

Assessing Economic Impacts of Liberalizing WTO Sugar Tariff Rates and Minimum Access Commitments by the United States

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Abstract: The U.S. sugar loan program supports prices of domestically produced sugar, and the sugar tariff-rate quota (TRQ) system helps support domestic sugar prices by restricting imports of sugar. U.S. commitments under international trade agreements, including the World Trade Organization (WTO) and the North American Free Trade Agreement (NAFTA), affect the level and allocation of the TRQs and also imports of high-tier tariff sugar outside the TRQ system. Increased market access resulting from U.S. sugar trade liberalization would imply changes in the U.S. sugar program. If the present loan rate program were to be retained, the loan rate would have to be reduced substantially in order to prevent large forfeitures to the U.S. Department of Agriculture (USDA). Research suggests that a sugar loan rate of 14 cents a pound, 4 cents less than the current loan rate, would be necessary to prevent sugar forfeitures to the USDA if the U.S. WTO minimum access commitment were to increase 50 percent.

Keywords: Baseline, economic model, NAFTA, sugar, Uruguay Round Agreement on Agriculture, WTO.

The Uruguay Round Agreement on Agriculture (URAA), completed in 1994, was a first step in the process of global agricultural policy reform. The URAA included a provision for a resumption of negotiations on agriculture by December 31, 1999. Although the November 1999 World Trade Organization (WTO) Seattle conference did not successfully initiate a new round, agricultural negotiations began in March 2000. These negotiations are being conducted as special sessions of the WTO Committee on Agriculture in Geneva, Switzerland.

This article analyzes the effects of possible changes in U.S. sugar policy resulting from upcoming trade liberalization negotiations. Specifically, it examines the loosening of existing commitments made by the United States as part of the URAA. These include a lowering of high-tier tariffs for U.S. sugar imports and an increase in the minimum import access commitments agreed to by the United States. These actions are analyzed as possible outcomes of WTO negotiations.

The analysis is based on modifying key U.S. policy assumptions underlying the sugar baseline of the U.S. Department of Agriculture (USDA). The main components of the U.S. sugar program modeled in the baseline are the tariff-rate quota (TRQ) import system, price support loan program, and the

sweetener provisions of the North American Free Trade Agreement (NAFTA). The sugar loan rate program and the TRQ system help to support the domestic price of sugar, but their effectiveness has been challenged by provisions in the URAA and the NAFTA. These elements are discussed below, and a theoretical structure for predicting outcomes of possible trade liberalization measures is developed. The sugar baseline model is used to analyze a 50-percent increase in the WTO minimum access at various levels of price support from the sugar loan rate program. It is also argued that reductions in the high-tier sugar tariff are unlikely to have any measurable effect on U.S. sugar imports.

U.S. Sugar Imports and the WTO

In the URAA, the United States agreed to import a minimum quantity of raw and refined sugar of 1.256 million short tons, raw value (STRV) each marketing year (October/September). Included in this amount is a commitment to import at least 24,251 STRV of refined sugar. The raw cane sugar tariff-rate quota (TRQ) is allocated to 40 quota-holding countries based on a representative period (1975-81) when trade was relatively unrestricted. A duty of 0.625 cent a pound, raw value, is applied to quota imports.²

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² In the Harmonized Trade System, chapter 17 specifies the low-tier tariff at 1.46066 cents per kilogram less .0206686 cents per kilogram for each degree of polarization under 100 degrees.

Most countries have the low duty waived under the General System of Preferences (GSP) or the Caribbean Basin Initiative (CBI). Between 95 and 98 percent of the raw cane sugar TRQ fills each year, and the refined sugar TRQ is filled almost as soon as it opens.

The high-tier sugar tariff applies to sugar imports above the level of the sugar TRQ. The Uruguay Round specified base rates for raw cane sugar of 18.08 cents a pound and for refined sugar of 19.08 cents a pound. Starting in 1995, the rates were to be cut by 0.45 cent a pound each year for raw sugar and 0.48 cent a pound for refined sugar. The yearly reductions were to take place until 2000, when the raw sugar high-tier tariff was to be 15.36 cents a pound and the refined sugar high-tier tariff rate was to be 16.21 cents a pound.

Sugar Loan Rate Program and Minimum Prices To Avoid Forfeiture

The 1996 Farm Act provides for the USDA to make loans available to processors of domestically grown sugarcane at a rate of 18 cents per pound and to processors of domestically grown sugarbeets at a rate of 22.9 cents per pound for refined beet sugar. Although the 1996 Farm Act required that the sugar TRQ be established higher than 1.5 million STRV as a condition for nonrecourse loans to processors, the FY 2001 Agricultural Appropriations Act eliminated the TRQ trigger for nonrecourse loans and all references to recourse loans.

Loans are taken for a maximum term of 9 months and are repaid along with interest charges before September 30. In order to forestall forfeiture, the sugar price must be high enough to cover the interest expenses. Cane processors share interest expenses with their growers, but beet processors do not and must therefore recover the entire interest expense of loan repayment in their share of the sugar's selling price. Cane processors incur transportation and distribution costs in moving sugar to the refiner and also face location discounts required by some refiners. These additional costs must be included in the minimum price to avoid forfeiture calculation. Because beet sugar is refined sugar requiring no further processing, the minimum price does not include transport adjustments. However, because beet sugar is normally sold subject to a 2-percent cash discount, this amount must be added to arrive at the minimum price.

Also, the 1996 Farm Act required that processors who forfeit sugar pledged as collateral for a nonrecourse loan face a penalty of 1 cent a pound for raw cane sugar and 1.072 cents a pound for refined beet sugar. Processors would have to consider these penalties when deciding whether to forfeit sugar to the Commodity Credit Corporation (CCC). For the sugar baseline, the minimum raw sugar market price to discourage forfeitures is calculated at 19.86 cents a pound, while the corresponding minimum refined beet sugar price is calculated at 24.78 cents a pound.

North American Free Trade Agreement

Low-tier Tariff NAFTA Imports

The NAFTA went into effect on January 1, 1994. Although the original agreement contained provisions that related to trade in sugar, they were modified by the terms of a side letter in November 1993 that altered the sugar provisions of the original NAFTA text. Although Mexico has since rejected the validity of the side-letter agreement, the United States maintains that the side letter provisions supersede those of the original NAFTA.

