touched the debt it inherited in 2001, paying only the amounts that were owed to workers and cane growers. The balance of that debt has continued to compile interest.

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\(^{21}\) A sound decision, since the courts have since reversed the government’s expropriation of many of the mills.
and penalty charges in SHCP’s accounts ever since.22

In the case of these mills, expropriated from CAZE and FIDELIQ,23 FEESA is in the process of completing bankruptcy procedures. The FIDELIQ mills were already in this process when they were expropriated and bankruptcy procedures for the CAZE mills were initiated in 2006. These procedures, while lengthy, should eventually provide an efficient write-off of the outstanding debt.

I.6.2. Seasonal Credit

Two types of short-term credit are essential to the smooth operation of sugar production: sugar growers need up front cash for inputs and field preparation; and mills need cash to purchase cane from growers and to carry sugar inventories until they are sold. In most cases, prior to the expropriation, the credit provided to growers by the mills was both scarce and expensive, in part because ejido lands cannot be collateralized and private property can rarely be seized in cases of default. In more recent times, the industry has been more successful in separating longer-term debt obligations by the mills from the delivery of short-term credit. This is important, since it allows indebted mills to continue day-to-day operations without undue risk to creditors and has also allowed growers, who have depended exclusively on mills for credit, to access credit from a variety of sources.

Generally, the delivery of credit to growers works in the following way. Growers, looking for credit from commercial banks, establish a trust fund that guarantees repayment. Funds for the guarantee are provided partly by the growers themselves (usually one-third of the guaranteed value), while SAGARPA and FEEGA (a guarantee fund operated by FIRA) provide the remainder. As cane is delivered, the mill acts as an agent of the growers’ trust fund and retains a portion of the cane revenue to repay the seasonal loans. Commercial banks lending to the trust fund can borrow from FIRA, but in recent years have made use of FIRA guarantees while obtaining funds elsewhere at lower cost. In the case of the less viable mills, financing often comes through Financiera Rural, a publicly funded development bank. The system has worked well and default rates are low.

For the mills, short-term financing has increasingly relied on the use of sugar warehouse receipts. In this approach, sugar inventories are held in certified warehouses as collateral. The warehouse operator guarantees quality and quantities. Most banks will ask that sugar inventories be stored in warehouses outside of the mill and in large consumption centers, to avoid mismanagement by the mill and also to avoid the blocking or seizing of the sugar by protesting growers or workers, as has happened in the past. Warehouse receipts are transferable under Mexican law and title of the sugar is effectively transferred to creditors. A separate repurchase agreement guarantees transfer back to the mill at a rate that covers creditor expenses. This mechanism isolates the collateral value of the inventories from other obligations by the mills, since the creditor is free to liquidate the inventories should the mill fail to exercise the repurchase agreement. Overall, the system has provided a reliable stream of short-term credit for the mills.

22 To comply with the expropriation decree FEESA had to honor debt owed to growers and workers as well as debts that would jeopardize the day-to-day operation of the mills if they were not paid.

23 FIDELIQ was a trust that now is SAE, the Administration and Sales Service of SHCP. FIDELIQ did not promote amparos against the expropriation.
II. IMPLICATIONS OF PHASING OUT SUGAR TARIFFS UNDER NAFTA

II.1. Impact of NAFTA on the Mexican Sugar Market—Cost Curve Results

To recap, recall that the tariff limiting Mexican exports of sugar to the United States has declined rapidly since 2003, so that the direct effects of NAFTA tariff reductions are largely already felt. Perhaps more significant will be the elimination of Mexico’s tax on soft drinks containing HFCS on January 1, 2008. The elimination of the tax, together with the scheduled elimination on sugar and maize tariffs, will put in place a set of policies that allow for the full integration of the U.S. and Mexican sweetener markets. It should be kept in mind that most soft drinks in the United States are sweetened with HFCS rather than sugar (as is the case in Mexico.) As relative prices within the two countries fall into line, Mexican sugar used for soft drinks is likely to come under increased pressure.

As reflected in figures 12 and 13, about 10 percent of refined sugar and 40 percent of estandar sugar produced in Mexico is not profitable in the price range for #14 contracts, the futures price of raw sugar in the United States (adjusted as appropriate for transportation and refining). The following should be noted:

The calendar year in the sugar market is characterized by relatively low prices in the first half when producers are trying to push their product into the market to obtain liquidity for cane payments and general operation, and higher prices in the second half when the new season is getting underway. Without import tariffs or quotas on U.S. sugar, imports of #14 sugar during the second half of the year would reduce these arbitrage opportunities. Indeed, seasonal price fluctuations

24 These dates also coincide with the start of the beet campaign in the United States.
already appear to have flattened somewhat. This will benefit consumers and judging from the cost data discussed previously, prices will not decrease to levels that would significantly threaten mills that currently are profitable.

Mill profits, however, will be reduced as domestic prices come closer to #14 contract plus refining and freight. This process will affect estandar sugar more than refined.

