A Partial-Equilibrium Simulation of Increasing the U.S. Tariff-Rate Sugar Quota for Cuba and Mexico

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In 1960, President Eisenhower enacted an economic embargo on Cuba, which is still in effect today. However, recent developments in Congress indicate a move toward cooperation with Cuba. Such actions include the introduction of the Cuban Humanitarian Trade Act of 1999, introduced in the House, the Cuban Food and Medicine Security Act of 1999, introduced in the Senate, as well as the United States-Cuba Trade Act of 2000, introduced in both the House and Senate.

The possibility of resuming trade with Cuba, along with the increase in trade with Mexico and Canada due to the NAFTA create an environment of uncertainty in U.S. markets. Of major concern is the NAFTA's influence on U.S. and Mexican sugar production, demand, and prices. This concern also holds true for the case of Cuba, the world's fifth-largest sugar exporter, and prior to the revolution of 1959, supplier of over one-third of total sugar requirements to the United States (Alvarez and Castellanos, 1995). Mexico and the United States underwent difficult negotiations due to the ambiguous nature of the original NAFTA text and a "side letter" allowing different quantities of Mexican sugar into the United States. One controversial issue is whether to include corn sweeteners when computing Mexico's net surplus producer status. Another is the level of the allocation when Mexico reaches net surplus producer status. According to the American Sugar Alliance (2001), for years 2000-2007, Mexico can export up to 250,000 MT of raw or refined sugar to the United States when it is a net surplus producer. For fiscal year 2001, however, the USDA announced Mexico's allocation at 105,788 MT. Mexico believed it should have complete access for all of its excess, which

it estimated at over 500,000 MT. Controversy notwithstanding, after the year 2008, Mexico will have unlimited access to the U.S. market.

The purpose of this study was to identify the status-quo of the sugar markets of Cuba, Mexico, and the United States, and then simulate various increases in the current U.S. tariff-rate quota for sugar, to include Cuba and account for increases in Mexico's allocation. The simulated effects on both domestic and international sugar markets, including production, consumption, prices, and trade are reported. Also reported are the simulated welfare effects for the U.S. sugar market. This study was carried out using a partial-equilibrium simplified world trade model, known as *Modele Internationale Simplifié de Simulation (MISS)* which simulates, in a comparative-static framework, the effects of various policy actions.

Overview of the Tariff-Rate Quota

The current U.S. sugar program continues to differ from the grains, rice, and cotton programs in that the USDA makes no income transfers to beet or cane growers. Instead, the incomes of producers are indirectly supported by limiting the amount of imported sugar through import quotas (Jurenas, 1999). The sugar program's provision of no net cost to the federal government also brought about the use of the import quota to support domestic prices and prevent loan forfeitures (Uri and Boyd, 1994). Quota allocations are given to quota-holding countries which allow the import of specific quantities of sugar produced in those nations at a first-tier, or low-tier, duty rate, which ranges from zero to 0.625 U.S. cents per pound. Imports above the allocated tariff-rate quota from either the quota-holding countries or other countries are subject to a second-tier, or high-tier, duty. This high-tier duty has historically been high enough to

discourage the importation of sugar above the low-tier quota (Henneberry and Haley, 1998).

Theoretical Framework

This study utilized the same model as that of Mahé et al. (1988), Johnson et al. (1993), and Kennedy et al. (1996). Consider a market in which N commodities are produced, consumed, and traded by K countries. Vectors of supply, demand, and excess demand are used to describe aggregate levels of production, consumption, and trade in each country. The supply sector in country k produces some combination of the N commodities in order to maximize producer rents, given prices, technology, and endowments. Aggregate production of the N commodities is described by the vector of supply functions:

$$(1) \qquad S_k (P^S_k; Z^S_k) = [S_{1k} (P^S_k; Z^S_k), S_{2k} (P^S_k; Z^S_k), \ldots, S_{Nk} (P^S_k; Z^S_k)],$$

where $P^S_k = (P^S_{1k,} P^S_{2k}, \ldots, P^S_{Nk})$ is the vector of prices observed by the supply sector and Z^S_k is a vector of exogenous variables, such as technology, input prices, and endowments for the supply sector of country k. The vector of demand functions describes aggregate consumption of the N commodities:

$$(2) \qquad D_k (P^D_k; Z^D_k) = [D_{1k} (P^D_k; Z^D_k), D_{2k} (P^D_k; Z^D_k), \ldots, D_{Nk} (P^D_k; Z^D_k)],$$

where $P^D_k = (P^D_{1k,} P^D_{2k}, \ldots, P^D_{Nk})$ is the vector of prices observed by the final demand sector and Z^D_k is a vector of exogenous variables for country k. The aggregate level of trade in the N commodities for country k is described by the excess demand functions:

$$(3) \qquad M_k (P^S_k, P^D_k; Z^S_k, Z^D_k) = D_k (P^D_k; Z^D_k) - S_k (P^S_k; Z^S_k)$$

where $M_k = (M_{1k}, M_{2k}, \ldots, M_{Nk})$ and $M_{ik} > 0$ indicates net imports and $M_{ik} < 0$ indicates net exports of commodity i for i = 1, 2, …, N.

The government of a country may intervene in the domestic market either through the use of price (π) or supply/demand shift (θ) instruments. A price instrument, denoted as $A^{\pi S}_{ik}$ for producers and $A^{\pi D}_{ik}$ for consumers of commodity i in country k affect the prices observed by the supply and final demand sectors. With the world price of commodity i represented as P^W_i, the domestic price functions for country k are:

$$(4) \qquad P^S_{ik} = P^S_{ik}(A^{\pi S}_{ik}, P^W_i) \text{ and } P^D_{ik} = P^D_{ik}(A^{\pi D}_{ik}, P^W_i)$$

for i = 1, 2, …, N.

Supply/demand shift instruments, denoted as $A^{\theta S}_{ik}$ for producers and $A^{\theta D}_{ik}$ for consumers of good i in country k, are implicit elements of vectors Z^S_k and Z^D_k which shift supply and demand functions by modifying non-price elements of a producer's or consumer's decision-making process. Examples include input subsidies, acreage reduction schemes, and food stamps. To make these supply and demand shifters explicit, the vectors Z^S_k and Z^D_k are defined as follows:

$$(5) \qquad Z^S_k = Z^S_k(A^{\theta S}_k, Z^{*S}_k) \text{ and } Z^D_k = Z^D_k(A^{\theta D}_k, Z^{*D}_k).$$

The aggregate supply, demand, and excess demand equations, (1), (2), and (3), respectively, can be expressed as functions of world price, policy instruments, and exogenous variables by substituting the domestic price functions (4) and the function of explicit variables (5) to obtain:

$$(1^*) \qquad S_k[P^S_k(A^{\pi S}_k, P^W), A^{\theta S}_k; Z^{*S}_k],$$

$$(2^*) \qquad D_k[P^D_k(A^{\pi D}_k, P^W), A^{\theta D}_k; Z^{*D}_k], \text{ and}$$

$$(3^*) \qquad M_k[P^S_k(A^{\pi S}_k, P^W), P^D_k(A^{\pi D}_k, P^W), A^{\theta S}_k, A^{\theta D}_k; Z^{*S}_k, Z^{*D}_k]$$

where $P^j_k(A^{\pi j}_k, P^W) = [P^j_1(A^{\pi j}_1, P^W), P^j_2(A^{\pi j}_2, P^W), \ldots, P^j_N(A^{\pi j}_N, P^W)]$ for j = S, D.

World markets are competitive by assumption, and world prices adjust to clear world markets. Therefore:

$$(6) \qquad \Sigma^{K}_{k=1}\ M_k\,[P^{S}_k\,(A^{\pi S}_k, P^{W}), P^{D}_k\,(A^{\pi D}_k, P^{W}), A^{\theta S}_k, A^{\theta D}_k; Z^{*S}_k, Z^{*D}_k] = \underline{0}$$

where the right-hand side of (6) is an n x 1 null vector. World prices are defined as functions of the actions of individual countries. Thus, the world price vector is the function:

$$(7) \qquad P^{W} = P^{W}\,(A^{\pi S}_k, A^{\pi D}_k, A^{\theta S}_k, A^{\theta D}_k; Z^{*S}_k, Z^{*D}_k)$$

for k = 1, 2, …, K.