According to the NAFTA side letter, Mexican sugar low-tier tariff exports to the United States are restricted by Mexico's 'net surplus production' of sugar. The net surplus is defined as Mexico's production of sugar less its consumption of sugar and high fructose corn syrup. From FY 2001 through 2007, Mexico is to have duty-free access to the U.S. market for the amount of its surplus as measured by the formula, up to a maximum of 250,000 metric tons, raw value (MTRV). Beginning in FY 2008, Mexico is to have duty-free access with no quantitative limit.

High-tier Tariff NAFTA Imports

The NAFTA specifies a declining high-tier tariff schedule for raw and refined sugar over the transition period to duty-free sugar trade in 2008. For 2001, the raw sugar tariff is 10.58 cents a pound, and the refined sugar tariff is 11.21 cents a pound. The raw sugar tariff drops about 1.5 cents each year, and the refined sugar tariff drops about 1.6 cents a year. Both rates reach zero in FY 2008.

The U.S. Sugar Baseline: Theoretical Framework for Analysis

Supply and Demand for U.S. Sugar

The components of U.S. sugar supply are: (1) beginning stocks held by cane processors, cane refiners, and beet processors; (2) U.S. cane and beet sugar production; (3) the raw and refined sugar TRQ whose minimum allocation levels have been bound in the WTO; (4) duty-free sugar from Mexico whose maximum levels have been bound by the side letter agreement to the NAFTA through FY 2007; (5) imports of sugar syrups entering under HTS 1702.90.4000 from which the sugar is extracted; (6) high-tier tariff sugar; and (7) sugar imports entering under the Refined Sugar and Sugar-Containing Products Re-export Programs, and under the Polyhydric Alcohol Program.

Figure A-1 isolates several supply components important for analysis. The U.S. price of sugar is measured on the vertical axis and sugar quantity on the horizontal. Production represents the largest source of U.S. sugar supply. It is shown as the right-most curve in the left panel. Except in the low price range, the production curve is drawn as very inelastic,

reflecting that most production decisions are made prior to the marketing year on the basis of expected prices rather than actual prices. The upward shape of the production curve in the low price range allows for sugar prices that are sufficiently low such that producers' and/or processors' variable costs cannot be covered, and less sugar is produced through acreage abandonment or reduced factory activity.

The sugar TRQ and duty-free sugar from Mexico are shown as relatively inelastic curves defined above the world price. Sugar syrup imports from which the sugar is recovered are shown as a price elastic curve. Because the syrups are profitable to import only because of high domestic prices relative to world levels, the curve is defined only in the region of high domestic prices. Sugar entering under the Re-export and Polyhydric Programs are omitted because they do not consistently affect domestic U.S. prices.

The U.S. sugar supply curve is shown in the right panel as the horizontal summation of the individual curves in the left panel. Except at prices close to world levels, the supply curve is very inelastic, i.e., unresponsive in the short run to changes in same-period prices. The supply curve is redrawn in the left panel of figure A-2, simplifying somewhat the contour by emphasizing the price-inelastic nature above the world price. Added to the left panel in figure A-2 is a downward sloping demand curve. This curve represents the aggregation of sugar demand by end users, including food

processors, beverage industries, non-food sugar users, and non-industrial users.

Market for High-tier Tariff Imports

The demand for high-tier tariff imports is shown in the right panel of figure A-2. It is the excess of demand over supply at prices lower than the price associated with the intersection of the supply and demand curves in the left panel. In figure A-3, excess supply of NAFTA sugar is shown in the middle panel, along with the U.S. excess demand for high-tier tariff sugar. The excess supply is perfectly elastic up to the point where all exportable NAFTA supply is being shipped to the U.S. market. At that point, the curve becomes perfectly inelastic.

The elastic portion of the curve corresponds to the pricing threshold where it is more profitable for Mexico to ship sugar to the U.S. market rather than the world market. The threshold is equal to the world price plus the NAFTA tariff, marketing costs, and price premiums. Because the NAFTA tariff rate is declining each year until 2008, the curve is shifting downward. With sufficiently high tariffs and/or high world prices, the excess supply and excess demand curves need not intersect. In this case, there are no high-tier imports. Over time, however, the curve shifts down as the tariff is reduced and the intersection becomes very likely.

The market for high-tier tariff world sugar is shown in the third panel of figure A-3. World supply is perfectly elastic at