The quantities under the greatest competitive threat are around 1.3 million tons of estandar sugar and 180 thousand tons of refined, which combined account for roughly 29 percent of national production. This does not necessarily mean that these mills will close, but rather that they will have to bring their costs down enough to compete at the #14 reference price, a possibility which does not seem unrealistic.

Most of the mills are competitively challenged when comparing their cost against world prices, as shown by the #11 Contract of the NYBOT. However, a more important issue is that HFCS prices typically fall between the #11 and #14 prices, which could drive sweetener prices down in Mexico as imports of U.S. HFCS increase. Additional imports of world sugar into Mexico and/or the United States, as well as any decline in corn prices, could reduce the price Mexican producers receive for their sugar.

As a practical matter, any Mexican sugar displaced by HFCS falls into a common U.S.-Mexican market and likely puts downward pressure on prices in both countries. In turn, the United States is committed to support sugar prices in the short-run by acquiring inventories and in the longer-run by managing third-party imports under its TRQ system. To the extent that both U.S. and Mexican mills can remain competitive behind the common U.S.-Mexican tariffs, further adjustments to the market will come at the expense of third-party imports.
III. EVALUATION OF POLICIES FOR THE SUGAR SECTOR

III.1. Policy Evaluation Matrix

Policymaking in the cane and sugar sector is a politically sensitive matter in Mexico. The goals of efficiency, efficacy, and economy have always been limited by political considerations in this highly controversial industry. The resulting cost of supporting the industry has fallen to varying degrees on taxpayers and consumers depending on the particular conditions and political pressures of the time. In general, consumers pay by facing significantly higher prices, while taxpayers have been asked to pay for bad debt. The current structure of the industry tends to spare taxpayers and the government budget but places much greater costs on consumers. The transfers from consumer to industry are high. The average spread between the better measured U.S. and international raw sugar prices for the last ten years is about US$0.281 per kilogram. Given a conservative consumption level of 40 kilos per capita, and a similar spread in Mexico, the transfer works out to about US$10.33 per capita, or over US$1 billion a year.

Table 6 shows a policy evaluation matrix of past, present, and possible future policies in the sugarcane and sugar sector. It should be noted that the policy objectives have changed as the government has developed a greater interest in linking sugarcane producers with the emerging market for biofuels. This relatively new objective creates important challenges as well as opportunities.

When considering this policy matrix it is important to understand the unique attitude of the Mexican government towards the sugarcane and sugar industry. It is common in government policy discussions about this sector to hear laments
about its backwardness and reluctance to integrate into modern markets, mixed with expressions of awe as to why the sector does not respond to world market signals.

However, this should come as no surprise since Mexican policies essentially isolate its domestic sugar market from the world market. For example in other countries, such as Brazil, low sugar prices and growing opportunities in energy markets have created strong incentives to expand the use of sugarcane for ethanol production. But in Mexico the state monopoly in the energy market and de facto protection of the cane-to-sugar production chain limit the sector’s ability to respond to the strong signals currently being sent by world energy markets.

Isolation of the sector from world signals is not only due to trade protection. The government’s recurring interventions to rescue the sector have also contributed to its failure to modernize. Moments of crisis should be the perfect opportunity to change policy orientation.