Empirical Analysis

The empirical results were calculated using *Modèle Internationale Simplifié de Simulation (MISS),* developed by Mahé et al. (1988). *MISS* is a multi-product, multi-regional, non-spatial, partial-equilibrium, world trade model, which simulates, in a comparative-static framework, the effects of various policy actions. Mahé *et al*. (1988) used *MISS* for an analysis of the interaction between European and United States policies. That model consisted of seven commodities and four regions: the European Union, the United States, a market-based rest of the world, and a centrally planned rest of the world. Kennedy *et al*. (1996) utilized *MISS* to study policy decisions made during the Uruguay Round of GATT negotiations. Their model consisted of seven commodities and three sectors: the European Union, the United States, and the rest of the world. Kennedy and Hughes (1998) used *MISS* to analyze welfare effects of agricultural trading blocs, by simulating a North American customs union.

The present model consisted of four regions: Cuba, Mexico, the United States, and an aggregated "Rest of the World" (hereafter referred to as ROW). In order to create

a framework in which cane sugar and beet sugar were perfect substitutes, only one commodity was specified within the model: refined sugar. By expressing beet and cane production in terms of sugar produced rather than beet or cane produced, the levels of supply could be directly compared to the levels of demand. Thus, the model assumes that sugar is produced by the farmer and sold directly to the consumer. However, to capture supply response differences between beet and cane production, two distinct production sectors were specified in each region, sugarbeet producers and sugarcane producers, that produce the same commodity. Of course, since Cuba and Mexico produce sugar from sugarcane only, their respective levels of sugarbeet production were zero. One demand sector was specified, representing aggregate consumption of sugar by both industrial and non-industrial users. Since only one commodity was specified within the model, only one price was specified as well. This model made use of the London Daily Price for refined sugar reported by USDA as the world refined sugar price. To model domestic price departure from world prices, protection coefficients were specified for each region. In the case of the United States, this coefficient was based on the U.S. wholesale refined beet sugar price, Midwest Markets, reported by *Milling & Baking News* and listed in the USDA ERS Sugar and Sweetener Situation and Outlook Reports (hereafter referred to as SSR). Since the United States utilizes an import quota to support domestic prices, initial protection coefficients for supply and demand were equal. This was also true of Mexico, which, from the year 2000 forward, is required under the NAFTA to implement a similar import control system. Mexico's protection coefficient was based on refined sugar prices reported in the USDA FAS GAIN Reports (hereafter referred to as FAS). Cuba was assumed to respond to the world market price, and thus, had a protection coefficient of

one. For simplicity, transportation costs were assumed to be zero; therefore, each region had a margin coefficient of one. *MISS* does not specify beginning and ending stocks for each region. Rather, a general 'world stocks' was specified, which accounts for world excess supply/demand in order to balance the model.

Table 1 contains production, supply, and distribution data for Cuba, Mexico, the United States, and the ROW, reported in SSR. For fiscal year 1999, average wholesale refined sugar prices were 22.87, 27.02, and 9.81 cents per pound for Mexico, the United States, and the world, respectively (SSR, 2000).

Table 1. Production, Supply, and Distribution of Sugar, FY 1999, in 1,000 MTRV.

Production, Supply, and Distribution of Sugar, FY 1999 (1,000 MTRV)

	Beginning Stocks	Production	Imports	Exports	Domestic Consumption	Ending Stocks
United States	1,523	7,597	1,655	209	9,079	1,487
Beet		*4,013*				
Cane		*3,584*				
Mexico	670	4,985	0	590	4,400	665
Cuba	290	3,780	0	3,200	720	150
ROW *	23,309	114,307	34,265	31,921	110,158	28,341
*Beet ** *		*28,310*				
*Cane ** *		*85,997*				
Total	25,792	130,669	35,920	35,920	124,357	30,643

All figures rounded to the nearest whole number

* Calculated by subtracting US, Mexico, and Cuba from World Totals.