Figure A-1

Supply of sugar in the United States

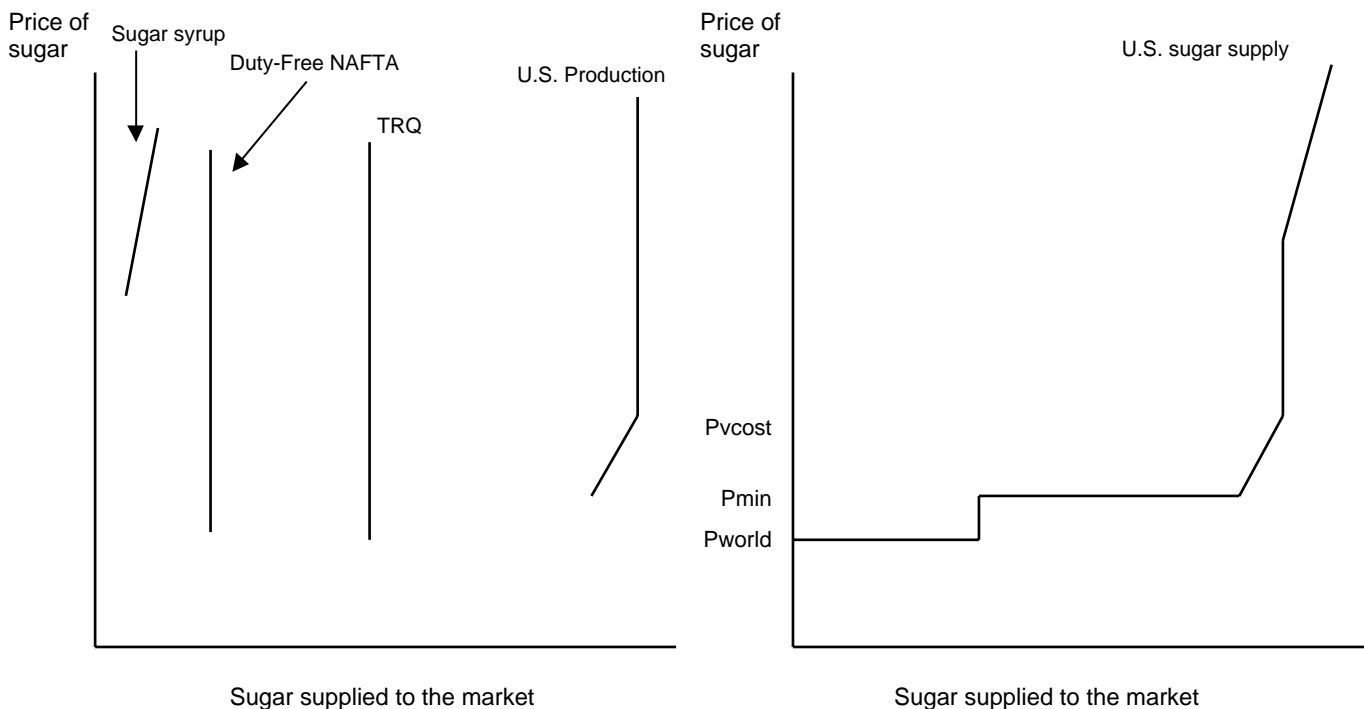
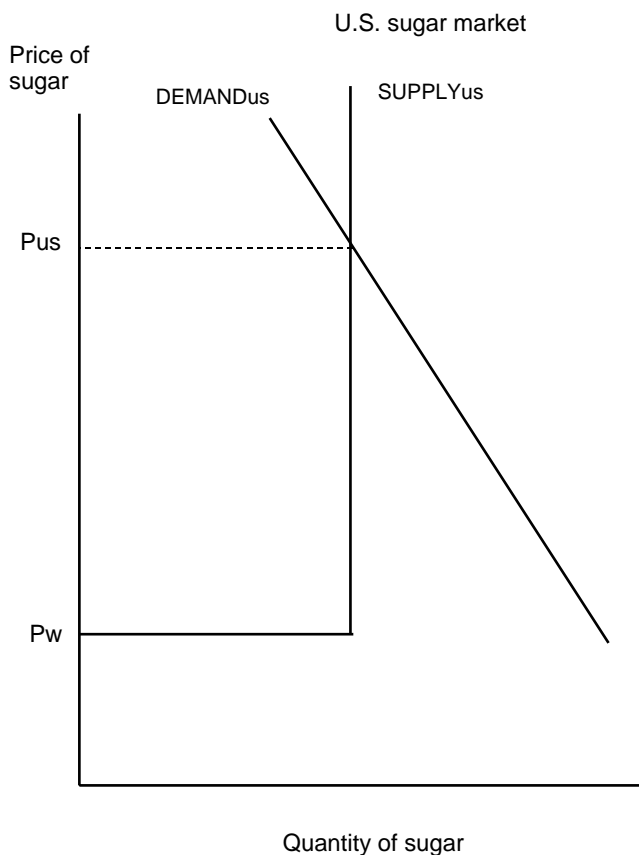
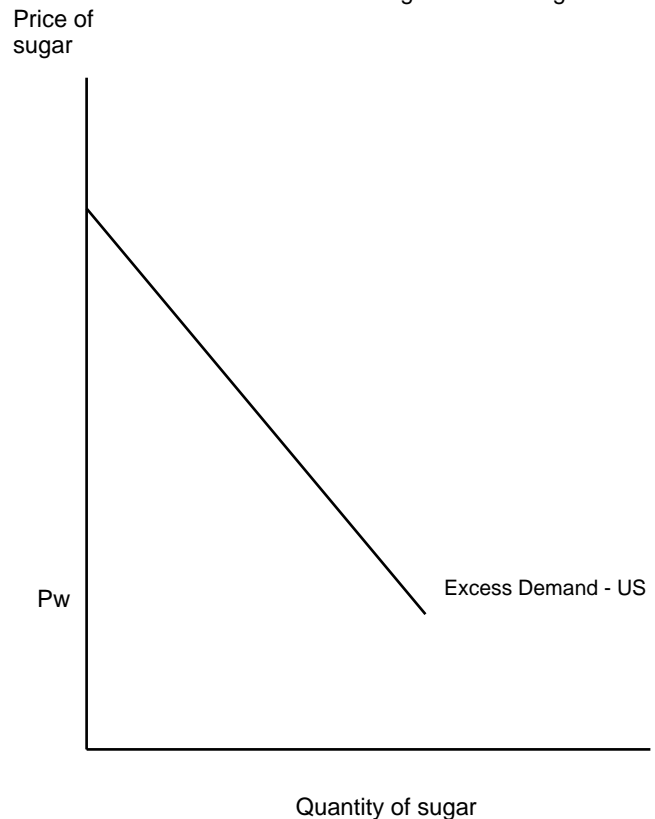


Figure A-2

U.S. market for sugar



Market for high-tier tariff sugar



a pricing threshold (P_{wto}) that is equal to the sum of the world price, WTO tariff, and marketing costs and premiums. (It is assumed that the NAFTA tariff rate is always lower than or equal to the WTO tariff rate, and that marketing costs of shipping Mexican sugar to the U.S. market are low.) The U.S. excess demand for world high-tier tariff sugar is derived from the differencing of NAFTA excess demand and excess supply. In figure A-3, this excess demand is a perfectly elastic line positioned at the NAFTA threshold price. Unless lower world marketing costs compensate for a WTO tariff rate higher than the NAFTA tariff rate (not likely), then there is no intersection of curves in the high-tier world sugar market and hence no high-tier imports are indicated.

Figure A-4 shows the case where the availability of NAFTA high-tier tariff imports is constrained. With no high-tier tariff world imports, the U.S. price (P_{us}) is higher than the NAFTA threshold (P_{thr}). The differencing of the excess demand and supply curves define an excess demand in the third panel which is downward sloping from P_{us} to P_{thr} , where it once again becomes perfectly elastic. With a sufficiently low WTO tariff, it is possible for a perfectly elastic world excess supply curve to intersect excess demand within the downward sloping range, thus indicating imports of high-tier tariff sugar.