Table 6. Evaluation of Sugar Sector Policies

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<tr>
<td><strong>Policy objectives</strong></td>
<td>Eliminate rural poverty</td>
<td>Obtain foreign currency</td>
<td>Eliminate rural poverty</td>
<td>Reprivatization of the industry</td>
<td>Resolve insolvency crisis</td>
<td>Conclude privatization of expropriated mills</td>
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<td>Resolve social unrest after the Revolution</td>
<td>Use the industry as an instrument to resolve broader labor issues</td>
<td>Political control of the peasant base</td>
<td>Reduce political and social unrest in the cane fields</td>
<td>Reduce political and social unrest in the cane fields</td>
<td>Conclude legal controversy with congress on the Cane Law</td>
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<td>Political control of peasant base</td>
<td>Political control of peasant base</td>
<td>Increase investment in the industry</td>
<td>Eliminate government involvement in setting prices</td>
<td>Eliminate government involvement in setting prices</td>
<td>Explore feasibility and options for greater production of ethanol and participation in domestic and export ethanol markets.</td>
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<td><strong>Policy instruments</strong></td>
<td>Price-cartel</td>
<td>Fixed sugar price</td>
<td>Increased government participation in the industry</td>
<td>Privatization</td>
<td>Expropriation</td>
<td>Better coordination and planning of non-NAFTA imports to mirror U.S. policy and create more predictable supply and prices.</td>
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<td>Permissive government in mill-peasant relationship</td>
<td>Cheap credit for the industry</td>
<td>New Decreto Cañero linked cane prices to sugar prices</td>
<td>New Decreto Cañero pegged cane prices to other crops and dissolved the obligation of growers to only sell cane to specific mills</td>
<td>Import quotas</td>
<td>Enhance business opportunities for agriculture in the government-controlled energy market</td>
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<td></td>
<td>Decreto Cañero: linkage between mills and specific growing areas</td>
<td>New Decreto Cañero pegged cane prices to other crops and dissolved the obligation of growers to only sell cane to specific mills</td>
<td>Expectation of huge exports to the United States under NAFTA</td>
<td>Expectation of huge exports to the United States under NAFTA</td>
<td>Attempts to reprivatize Congress took protectionist measures against fructose</td>
<td>Increased use of technology in both the fields and mills</td>
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<td></td>
<td>Fructose imports to spur competitiveness and prompt consolidation/closure of inefficient mills</td>
<td>Fructose imports to spur competitiveness and prompt consolidation/closure of inefficient mills</td>
<td>Measures to address debt-issues</td>
<td>Consolidation of small plots of land and decollectivization of property</td>
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<td></td>
<td>Abrogation of Decreto Cañero</td>
<td>Expropriation</td>
<td>Better coordination and planning of non-NAFTA imports to mirror U.S. policy and create more predictable supply and prices.</td>
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<tr>
<td><strong>Economy for the state</strong></td>
<td>Zero-cost program</td>
<td>Huge credit bailouts</td>
<td>Very expensive subsidization of the industry</td>
<td>Mills privatized with full liabilities, providing short-term benefit to the state but giving rise to medium-term crisis</td>
<td>Cash cost of the expropriation was low, but had an important opportunity cost for Government</td>
<td>Energy market opportunities and world market openness may require compensation for losers</td>
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<td><strong>Efficiency of policies</strong></td>
<td>Oligopoly pricing, where consumers bore most of the cost</td>
<td>Fixed prices to reduce costs to consumers resulted in higher per-capita consumption</td>
<td>Combination of price controls and producer subsidies/credit led to crises during the 1980s</td>
<td>Linkage of cane prices to sugar prices was a huge mistake that created an upward spiral of cane prices and prompted the return of cartels to the sugar trade</td>
<td>The misalignment of domestic, NAFTA and international prices became broader, from successful cartelization of industry members, including Government</td>
<td>Should be evaluated by the level of alignment of Mexican prices with NAFTA and world prices</td>
</tr>
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<td><strong>Efficacy of policies</strong></td>
<td>Social unrest and political control was attained, poverty issues remained unresolved</td>
<td>Policy was effective in obtaining hard currency through exports and resolving broader labor issues</td>
<td>Credit was diverted to investments in other businesses</td>
<td>Poverty issues remained unresolved</td>
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<td>Policy was very effective in reducing poverty in rural cane-growing areas, but quite ineffective in increasing efficiency in the sector</td>
<td>Policy was effective in preserving an activity that was very important to rural Mexico, while at the same time reducing its cost to the state</td>
<td>Policy could not improve the sector's ability to compete with other sweeteners</td>
<td>The only objective that expropriation was successful in attaining was the resolution of the political and social unrest in the cane field</td>
<td>Abrogation policy backfired, when decreto cañero became a law</td>
<td>Should be evaluated by the success of the policy in integrating the cane sector into the energy market, reducing sweetener prices, and preserving efficient cane producing areas</td>
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### III.2. Recent Policy Developments

Following the abrogation of the cane decree in 2004, Congress passed a Cane Law in 2005 that not only reproduced but enhanced the protectionist spirit of the previous cane decree. The executive branch, through the Attorney General, filed a suit challenging the constitutionality of the Cane Law. The suit specifically argued that the law allows illegal price fixation by congress and/or the executive power, violates freedom of association by limiting the number of cane producer organizations, and improperly establishes a compulsory arbitrage entity independent of the judiciary. The attorney general also contested the Cane Law’s intention to regulate the form and content of cane supply contracts. The Supreme Court ruled that:

- Government intervention in prices is constitutional, but the Court implied that such interventions should only happen in accordance with Article 7 of the Competition Act, which allows price ceilings but not minimum prices as expected by the cane growers.
- Constraining the number and nature of cane producer associations is constitutional.
- Compulsory arbitrage by an entity separate from the judiciary branch is unconstitutional.
In parallel with the Attorney General’s suit, the sugar mills filed an injunction (amparo) against the Cane Law that included broader concepts of injury, particularly regarding the form of cane contracts. Even though the Cane Law mentions the possibility of nonuniform contracts, how they would be implemented is left unclear. This and other issues are still pending resolution, but in the meantime mills continue to use the national sugarcane pricing formula for both economic and political reasons.
IV. TRADE POLICIES AND MARKETING ISSUES

This section provides a set of policy options that could help maximize the benefit of NAFTA for the sugar sector. But while the economic cost of these measures is quite low, their political cost could be very high. The cane and sugar sectors are very wary of trade policy reforms because of the downward pressure that more open trade would likely exert on prices and business opportunities.

IV.1. Sugar, Fructose, and Possible Dumping Issues

U.S. sugar producers have expressed interest in opening a dumping case against Mexican sugar on the grounds that the wholesale price from Mexican mills to international traders is lower than the domestic price in Mexico. Such concerns have been raised in publications such as Inside U.S. Trade and include speculation that the price for Mexican sugar sold to the United States is lower than its cost of production.