Source: USDA Sugar and Sweetener S&O/SSS-228/May 2000

** Taken from various FAS GAIN Reports.

The elasticities used in the empirical model were taken from various sources and adjusted to fit the present model. For brevity, only the final own-price supply and demand elasticities used in the simulation are reported in Table 2. The reader is referred to Petrolia (2001) for specific sources and modifications of elasticity estimates. The "supply" side is conceived to be composed of growers, cane refiners, and processors, while those of the demand side are households and users of refined sugar as an input,

such as bakers, confectioners, and beverage producers. The United States has both a short- and long-run elasticity of demand. While it is possible that consumer preferences for sugar may change over time, this difference is intended to represent, for example, a beverage producer's ability to switch to lower-cost sweeteners, such as HFCS, in the long run. We may conceive of land and capital being fixed in the short run, with all inputs being variable in the long run. Also, note that cane supply is more inelastic than that of beet, primarily because cane production is limited by local refining capacity. Since sugar beets do not experience a "refining" stage, beet growers do not have this limitation. Sugar beets and sugarcane do not compete for land, thus cross-price elasticities of supply were assumed to be zero. Also, since sugar was the only commodity within the model, there were no cross-price elasticities of demand. Note that simulations were undertaken using both "short-run" and "long-run" elasticities. The authors recognize that it is most difficult to conceive of a static model in the long run, and that short-run elasticites are the only appropriate elasticities for this type of model. However, the authors also believe that the short- and long-run elasticities may be more appropriately viewed as lower and upper bounds on elastities, giving the results a sort of "confidence interval".

Table 2. Own-price supply and demand elasticities used in *MISS*.

Own-Price Supply and Demand Elasticities Used in *MISS*								
	Short-Run Elasticities				*Long-Run Elasticities*			
				Supply				
	US	**Mexico**	**Cuba**	**ROW**	**US**	**Mexico**	**Cuba**	**ROW**
Beet	0.34	-	-	0.10	0.86	-	-	0.43
Cane	0.14	0.18	0.13	0.23	0.40	0.67	0.68	0.62
				Demand				
	US	**Mexico**	**Cuba**	**ROW**	**US**	**Mexico**	**Cuba**	**ROW**
Sugar	-0.14	-0.73	-1.40	-0.64	-0.50	-0.73	-1.40	-0.64

Trade Liberalization Scenarios

Four trade liberalization scenarios, summarized in Table 3, were developed in which the United States import quota was gradually increased relative to the base year. These scenarios were carried out to simulate increased imports of sugar to the United States from both Mexico and Cuba. The base represented the status-quo prior to 1994, when Mexico's quota allocation was 25,000 MT. Scenario 1 simulated Mexican accession into the U.S. market of 250,000 MTRV of refined sugar, analogous to the NAFTA agreement for the years 2000-2007. Scenario 2 simply allocated to Cuba an allocation of 250,000 along with Mexico. Scenarios 3 and 4 gave Cuba and Mexico an

Table 3. Scenarios simulated in *MISS.*

Scenarios Simulated in MISS			
Scenario	**U.S. Import Quantity Allocated (MT)**		
	Cuba	**Mexico**	***Total***
Base	0	25,000	***25,000***
1	0	250,000	***250,000***
2	250,000	250,000	***500,000***
3	500,000	500,000	***1,000,000***
4	750,000	750,000	***1,500,000***

allocation of 500,000, and 750,000 MTRV each, respectively. These scenarios simulated, under hypothetical import levels, the free-trade regime stipulated under the NAFTA that will be in force after 2008, with the addition that Cuba was also given similar access.

Results

Table 4 indicates, in the short run, that giving Mexico its allocation of 250,000 MT will drive the U.S. price down to 25.1 cents per pound, still well above the loan rate for beets of 22.9 cents. These results show that an allocation of 1 million MT of sugar between Cuba and Mexico (Scenario 3) would be necessary to drive the domestic price

below 20 cents per pound. It is difficult to compare these results to the real world, since Mexico has not yet reached an export level of 250,000 MT, and yet the average wholesale beet sugar price for fiscal year 2000 was 21.9 cents (triggering the loan rate). Evidently, other economic factors are at work, and perhaps such allocations as those simulated here would result in even greater price reductions. Note, however, that with long-run elasticities, even in Scenario 4, the refined price stays just above 20 cents per pound, indicating that a more elastic sugar market would sustain higher prices as imports increased.