Figure A-5 shows the case of a U.S. price floor at P_{lr} . U.S. excess demand for NAFTA high-tier tariff sugar is downward sloping until P_{lr} where it becomes perfectly elastic. Unless the NAFTA excess supply curve intersects the excess demand along its downward sloping portion, U.S. excess demand for world high-tier tariff sugar is perfectly elastic at P_{lr} .

Analysis of Reduction in WTO Tariff Rates

Any cut in the WTO tariff rate would likely be made ineffective by the lower NAFTA tariff rate. For raw sugar in 2001, the NAFTA tariff rate is 4.78 cents a pound lower than the corresponding WTO tariff. The gap grows at the rate by which the NAFTA tariff rate declines, or 1.51 cents a pound per year until 2008 when the NAFTA tariff becomes zero (fig. A-6). For refined sugar in 2001, the NAFTA tariff rate is 5.00 cents a pound lower than the corresponding WTO tariff rate. The gap grows each year by 1.6 cents a pound until 2008.

Entry of high-tier tariff sugar from third countries would be in addition to amounts that could be supplied from Mexico. This situation would correspond to case B. A lowering of the high-tier tariff could lead to emergent imports or an increase if NAFTA supplies were sufficiently constrained. Any increase in imports would cause the U.S. price to fall to

Pwto. In case C, world high-tier tariff imports could emerge if Pwto fell below Plr, but the U.S. price would fall no lower than Plr.

Analysis of Increase in WTO Minimum Access

In figures A-3, A-4, and A-5, an increase in the WTO minimum access is represented as a rightward shift of the U.S. sugar supply curve in the left panel. Because the middle panel's excess demand for high-tier tariff sugar is derived by differencing domestic demand and supply, there is less excess demand than formerly. This reduced excess demand is shown as a leftward movement of the excess demand curve. In case A, an increase in the minimum access reduces NAFTA high-tier tariff imports on a one-to-one basis, with no effect on sugar pricing. However, if the minimum access increase were sufficiently large, NAFTA high-tier imports could be totally displaced, with the U.S. price falling below Pthr. At that point, a higher return for NAFTA sugar would be in the world market rather than the U.S. market.

Case B has all of the NAFTA sugar surplus entering the U.S. market at a price higher than the threshold level. The increase in minimum access reduces U.S. excess demand for high-tier tariff sugar. The excess demand curves in both the middle and right panels shift down. The initial effect is to lower the purchase price with no effect on the amount of NAFTA imports. If there are high-tier tariff sugar imports from the world market, these imports decrease, potentially to zero. If the increase in minimum access is sufficiently large, the purchase price can decrease to the NAFTA threshold level (Pthr) and NAFTA high-tier tariff imports may decrease.

Case C incorporates a price floor. In the figure, an increase in minimum access shifts the middle panel's excess demand leftward. High-tier tariff imports do not change, but the price falls to the floor level. At the price floor, greater minimum access imports do not add to consumption because the price cannot fall in order to stimulate increased consumption. Stocks withheld from the market accumulate, thus causing the government higher budget expense through processors' forfeiting sugar and storage payment expense.