However, based on the cost data presented earlier, it is improbable that Mexican sugar is being sold at a loss to the United States. Most of the sugar exported recently to the United States from Mexico is refined and according to the data in Figure 13 only 20 percent of Mexico’s refined sugar has production costs higher than the minimum range of the NYBOT #14 contract, only 10 percent exceeds the maximum price for #14, and none is as high as the minimum price for Midwest refined.

Nevertheless, and particularly in the face of a possible attempt from the U.S. sugar industry to block imports from Mexico, firms must keep detailed records of their export operations so that they can defend themselves in the event of a dumping controversy.
Another important question is the degree to which corn fructose poses a competitive threat for the Mexican sugar industry. Recent increases in the price of corn due to rising demand for ethanol seem to have slowed the growing production of corn sweetener in Mexico. But despite the ethanol boom there is still plenty of opportunity for both imported and domestically produced HFCS to displace sugar. As biotechnologically enhanced corn varieties continue to increase yields in Mexico, the cost of domestic production will decrease, allowing Mexican HFCS producers to compete more effectively against U.S. fructose exports, which face greater costs in terms of freight and logistics because of the need to use food-grade, controlled temperature, stainless steel containers to avoid fungal and bacterial contamination during transport to Mexico.

It is difficult to estimate the cost of producing HFCS because of the many byproducts that are also generated. One study\(^{25}\) (Suárez 1999) estimated the cost of wet milling fructose at 1,880 pesos per metric ton (dry basis), where 57 percent of the cost is raw materials, 42 percent processing, and 5 percent transport.


<table>
<thead>
<tr>
<th>Input</th>
<th>Price increase (%) 1998–2007</th>
<th>Pesos per ton (dry basis)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw materials (corn)</td>
<td>76(^{a})</td>
<td>1,072 1,886</td>
</tr>
<tr>
<td>Processing and transport</td>
<td>27(^{b})</td>
<td>884 1,119</td>
</tr>
<tr>
<td>Total</td>
<td>1,955</td>
<td>3,005</td>
</tr>
</tbody>
</table>

Source: IMCO, with data from Suárez (1999).
(a) Increase in Kansas City average cash prices, 1998–2007
(b) Increase in U.S. urban consumer price index, city average (CPI-U, 1984=100).

The HFCS industry is essentially a price taker, with HFCS quotes usually come in only slightly lower than sugar prices regardless of its production cost. As reflected in Figure 15, at current prices, the profit margin for producers of HFCS is about 60 percent.
In addition, the Mexican sugar industry has enjoyed a very high level of protection against corn sweeteners. After several attempts at imposing quotas and other trade measures to restrict HFCS imports, in 2003 the Mexican Congress levied a tax on beverages sweetened with anything other than cane sugar. The United States took the issue to the World Trade Organization (WTO), which decreed that Mexico should repeal the soda tax by the end of 2007, and indeed the tax was not included in the 2007 Government Revenue Act (Ley de Ingresos de la Federación). In July 2007 the United States and Mexico agreed on reciprocal sugar and HFCS import tariffs and quotas through 2007. Despite the expectation that the final phaseout of tariffs and quotas in 2008 could lead to a flood of HFCS imports, high corn prices may give the Mexican sugar industry a measure of relief from competing against HFCS, at least in the short-term.

**IV.2. Sugar Quality and Specifications**

Mexico’s estandar grade sugar barely has a market in the United States; it is too dark to sell as refined sugar and has higher polarity than raw sugar.

In general, Mexican mills do not have the cost structure required to compete in the international raw sugar market, in which mills must be able to make a profit at prices of 10-12 cents per pound (220-265 dollars per metric ton), including transport costs to the nearest port.

This does not mean that only Mexican mills that produce refined sugar can export to sell to the U.S. wholesale market, but rather that with the current cost structure mills that produce estandar will need to discover and cultivate niche markets in the United States such as organic sugar, specialty packaging, oversized grain, bakery sugar, and others.
However, niche markets have the disadvantage of quick saturation. The commoditized estandar sugar could find a more reliable market in the United States by modifying its characteristics in three ways: raising the color specification, increasing minimum polarity, and reducing extraneous content. Addressing the color and polarity will involve only minor costs, but reducing the extraneous content will require major capital investments.

Color specification could be brought up, if not to the 25-50 ICUMSA required to be considered refined, then at least to an acceptable 100-150 ICUMSA at only a small cost per ton in any energy-efficient mill. Increasing minimum polarity from 99.4 degrees to 99.5 degrees, the minimum U.S. standard for refined sugar, is also a measure that can be taken at an insignificant cost.

However, reducing extraneous matter, particularly the iron content produced by the sanding effect of sugar in contact with processing equipment at the mill, will require heavy investments—iron equipment would have to be replaced with stainless steel, which practically means rebuilding the mill. A very rough estimate is that this would cost US$100–300 per ton of seasonal production, meaning that in a 100,000 ton mill (roughly the average size for Mexican mills), the total investment could be between US$10 million and US$30 million.