The results further indicate that given increased imports by the United States, the world price would remain largely unaffected, seeing, at most, a 1.6% increase. This adds doubt to the argument that as the United States liberalizes trade, exporters will have less of an incentive to export because the world price would rise dramatically, lessening the

Table 4. Refined sugar price changes relative to the base, 1,000 MTRV.

Refined Sugar Price Changes Relative to the Base (1,000 MTRV)

United States Refined Sugar Price

Scenario	*Short-Run Elasticities*			*Long-Run Elasticities*		
	Cents/lb.	**$/MT**	**% Change**	**Cents/lb.**	**$/MT**	**% Change**
Base	26.98	594.58		26.98	594.58	
1	25.10	553.19	-6.96%	26.00	572.99	-3.63%
2	23.15	510.27	-14.18%	24.93	549.45	-7.59%
3	19.67	433.39	-27.11%	22.86	503.84	-15.26%
4	16.66	367.15	-38.25%	20.88	460.14	-22.61%

World Refined Sugar Price

Scenario	*Short-Run Elasticities*			*Long-Run Elasticities*		
	Cents/lb.	**$/MT**	**% Change**	**Cents/lb.**	**$/MT**	**% Change**
Base	9.81	216.21		9.81	216.21	
1	9.83	216.73	0.24%	9.83	216.55	0.16%
2	9.86	217.29	0.50%	9.84	216.95	0.34%
3	9.91	218.46	1.04%	9.88	217.73	0.70%
4	9.96	219.62	1.58%	9.91	218.51	1.06%

gap between domestic and world prices. On the contrary, the world price remains relatively low, and unless the domestic price is allowed to equal world levels, the incentive to export to the United States will remain intact.

Table 5 indicates that in the short run, when Mexico is given an allocation of 250,000 MT, beet sugar production falls only 2.42%, from 4.013 million MT to 3.916 million MT, while cane sugar decreases only 1%, from 3.584 million MT to 3.548 million MT. Also demand rises slightly from 9.079 million MT to 9.171 million MT, a rise of 1.02%. Hence, results indicate that the affect of the NAFTA agreement for years 2000-2007 should be minimal with regard to production and consumption. Note that long-run results are somewhat greater for production, but still relatively small. However,

Table 5. U.S. supply and demand changes relative to the base, in 1,000 MTRV.

United States Supply and Demand Changes Relative to the Base (1,000 MTRV)

Short-Run Elasticities

Scenario	Beet Supply	% Change	Cane Supply	% Change	Demand	% Change
Base	4013.00		3584.00		9079.00	
1	3915.89	-2.42%	3548.16	-1.00%	9171.61	1.02%
2	3809.54	-5.07%	3508.02	-2.12%	9275.11	2.16%
3	3604.08	-10.19%	3428.81	-4.33%	9490.28	4.53%
4	3406.23	-15.12%	3349.96	-6.53%	9712.71	6.98%

Long-Run Elasticities

Scenario	Beet Supply	% Change	Cane Supply	% Change	Demand	% Change
Base	4013.00		3584.00		9079.00	
1	3887.39	-3.13%	3531.32	-1.47%	9126.21	0.52%
2	3749.75	-6.56%	3472.54	-3.11%	9179.78	1.11%
3	3480.47	-13.27%	3354.27	-6.41%	9292.36	2.35%
4	3219.23	-19.78%	3234.92	-9.74%	9410.38	3.65%

as this allocation is extended to Cuba (Scenario 2), and as both Cuba and Mexico export more sugar to the U.S. (Scenarios 3 and 4), results indicate that beet sugar supply would see significant decreases, about 15% in the most extreme case, whereas cane sees a more modest reduction of 6.5%. Demand rises from 2% to 4% to 6%, respectively, in the latter three scenarios. Again, and as expected, long-run elasticites give somewhat larger changes in production.

Table 6 indicates that Cuba sees little change in supply and demand as a result of being given access to the U.S. market. Even in the most liberalized scenario, Cuba's production increases only 7,000 MT, a change of 0.2%, while demand falls 2.17%. Therefore, results indicate that market access for Cuba, in itself, will not significantly affect the Cuban sugar market.

Table 6. Cuban supply and demand changes relative to the base, 1,000 MTRV.