Figure A-3
Case A--Unconstrained NAFTA supply at Pthr

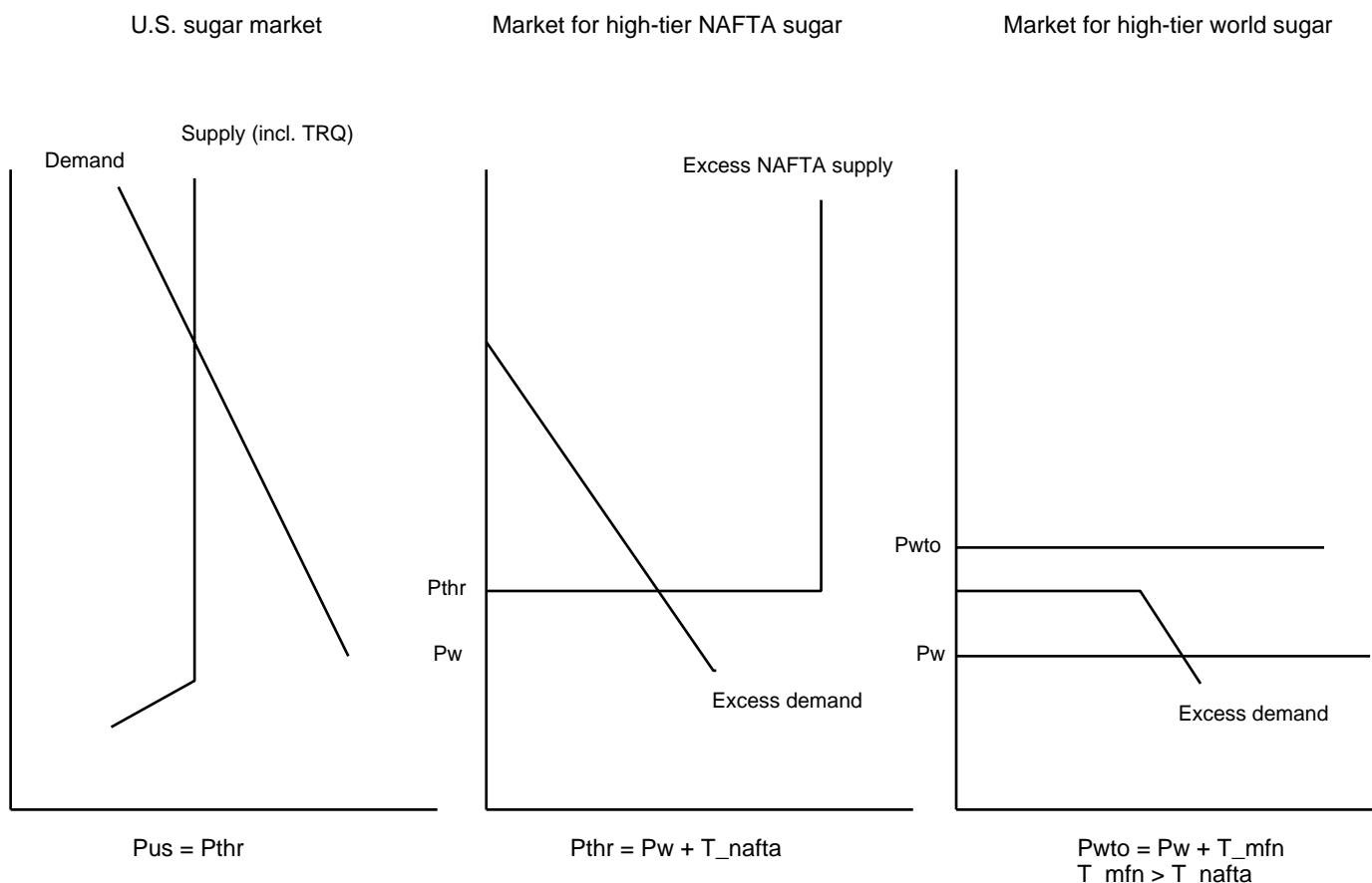


Figure A-4

Case B--Constrained NAFTA supply above P_{thr}

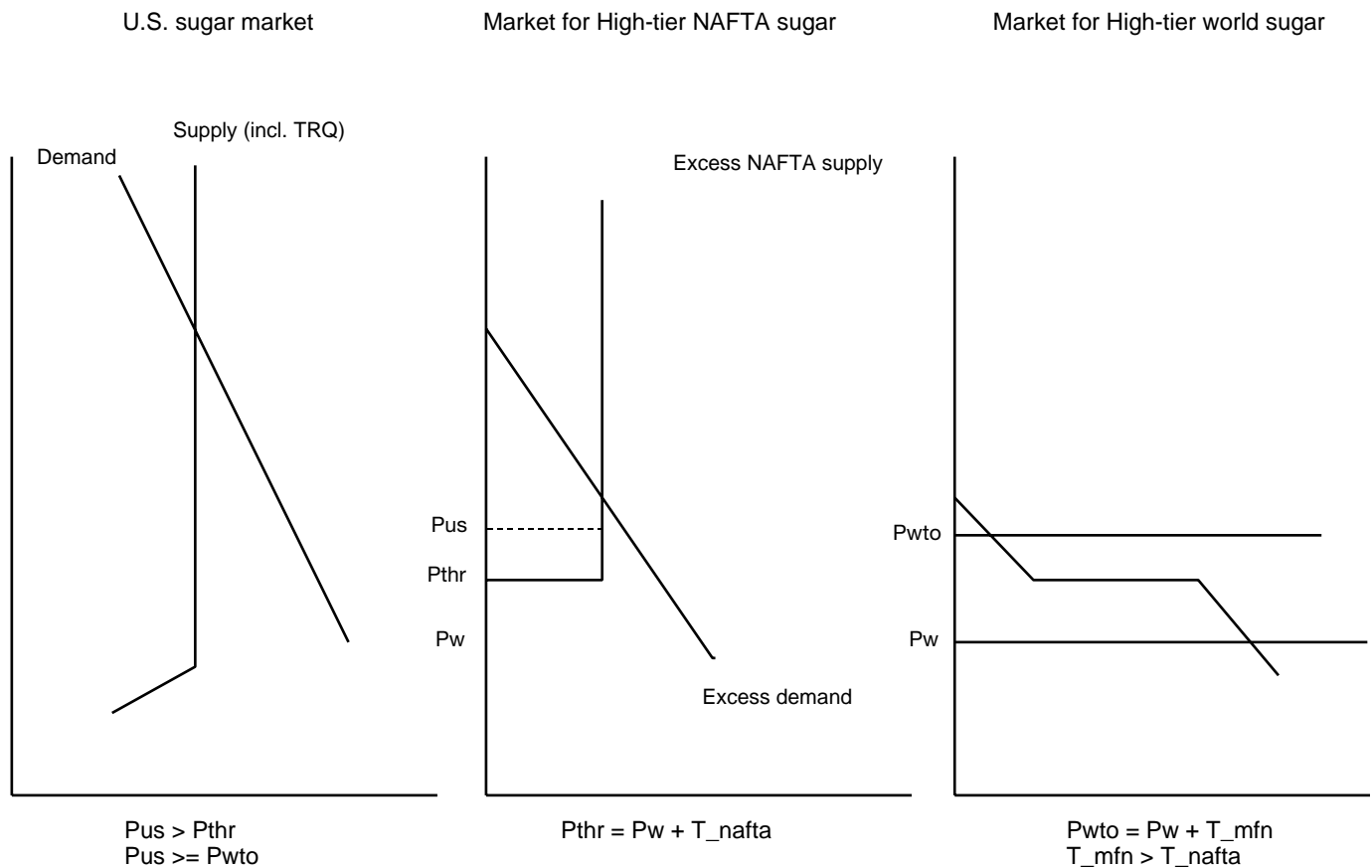


Table A-1 presents a summary of possible results suggested by this theory.

The U.S. Sugar Baseline: Modeling Framework

The USDA releases its U.S. sugar baseline projections at the Agricultural Outlook Forum in February. Baseline projections are a conditional scenario based on specific assumptions about macroeconomics, agricultural policy, weather, and international developments. All commodity baselines incorporate provisions of the Federal Agriculture Improvement and Reform Act of 1996 (1996 Farm Act) and assume that its provisions remain in effect throughout the projections period. Additionally, the U.S. sugar baseline incorporates the provisions of the URAA and the NAFTA.

The USDA sugar baseline model currently projects supply, use, and prices out through 2011. The production sector includes sugarcane producing areas of Florida, Louisiana, Texas, Hawaii, and Puerto Rico. The sugarbeet producing areas include the Great Lakes region (Michigan and Ohio), the Red River Valley (Minnesota and eastern North Dakota), the Upper Great Plains (Montana, northwestern Wyoming,

and western North Dakota), the Central Great Plains (Colorado, Nebraska, southeastern Wyoming), the Northwest (Idaho, Washington State, eastern Oregon), and the Far West (California, central Oregon). Acreage allocation decisions are modeled as functions of grower prices relative to alternative crop prices.³

Crop yield projections are based on observed trends. Regional sugar yield per-acre projections are based on econometric analysis of the relationship between sugar yields and crop yield developments and yearly trend improvements that capture technical improvements in each of the regions.

Sugar production differs from other field crops in that it requires extensive processing to be put in a form that is marketable. Unless processing facilities are close to cropping acreage, it is uneconomical to grow sugar crops. In the baseline model, adjustments to processing capacity are a function of the margin between predicted sugar prices and the

³ See 'Calculation of Real Price Indices for U.S. Sugar Crops,' in *Sugar and Sweetener Situation and Outlook*. SSS-229, Sept. 2000.