**IV.3. Mexican and U.S. Policies on Non-NAFTA Imports**

The highly protective sugar policy of the United States is very complex and it would be difficult to do the subject justice in just a few paragraphs. It seeks to balance the interests of consumers and domestic producers through a combination of industry support and import barriers aimed at controlling supply, achieving specific minimum price targets, and avoiding fiscal costs to the government.

The government basically guarantees its domestic industry a minimum price for sugar by providing mills with short-term loans (maximum of nine months) prior to the crushing season based on a preestablished price per pound of sugar. The processor has the option of repaying the loan or forfeiting an equivalent amount of sugar to the Commodity Credit Corporation (CCC), a U.S. government agency. If too much sugar is imported the price will fall below the level at which producers can make a profit and they will forfeit their sugar rather than repaying the loan, effectively transferring the cost of the program to the government.

To control supply the government imposes prohibitively high tariffs on imported sugar, but allows a specific amount—the Tariff Rate Quota (TRQ)—to be imported either duty free or at a much lower tariff rate. The U.S. sugar industry actively lobbies to reduce these quotas to keep domestic sugar prices high. Since HFCS was introduced in the 1970s, artificially high sugar prices have contributed to the rapid growth in their production, particularly for use in the beverage industry where HFCS almost completely displaced sugar. This substitution of HFCS for sugar is a key reason why the total TRQ was reduced during that period. However, beginning in 2005 the ethanol boom has increased demand for corn and driven up its price, leading to higher production costs for HFCS producers and weakening the

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26 ICUMSA stands for the International Commission for Uniform Methods of Sugar Analysis.

27 According to the USDA [http://www.ers.usda.gov/Briefing/Sugar/Trade.htm], a TRQ system applies “a two-tiered tariff for which the tariff rate charged depends on the volume of imports. A low-tier (in-quota) tariff is charged on imports within the quota volume. A high-tier (over-quota) is charged on imports in excess of the quota volume.”
competitive position of HFCS in relation to sugar.

In recent years the United States has typically imported roughly one-quarter as much sugar through the TRQ system as it produced domestically (including both cane and beet sugar). Most of the TRQ is for raw sugar and is assigned to specific countries. From 2003 to 2005 the annual total TRQ was about 1.1 million metric tons of raw sugar (MTRV), but in fiscal year 2006, when U.S. sugar inventories were low following major hurricanes in Louisiana and Florida (were most U.S. sugar is produced), the TRQ was raised to 2.6 million MTRV. About 91.2 percent of this quota (2.4 million MTRV) was actually delivered.

The original TRQ allocations were largely based on actual import patterns at the time the system was initiated. The TRQ favors countries with median production costs (like the Dominican Republic) as well as those in which U.S. sugar companies are operating. Also, the TRQ is assigned to nations with which the U.S. has good political and commercial relations. However, the quota is not assigned on political criteria alone; there are also efficiency considerations, such as the producing countries’ costs and their distance from the United States.

Under the terms of NAFTA, Mexico and the United States have a customs union in sugar in which both countries must essentially set the same tariff for non-NAFTA sugar imports to avoid substitution of cheap non-NAFTA sugar for expensive domestic sugar in one country that could then be exported to the other country. While the U.S. TRQ creates an opening for nontariff sugar imports, it is unlikely to be

In contrast, Mexico makes policy “on the fly” to grant import quotas to third-party countries whenever it determines that there are speculative movements to take advantage of varying domestic prices, which usually happens when sugar prices increase during the second half of the calendar year. This policymaking pattern on imports is less predictable than U.S. policy. Mexico should mirror the predictability and consistency of the U.S. quota, for the benefit of its consuming industries and individual consumers.

29 Ibidem, Table 23e.
30 Which should be the reason why U.S. authorities have such a keen interest in Mexican, Central American, and Caribbean production.
V. POLICY OPTIONS TO IMPROVE THE COMPETITIVENESS OF MEXICAN SUGAR UNDER NAFTA

As seen in the previous sections, no Mexican mill can produce sugar at the cost required to easily compete in world markets, about 10–12 cents per pound. Some cannot even meet the much higher production efficiency ceiling to compete in NAFTA, about 22–23 cents per pound. Therefore, serious reforms and restructuring are required to minimize the impacts of NAFTA on the Mexican sugar industry.

V.1. Mill Size and Structure

The rule of thumb in the international sugar business is that to be successful a mill must produce more than 100,000 thousand tons of sugar per season and have a sugar-to-cane recovery ratio greater than 10 percent. While these are not the only determinants of production cost, they provide a useful benchmark.31

Table 8 shows that 78 percent of Mexican mills have recovery rates higher than 10 percent, 40 percent produce more than 100,000 tons per season, and 37 percent meet both criteria.