Cuban Supply and Demand Changes Relative to the Base (1,000 MT)

Using Short-Run Elasticities

Scenario	Cane Supply	% Change	Demand	% Change
Base	3780.00		720	
1	3781.13	0.03%	717.55	-0.34%
2	3782.27	0.06%	714.96	-0.70%
3	3784.91	0.13%	709.63	-1.44%
4	3787.56	0.20%	704.38	-2.17%

Using Long-Run Elasticities

Scenario	Cane Supply	% Change	Demand	% Change
Base	3780.00		720.00	
1	3784.16	0.11%	718.42	-0.22%
2	3788.69	0.23%	716.62	-0.47%
3	3798.14	0.48%	713.02	-0.97%
4	3807.22	0.72%	709.42	-1.47%

Since no policy changes were simulated for Mexico, and since Mexico's domestic price was protected from the world market, they experienced no production or consumption changes throughout all simulations. Mexico's increase in imports to the United States is a case of trade diversion, rather than trade creation. Or perhaps, this should be viewed as the *removal* of trade diversion resulting from the initial U.S. policy.

Welfare Effects

It is generally accepted that liberalized trade in sugar would result in gains to consumers and losses to producers in the U.S. sugar market. Nevertheless, a calculation of domestic welfare effects is included here to give an approximation of the degree of such effects. Before reporting the results, however, the authors would like to make known a few caveats. First, recall that Marshallian and Hicksian welfare measures are identical in the presence of zero income effect. Since sugar likely composes only a miniscule part of the typical American consumer's budget, the assumption that the income effect is zero is not heroic. The same can be said of the production side, if, as Mishan (1968) writes, "So long as firms are explicit profit maximizers, they are uninfluenced by welfare effects and no such distinction need therefore be maintained for producer's surplus." Marshallian and Hicksian measures are, again, identical. Second, recall the discussion earlier on the use of short- and long-run elasticities in a static model. Quoting Mishan again, "[I]n the long period at least, the area above the supply curve is not an unambiguous index of gain to any person or group in the economy." Recognizing this, "long-run" welfare results are given along with "shor-run" results to construct a sort of "confidence interval", but encourages the reader to focus on short-run results. Third, there exists a problem in interpreting producer gains and losses. In this simplified model,

there is only one "producer", but in reality there are growers, refiners, processors, etc., each of whom may gain or lose given particular policy changes. For example, imports of *raw* sugar are in direct competition with the product of sugarcane growers, yet increases in raw sugar translate into greater demand for the services of a refinery. On the other hand, imports of *refined* sugar would be in direct competition with the product of grower and refiner alike. However, to give some indication of the overall impact of policy changes, the estimated welfare effects can be considered a "net" effect on the production side. Last, only one price, the wholesale beet price, was used to represent the U.S. market. However, the domestic raw cane price is typically a few cents per pound less than the wholesale price, and thus, losses in producer rent may be somewhat overstated. Conversely, a significant portion of sugar is bought at the retail price, which is typically 12-16 cents per pound greater than the wholesale price. Hence, estimated consumer gains due to trade liberalization may be too conservative.

Table 7 shows, using short-run elasticities, that as imports progressively increase from Scenario 1 to 4, consumer surplus increases relative to the base, from $377.7 million to $2.137 billion, respectively. Producer quasi-rent decreases relative to the base, ranging from $312 million to $1.632 billion. As expected, there is a net welfare gain for all scenarios, ranging from $66 million in Scenario 1 to $504.7 million in Scenario 8. In short, any move toward liberalization results in losses of producer quasi-rent, consumer surplus gains, and a net welfare gain for the economy.

Table 7. U.S. changes in consumer surplus and producer quasi-rent, and net welfare gains.

United States Changes in Consumer Surplus and Producer Quasi-rent and Net Welfare Gains

Using Short-Run Elasticities

Scenario	Quantities (MTRV)			US$/MT	Surplus/Quasi-rent Changes		
	Beet	Cane	Demand		Consumer	Producer	Net Gain
Base	4,013,000	3,584,000	9,079,000	594.58			
1	3,915,890	3,548,160	9,171,610	553.19	$377,696,374	-$311,688,430	$66,007,944
2	3,809,540	3,508,020	9,275,110	510.27	$773,717,507	-$628,723,277	$144,994,230
3	3,604,080	3,428,810	9,490,280	433.39	$1,496,591,122	-$1,179,095,985	$317,495,137
4	3,406,230	3,349,960	9,712,710	367.15	$2,136,899,303	-$1,632,173,001	$504,726,302