Figure A-5

Case C--Constrained NAFTA supply above P_{thr}, with U.S. price floor

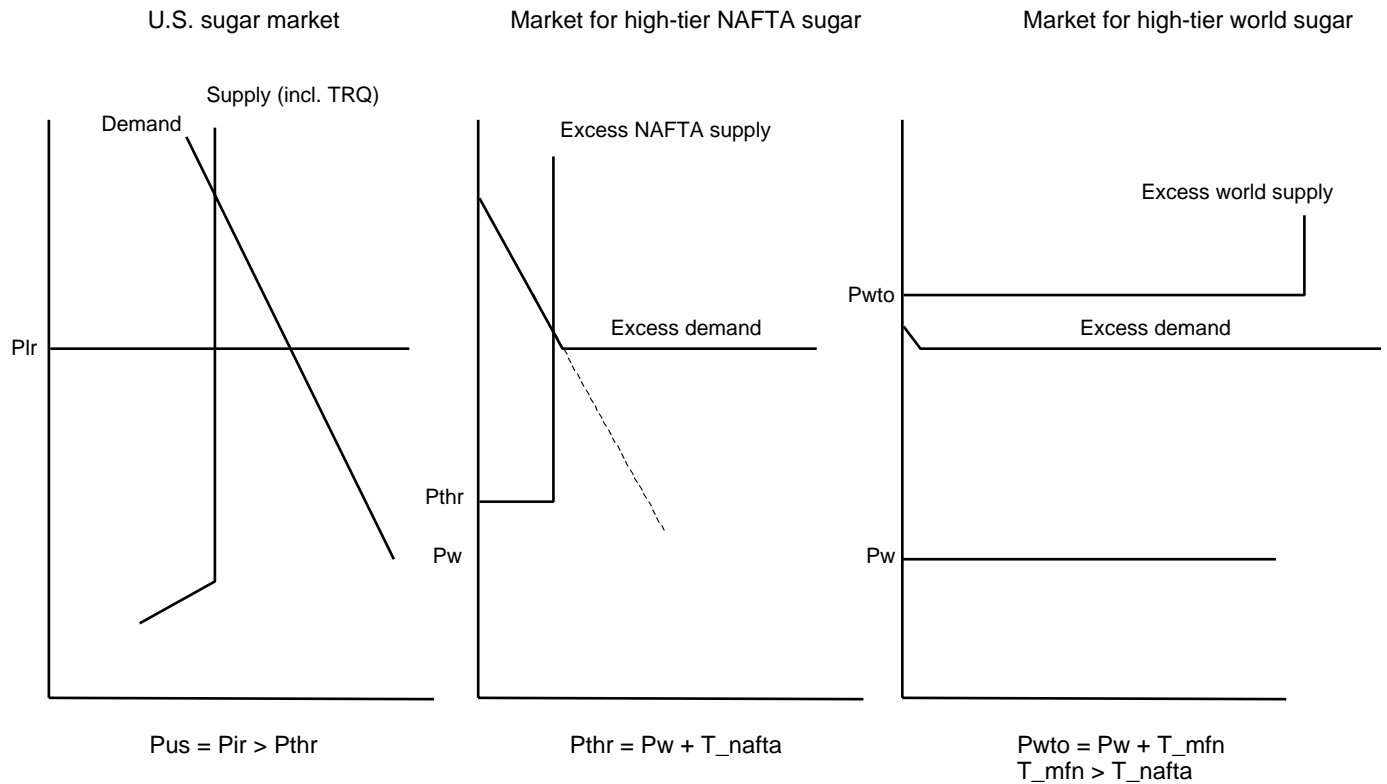
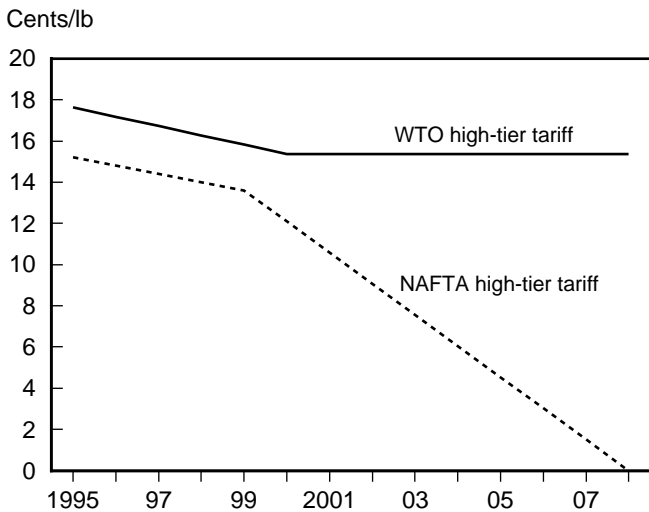


Figure A-6

High-tier tariffs for U.S. sugar imports, 1995-2008



Source: U.S. Consumers Service.

average sugar price necessary for processors to cover variable costs. Within a producing region, it is assumed that there is a normal distribution of costs about point estimates reported by the USDA.⁴

If the margin drops to zero, the modeling specification indicates the exit of one-half of processing capacity from that region. It is further assumed that capacity reductions are irreversible; that is, there is a very high cost of reopening closed facilities.

Sweetener demand is composed of end-use demands by the beverage and food processing industries, by non-food demanders, and by households or non-industrial users. Commodity coverage includes not only sugar but also high fructose corn syrup (HFCS). In recognition of the importance of NAFTA, the USDA sugar baseline model includes a Mexican sweetener component. Particular attention is placed

⁴ See www.ers.usda.gov/farmincome/ for costs of processing for cane and beet sugar.