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31 These mills still can have high costs, which stem from inadequate regulation or a combination of inefficient cane fields and factories. Mills like San Cristobal got too big, with a disordered layout, which creates inefficiencies.
Table 8. Mills with Production over 100,000 Tons and Recovery Rate above 10 Percent

<table>
<thead>
<tr>
<th>Recovery rate</th>
<th>Below 85,000</th>
<th>85,000-100,000</th>
<th>More than 100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over 10%</td>
<td>19 mills</td>
<td>5 mills</td>
<td>21 mills</td>
</tr>
<tr>
<td>Below 10%</td>
<td>8 mills</td>
<td>2 mills</td>
<td>2 mills</td>
</tr>
</tbody>
</table>

The government could assist the industry in becoming more competitive by helping growers to consolidate and mills to scale up production to increase their capacity and efficiency. This can be achieved by making the investments required to scale up their processing capacity to a more cost-effective size, improving their sugar recovery rates, or closing smaller mills and consolidating production in the larger ones. A key role of the government would be to use its convening power to bring together disparate and often competing stakeholders in the industry to study and collaborate on how best to increase profits and production in the sector. However, before growing more cane and increasing overall processing capacity there should be careful analysis of whether there would be a market for any additional production.

V.2. Downsizing the Labor Force

The serious overstaffing of Mexican mills is the single most important area in which cost savings can be achieved, but efforts to reduce the number of workers have been unsuccessful. The Secretaría del Trabajo y Previsión Social (STPS), Mexico’s labor authority, historically has been managed with a tendency toward minimizing conflicts, which has not helped reduce labor costs or increase labor efficiency. Labor currently represents 14.2 percent of total production costs in the sugar industry and almost 45 percent of the processing costs at mills. When compared to the United States, the number of mill workers is high. A recent USDA study finds that in the United States, 908.6 tons of sugar is produced per mill worker. The comparable figure for Mexico is 94.3 tons. Still, overall costs are similar, U.S. cost for mill workers was $97.7 / ton, while the cost in Mexico is roughly $85.5 / ton.

The sugar industry is ruled by a Contrato Ley, a mandatory labor contract for all companies and workers. The industry must be provided the financial and political resources, including compensation and retraining for laid-off workers and support to affected communities, to enable this contract to be changed or eliminated so that appropriate reductions can be made in the labor force at the mills. Critics argue that constraints on efficiency tied to the Contra Ley arise partly because the specific tasks enshrined in the industry standard contract are restrictive and do not reflect modern realities, making it difficult to phase out certain classes of employee while adding others. By way of example, the work-rules on steamfitters is spelled out, while rules concerning computer technicians are not.

V.3. Energy Cost Reductions

The second most important place to reduce processing costs is in energy use. Industry-wide, energy represents 4.6 percent of total costs at the mill and 14 percent of processing cost. Mills could dramatically reduce their energy costs by using bagasse, which is abundant
at the mills, rather than burning bunker oil or using electricity from the Mexican power company CFE. The Brazilian, Guatemalan, and Colombian experiences show that it is possible to meet the entire energy demand of a mill on bagasse alone.

**V.4. Cost Reduction in the Cane Fields**

As noted previously, there is both a serious need and significant opportunity for cost reduction in the Mexican sugar industry. An important facet of this is the production cost of sugar cane, which is almost as high as the world price for processed sugar.

Transportation costs. On average, transportation accounts for about 16.5 percent of the cost of sugarcane delivered to the mills. The mills, growers, and local governments also invest significant amounts every year to maintain the roads on which cane is transported, but responsibility for the transportation itself falls to each grower and there is little coordination or integration of investments, resources, equipment, or timing. This system must be rethought, with the transport of cane to the mill managed as a shared, centrally coordinated responsibility. A good example of such an integrated framework is Australia, where mills use small railroads or a small fleet of trucks controlled by the mill to transport cane from surrounding areas.

Sugarcane varieties. There are also opportunities to increase cane production and yields, which could help reduce costs. Australia and Brazil, for example, use cane that is genetically modified for special purposes, such as having a higher percentage of reducing sugars to improve yields for ethanol production or being more resistant to water stress.

In the past Mexico produced its own varieties through the Instituto Mexicano para la Producción Azucarera, (IMPA) a government research entity in cane genetics. After IMPA was closed in the early 1990s, production of hybrid cane varieties was taken over by the Cámara Nacional de las Industrias Azucarera y Alcohólera (CNIAA). Most varieties in widespread use in Mexico were developed between the late 1950s and the early 1970s. At one time Mexican mills were processing 40 different varieties of cane, but this has been reduced to 10 to 16 principal varieties, which has allowed better control of the sucrose maximization curve. The main varieties used in Mexico during the 2000/2001 season were Mex-69-290, CP-72-2086, Mex-68-P-23, and Mex-57-473, which accounted for almost 60 percent of the cane in the country.32

The cane varieties used in many of the expropriated mills were developed by the growers themselves through years of hybridization of the four main varieties. Additional and deliberate efforts should be made to introduce new varieties with higher yields and to match particular varieties to specific local growing conditions and needs rather than relying on the haphazard efforts of different growers and mills. The high yields of Australia shown in Figure 6, between 10 to 15 tons of sugar per hectare, reflect the benefit of using Queensland varieties developed specifically for Australian conditions.