Using Long-Run Elasticities

Scenario	Quantities (MTRV)			US$/MT	Surplus/Quast-rent Changes		
	Beet	Cane	Demand		Consumer	Producer	Net Gain
Base	4,013,000	3,584,000	9,079,000	594.58			
1	3,887,390	3,531,320	9,126,210	572.99	$196,525,242	-$162,094,589	$34,430,653
2	3,749,750	3,472,540	9,179,780	549.45	$412,009,371	-$334,397,279	$77,612,092
3	3,480,470	3,354,270	9,292,360	503.84	$833,508,603	-$654,768,044	$178,740,559
4	3,219,230	3,234,920	9,410,380	460.14	$1,242,856,124	-$944,518,303	$298,337,821

Conclusions

This study illustrates the economic gains possible through liberalization of sugar trade. However, while the use of a partial-equilibrium framework allows for an adequate analysis of the sugar market, it ignores gains and losses outside of the sugar market. For example, communities and businesses dependent on domestic sugar production could be significantly affected due to such changes in supply.

Also, the results of this model follow from the assumption that the world market is large and that members of that market respond to world prices. This may not be the case, however, as many nations either protect domestic markets or have long-term agreements with others to trade specified amounts of sugar regardless of market conditions. If this was the case, the ROW sector would be composed of two parts: one that responds to world prices, and one that does not, where the price-responsive part

could be considered as a “dump” market. Obviously, this specification would make the world market more responsive to changes in U.S. import policies, resulting in greater price fluctuations.

Another issue is that domestic sugar prices, if sufficiently depressed, could lead to increased loan forfeitures, which also means increased government spending, both on the loans and on storage for the forfeited sugar. Recall that the average wholesale beet sugar price for fiscal year 2000 was below the loan-rate trigger level, and during that period, Mexico’s imports did not even exceed 150,000 MT (SSR 2001). Of equal concern is the increased price volatility and uncertainty that would be introduced as a result of increased trade liberalization.

As tariffs on Mexican sugar imports fall, there will be greater incentive for Mexico to send its surplus to the United States. As the NAFTA stipulates, TRQs for other countries will be cut, if necessary, to offset imports of Mexican sugar. What this means in terms of trade relations with the rest of the world remains to be seen. However, it can be expected that those countries whose sugar is displaced by that of Mexico will seek some type of reconciliation, be it countervailing duties imposed on the United States or some future negotiations allowing more foreign sugar into the United States. Also, the very use of the TRQ as a quantitative limit to imports will come under severe pressure as trade barriers are lowered and eventually dissolved for Mexico. In the extreme case, only Mexican sugar would be imported into the United States, with all other TRQs being cancelled. In addition, after the transition period, Mexican sugar will be free to flow into the domestic market at will. Hence, U.S. sugar policy may very well become ineffective as a means of supporting prices through import quotas.

With regard to Cuba, any move toward trade would certainly aid in restoring economic stability to the island. Although results indicate that resuming trade with Cuba would have little effect on their market, since sugar is a major player in the Cuban economy, allowing them a fraction of total U.S. sugar imports, at U.S. prices, would give their sugar industry an immediate boost. This could lead to increased investment by both domestic and foreign sources, and improved production and refining capacity. It is likely that such investments in Cuban sugar infrastructure would also translate into gains for U.S. equipment, fertilizer, and seed firms.

While this study makes evident the specific gains from liberalizing sugar trade, it alludes to a broader and more critical issue. While strong opposition remains with regard to resuming trade with Cuba, the United States must be mindful not to allow itself to be a victim of its own policies. While the objective of the embargo is to limit Cuba economically, other countries, are not following suit, but are beginning to invest in Cuba. With Cuba in such close proximity to the United States and with so many opportunities for investment and development, the United States should seriously consider its political objectives with respect to the island and weigh these against its long-term economic objectives. With sugar being such a major player in the Cuban economy, it may serve as the easiest means for the United States to reacquaint itself with the island, and get a foothold in the development boom that is likely to transpire in a post-Castro Cuba.

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