Table A-1--Potential effects of trade liberalization on U.S. sugar

Case	Decrease in high-tier WTO tariff 1/			Increase in level of minimum WTO access		
	High-tier NAFTA imports	High-tier world imports	U.S. price	High-tier NAFTA imports	High-tier world imports	U.S. price
Case A: Unconstrained NAFTA supply at the NAFTA threshold price 2/	none	zero imports, regardless	none	reduction on one-to-one basis	zero imports, regardless	none
Case B: Constrained NAFTA supply above the NAFTA threshold price	none	increase if WTO threshold price is less than a U.S. price consistent with zero high-tier imports from non-NAFTA exporters	decreases if there is increase in high-tier world imports	potential decrease if U.S. price falls to NAFTA threshold price	decrease, potentially to zero	decrease, potentially to NAFTA threshold
Case C: Constrained NAFTA supply at the U.S. price floor	none	potential increase if WTO threshold price becomes lower than U.S. price floor	none	none	none	none (although there would be a decrease if initial U.S. price were above floor)

1/ Analysis assumes that bound WTO high-tier tariff is greater than the NAFTA tariff.

2/ NAFTA threshold price = world price + high-tier NAFTA tariff + marketing margins; also: WTO threshold price = world price + high-tier WTO tariff + marketing margins.

on modeling how much exportable sugar surplus Mexico possesses throughout the projections period. Substitution trade-offs in Mexico between sugar and HFCS are of particular modeling concern because of the potential of HFCS to displace sugar, especially in beverage end-uses.

Scenario Analysis

Analyzing the effect of increasing sugar import minimum access commitments by the United States involves crafting of scenarios that differ from the published baseline. A thesis explored in the theoretical section of this paper is that sugar policy developments are interrelated. Increased market access would have to be fitted with NAFTA provisions and the sugar loan rate program. Although Mexico and the United States differ in the interpretation of the NAFTA side-letter modification to the original agreement, it is clear that the sugar sectors of both countries are moving toward becoming unified. Also, if policymakers decide to retain the current structure of the U.S. sugar loan rate program, increased minimum access will likely increase the probability of loan forfeitures to the CCC at the current loan rate of 18 cents a pound for raw cane sugar. This suggests an analysis of increased minimum access commitments in the context of alternative loan rates.

There are six scenarios selected for analysis (table A-2). The base assumes the current loan rate of 18 cents a pound and minimum access close to the URAA commitment level. The alternative to the current level of minimum access is a 50-percent increase. Two other loan rate levels are considered as alternatives: 16 cents a pound (2-cent reduction), and 14 cents a pound (4-cent reduction).

The Base Scenario

Table A-3 shows scenario results for selected variables. In the base scenario, the raw sugar price drops to the minimum

Table A-2--Modeling Scenarios: Alternatives to the U.S. sugar baseline

Name	Raw sugar loan rate Cents/pound	Minimum access commitment 1,000 short tons, raw value
Base	18	1,256
LR18TL50	18	1,884
LR16TL00	16	1,256
LR16TL50	16	1,884
LR14TL00	14	1,256
LR14TL50	14	1,884

Source: Economic Research Service.

Table A-3--Effect on U.S. sugar baseline of loan rate reductions and 50 percent increase in WTO minimum access commitment

Baseline category/ scenario 1/	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Sugar tariff-rate quota less NAFTA allocation (1,000 short tons, raw value (STRV))												
Base	1,096	1,158	1,158	1,208	1,208	1,208	1,208	1,208	1,208	1,208	1,208	1,208
Ir18tI50	1,096	1,158	1,158	1,208	1,824	1,824	1,824	1,824	1,824	1,824	1,824	1,824
Ir16tI00	1,096	1,158	1,158	1,208	1,208	1,208	1,208	1,208	1,208	1,208	1,208	1,208
Ir16tI50	1,096	1,158	1,158	1,208	1,824	1,824	1,824	1,824	1,824	1,824	1,824	1,824
Ir14tI00	1,096	1,158	1,158	1,208	1,208	1,208	1,208	1,208	1,208	1,208	1,208	1,208
Ir14tI50	1,096	1,158	1,158	1,208	1,824	1,824	1,824	1,824	1,824	1,824	1,824	1,824
U.S. raw sugar price, No.14 New York contract (cents per pound (lb))												
Base	18.40	21.03	23.20	23.02	19.91	19.86	19.86	19.86	19.86	19.86	19.86	19.86
Ir18tI50	18.40	21.03	23.20	23.02	19.86	19.86	19.86	19.86	19.86	19.86	19.86	19.86
Ir16tI00	18.40	21.03	23.20	23.02	21.50	19.99	18.62	18.89	19.79	18.49	19.58	19.93
Ir16tI50	18.40	21.03	23.20	23.02	20.51	19.22	17.86	17.86	17.86	17.86	17.86	17.86
Ir14tI00	18.40	21.03	23.20	23.02	21.50	19.99	18.62	18.95	19.88	18.53	19.64	19.97
Ir14tI50	18.40	21.03	23.20	23.02	20.51	19.22	18.48	16.25	20.15	21.09	22.10	22.69
Sugar production (1,000 STRV)												
Base	9,041	8,490	8,613	8,842	8,924	8,782	8,769	8,747	8,715	8,711	8,714	8,722
Ir18tI50	9,041	8,490	8,613	8,842	8,924	8,778	8,769	8,747	8,715	8,711	8,714	8,722
Ir16tI00	9,041	8,490	8,613	8,842	8,924	8,887	8,763	8,511	8,472	8,486	8,401	8,442
Ir16tI50	9,041	8,490	8,613	8,842	8,924	8,811	8,640	8,334	8,278	8,248	8,235	8,241
Ir14tI00	9,041	8,490	8,613	8,842	8,924	8,887	8,763	8,498	8,465	8,481	8,390	8,437
Ir14tI50	9,041	8,490	8,613	8,842	8,924	8,811	8,640	8,447	7,193	7,304	7,350	7,393
Beet production (1,000 STRV)												
Base	4,976	4,420	4,350	4,415	4,419	4,438	4,461	4,467	4,456	4,456	4,464	4,474
Ir18tI50	4,976	4,420	4,350	4,415	4,419	4,438	4,461	4,467	4,456	4,456	4,464	4,474
Ir16tI00	4,976	4,420	4,350	4,415	4,419	4,439	4,428	4,383	4,367	4,366	4,343	4,357
Ir16tI50	4,976	4,420	4,350	4,415	4,419	4,419	4,398	4,379	4,355	4,338	4,335	4,342
Ir14tI00	4,976	4,420	4,350	4,415	4,419	4,439	4,428	4,370	4,358	4,358	4,323	4,343
Ir14tI50	4,976	4,420	4,350	4,415	4,419	4,419	4,398	4,356	3,870	3,906	3,917	3,925
Cane production (1,000 STRV)												
Base	4,065	4,070	4,263	4,427	4,506	4,344	4,308	4,280	4,259	4,255	4,250	4,248
Ir18tI50	4,065	4,070	4,263	4,427	4,506	4,340	4,308	4,280	4,259	4,255	4,250	4,248
Ir16tI00	4,065	4,070	4,263	4,427	4,506	4,448	4,334	4,128	4,105	4,120	4,058	4,085
Ir16tI50	4,065	4,070	4,263	4,427	4,506	4,392	4,243	3,955	3,923	3,909	3,900	3,899
Ir14tI00	4,065	4,070	4,263	4,427	4,506	4,448	4,334	4,128	4,107	4,123	4,067	4,095
Ir14tI50	4,065	4,070	4,263	4,427	4,506	4,392	4,243	4,091	3,322	3,398	3,433	3,468
Commodity Credit Corporation (CCC) sugar stocks (1,000 STRV)												
Base	297	793	793	793	1,207	1,628	1,938	2,122	2,174	2,709	3,026	3,248
Ir18tI50	297	793	793	793	1,823	2,855	3,780	4,580	5,248	6,398	7,331	8,169
Ir16tI00	297	793	793	793	793	793	1,062	1,005	809	1,101	857	793
Ir16tI50	297	793	793	793	793	930	1,721	2,103	2,329	2,657	2,790	2,814
Ir14tI00	297	793	793	793	793	793	793	793	793	793	793	793
Ir14tI50	297	793	793	793	793	793	793	1,147	793	793	793	793
Mexico sugar exports to the United States: high-tier tariff exports through 2007 and total exports, 2008-11 (1,000 STRV)												
Base	6	8	0	67	744	784	821	853	1,152	1,773	1,687	1,720
Ir18tI50	6	8	0	67	744	784	821	853	1,152	1,773	1,687	1,720
Ir16tI00	6	8	0	67	406	584	821	853	1,152	1,761	1,445	1,702
Ir16tI50	6	8	0	67	0	0	821	853	1,152	1,420	1,372	1,393
Ir14tI00	6	8	0	67	406	584	821	853	1,152	1,777	1,451	1,713
Ir14tI50	6	8	0	67	0	0	192	853	1,152	1,823	1,890	2,076