If Mexico achieved the same yields as Australia, its current 664,244 hectares of sugarcane would produce between 6.64 and 9.96 million tons of sugar as opposed to the 5.23 million tons actually produced in 2006/2007. Producing 6.64 million tons would severely stress the current industrial infrastructure and producing 9.96 million tons would definitely require more milling capacity.

Plot size and field fragmentation. The small size of most landholdings, an omnipresent problem in Mexican agriculture, is one of the sugar industry’s main obstacles to improving the efficiency of cane production. Barbed-wire fences, walls, and natural obstacles, which divide and protect not only individual property but collectively owned ejido property as well, make mechanization difficult and property ownership must be organized in such a way that these barriers are not necessary and can be dramatically reduced.

V.5. Risk Sharing

Mexican sugar policy has traditionally emphasized reducing the risks faced by cane producers but has provided little security for sugar mills. The growers do not invest their excess capital in the mills, which face greater market risks, but instead put the money into unnecessary fertilizers or new trucks that will later saturate the roads and without necessarily improving overall transportation efficiency. Meanwhile the mills are undercapitalized and often run into financial trouble when the sugar market is unfavorable.

The current formula of giving growers 57 percent of a set reference price for the sugar their cane is expected to produce is not really a risk-sharing mechanism. The cane payment is calculated on the basis of a fixed theoretical price while mill revenue depends on actual market conditions. As it currently operates, the policy makes growers’ interests are antagonistic to those of the mills. A more rational approach would be to encourage mills to allow growers to become part owners in the mills, while reducing guaranteed prices for growers. This would align their common interests in policies that would maximize profits. Given that there are reliable profits and appropriate cash flows in the cane side of the business, it would be logical for growers to start investing in the mills if they expect the industry to grow and continue providing positive externalities. In the 1970s, the government gave expropriated mills to the growers but did not give them a clear mandate, corporate governance, and or instruments to hedge sugar business risks. It is no surprise that all of these experiments failed.

If it is not possible for the growers to buy stock in the mills, another option is to make the payment formula for sugarcane more flexible and link it more closely to actual market conditions. One way of implementing this would be to pay the growers most of their share of the reference price on delivery of cane to the mills, but holding a fixed percentage in escrow until the actual market price is determined to ensure that the mills get their 43 percent of the price.

V.6. Vertical Integration

Efficient sugar production requires some degree of vertical integration between growers and the mill. Guatemalan, Colombian, Brazilian, and U.S. mills have control over a large percentage of the fields that supply their cane. But this does not necessarily mean that the Mexican Constitution should be amended so that industrial owners can buy more land. By law, the pequeña propiedad cañera (small landholding in sugarcane) should not be larger than 300 hectares and a single agroindustrial complex should not control or contract production from more than 7,500 hectares of sugarcane fields. However, some agroindustrial companies create legal structure to get around this restriction, mainly by renting land.

Since vertical integration is closely linked to the risk sharing issues mentioned before, and options for mills to directly control production are limited by law and the current landownership structure, the government
should promote partnership arrangements between growers and processors that include a clear mandate, transparency, and good corporate governance. This should be feasible given that the mills and their supplier base are natural partners with a common interest in promoting the well-being and viability of the industry.

V.7. Energy, Biofuels, and Electricity Production

The Mexican sugar industry could substantially reduce its energy costs and reduce its carbon emissions by burning bagasse to meet energy needs at the mills rather than using oil and electricity. The mills could also generate revenue by trading carbon bonds and selling electricity back into the grid or to other industrial users if the Comisión Reguladora de Energía (CRE) listed sugarcane bagasses as a renewable sources of energy and if Mexican laws were modified to loosen restrictions and price controls on the sale of electricity to the Comision Federal de Energía (CFE). Furthermore, if the mills could profit by selling their excess electricity they would have greater incentives to prevent thermal loss through better insulation and make other investments aimed at improving their energy efficiency.

Ethanol has an opportunity cost in terms of sugar and/or molasses production. Producing ethanol from sugarcane usually requires large mills that are vertically integrated with their source of raw material. A Brazilian usina can harvest cane from a geographical area well in excess of 75,000 hectares. Nothing remotely similar exists in Mexico. The expropriated San Cristóbal mill, for example, one of the largest in Mexico, is supplied by a growing area of about 42,000 hectares, but at very high costs.

In addition, the high production costs and guaranteed prices for cane in Mexico make ethanol production unfeasible. Some governors and cane grower unions advocate creating a differentiated market with clearly separated cane supplies for sugar and ethanol production. However, such a market would be very difficult to implement without creating arbitrage opportunities between the two sectors.

Producing electricity for sale through the power grid (by burning bagasse) is an attractive business venture for mill owners because it rewards greater mill efficiency and does not have opportunity costs in terms of other foregone economic activities, regardless of whether the cane is used for sugar or ethanol. The Ministry of Energy’s 2002 National Energy Balance statistical report showed that sugarcane bagasse accounted for 1.4 percent of Mexico’s gross internal energy supply.33

Selling electricity to CFE offers limited profit incentives because it is the only legal buyer of electricity and therefore exercises monopsonistic control and pricing. However, there are some mechanisms to avoid the constitutional restriction for public service of energy, such as selling the electricity directly to a partner company.

Again, the CRE should include sugarcane in its list of renewable sources of energy so that it can be considered for carbon bond trading and to be exempted from laws restricting sales to the grid. Wider energy policy must be addressed for this electricity to have the best possible sales price.

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V.8 Process

As discussed, the sugar industry is made up of private producers and growers. The government currently takes an active role in the industry but it is unlikely that sustainable reforms can take place without broad agreement between the mills, growers, and local communities. For this reason, the government should consider using its influence to gather the many industry stakeholders into forging a common solution to the industry’s challenges.

In doing so, the industry may want to examine the process by which Australia is currently restructuring its sugar industry. In the late 1990s, the Australian industry was characterized by milling operations with mixed levels of competitiveness. New water management practices also highlighted a need to examine historic patterns of irrigation for sugar in dryer regions. In response, the Australian government brought together a broad group of stakeholders to forge a plan to restructure the industry. The result is the Sugar Industry Reform Program 2004 (SIRP). The program includes a statement of intent, signed by industry leaders, that focuses on long-term sustainability based on competitiveness and the appropriate use of natural resources. The government backs the restructuring with AUS$ 444 million targeting the following program components: sustainability grants; income support (including business planning for income support recipients); business planning (mills, growers and harvesters); reestablishment grants; retraining; grower restructuring grants; and crisis counseling; and intergenerational transfers.34

34 More on the program can be found at www.daff.gov.au.
VI. CONCLUDING REMARKS

The Mexican sugar industry has a promising future but only if strong measures are taken to restructure it. The NAFTA market integration is certainly a challenge, but the Mexican industry should be able to find appropriate measures to enable it to compete effectively at prices between the #14 futures contract and the Midwest Refined price. Comprehensive policy actions should be taken to tackle the complex issues of the sugar industry’s organization and should also give higher priority to the interests of Mexican consumers. There are plenty of opportunities for the industry to adjust its cost structure so that it can face the competitive challenges ahead.

The government recently took a very bold action in favor of consumers through a ruling from Comisión Federal de Competencia Económica (CFC), Mexico’s antitrust authority. The CFC ordered the Fideicomiso Comercializador (FICO), the trading trust fund of the expropriated mills, to be dissolved. The implications of this ruling are enormous, because it implies that no single industrial group can be the size of FICO (which currently controls the marketing of more than 25 percent of national production). This measure, combined with more openness to U.S. (and possibly international) sweeteners, should provide a huge incentive for industry efficiency.

But the most important challenge for the sugar industry—reducing its cost structure—faces big political obstacles. In general, mill owners invoke the interests of the workers and growers as a social rationale for not reducing production costs or allowing more open trade in sweeteners. The growers believe that mill owners are selling sugar at too low a price compared

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35 FICO was seen as a price referent in the private industry. New formation of price cartels will be harder without this price reference. Also, if FEESA-FICO controls the previously private producer groups CAZÉ, Alianza Popular, Jose María Morelos, Santa Rosalia, and San Pedro, that is the maximum group size that CFC, the Mexican antitrust authority, would permit. This should reduce opportunities of arbitrage.
with other consumer prices and assert that the 57 percent of the reference price that they receive is quite a bargain for the mills. In the eyes of the growers, excess costs are a way to receive a higher share of the value-added that would not exist without their raw material. They also oppose free trade because it would drive down prices and reduce the value of their sugarcane, making it difficult to make a profit given their current production costs. Like agricultural interests in most countries, Mexican cane growers have strong influence in Congress through their elected representatives. Legislative procedures and dynamics are biased toward preservation of the status quo and legislators representing sugar producing areas are generally wary of changes in policy.

A clear example is the abrogation of the Cane Decree in 2005 and SAGARPA’s interest in promoting a more free-market approach to determining cane prices. The growers’ legislative arm rapidly moved to pass a new Cane Law that preserved—and even strengthened—the protections that had been provided by the Cane Decree. This put then-President Vicente Fox in the tough position of either vetoing the law and suffering the political repercussions, or letting it pass and delaying the reforms that the sector needs to survive and remain competitive. In the end, although a constitutional controversy was promoted by the Attorney General of the Republic against the law and decisions were delivered by the Supreme Court, some issues remain ambiguous or unresolved and the law is only partially in force. More importantly, while the law in principle allows mills to opt out of the national pricing policy and agree to nonuniform contracts with individual growers, for economic and political reasons the status quo remains largely unchanged.

Moving forward, it is in the interest of all stakeholders to work toward a sustainable and profitable sugar industry. The ongoing integration of the US and Mexican sweetener markets represent both competitive threats and opportunities. Uncertainty about policy and lingering disputes can only work against the pressing need to improve productivity within the industry.