1/ Scenario descriptions:

Base - revised sugar baseline.

Ir18tI50 - loan rate = 18 cents/lb and WTO minimum access increased by 50 percent.

Ir16tI00 - loan rate = 16 cents/lb and WTO minimum access at bound level.

Ir16tI50 - loan rate = 16 cents/lb and WTO minimum access increased by 50 percent.

Ir14tI00 - loan rate = 14 cents/lb and WTO minimum access at bound level.

Ir14tI50 - loan rate = 14 cents/lb and WTO minimum access increased by 50 percent.

Source: Economic Research Service, USDA.

level to avoid forfeitures in 2004 and remains at that level throughout the remainder of the projections period. In 2004, the raw sugar high-tier NAFTA tariff rate will be 6.04 cents a pound. If the world price is 10 cents a pound, then the price at which Mexico would find it attractive to ship exportable supplies of sugar into the U.S. market (the 'threshold price') would be 19.50 cents a pound. (This assumes a marketing cost of 1.1 cents a pound, a desired price premium of 1.36 cents a pound, and a 1-cent-a-pound discount from the No. 14 New York contract for delivery into Louisiana.) Because the threshold is below the minimum price to avoid forfeitures (19.86 cents a pound), all exportable sugar from Mexico (744,000 STRV) would find its way into the U.S. market because forfeitures to the CCC would act to keep raw sugar prices at the minimum level. Government-owned stocks increase by 321,000 STRV in 2004 and continue to accumulate. The ending stocks-to-use ratio increases to 37.9 percent in 2011. Because of downward price protection for U.S. sugar producers from the non-recourse loan program, the level of production remains steady throughout the projections period.⁵

Loan Rate Reductions

Decreasing the loan rate by either 2 or 4 cents a pound with no change in minimum access imports avoids forfeitures to the CCC. Significant high-tier imports from Mexico commence in 2004, and the U.S. price decreases to the 19.50 cents a pound threshold level. Because the minimum price to avoid forfeiture is lower than the threshold (17.86 cents a pound for a 16-cent loan rate, and 15.86 cents a pound for a 14-cent loan rate), not all of Mexico's exportable surplus is attracted into the U.S. market, as was the case in the base. With greater downward price flexibility, U.S. sugar production decreases as more sugar from Mexico enters. In 2005, production is 86,000 STRV less than the base; and in 2006, production is 382,000 STRV less than the base. Cumulative reductions in production avoid pricing outcomes where the new minimum price levels to avoid forfeiture to the CCC are reached. As a result, CCC-owned stocks do not grow as in the base. In 2011, the U.S. raw sugar price is projected at about 20 cents a pound.

Increasing Minimum Access Import Commitments

The effect of increasing minimum access imports depends on the loan rate level. The primary effect when the loan rate is 18 cents is to increase CCC-owned stocks on a one-to-one basis. The minimum price of 19.86 cents a pound is reached in 2004 even in the base with no increase in minimum access imports. The high price floor prevents offsetting reductions in either NAFTA imports or in domestic produc-

tion. The ending stocks-to-use ratio reaches 79.8 percent in 2011.

The initial effect in 2004 when the loan rate is 16 cents a pound is to decrease the U.S. raw sugar price to 18.95 cents a pound. Because this price is below the NAFTA threshold price of 19.50 cents a pound, there are no high-tier imports from Mexico; thus increased minimum access imports are initially partially offset. In 2005, however, the reduction in the NAFTA high-tier tariff causes the U.S. price to reach the new threshold level of 17.99 cents a pound. Notwithstanding, NAFTA imports are still lower than the base by 638,000 STRV. In 2006, the reduction in the NAFTA high-tier tariff drives the U.S. price to the minimum price to avoid forfeiture at 17.86 cents a pound. Because the NAFTA threshold price is 16.48 cents a pound (i.e., lower than the minimum price by 1.38 cents), all of Mexico's exportable surplus reaches the U.S. market, and CCC-owned inventories start to accumulate. By 2011, CCC-owned inventory is projected at 2.439 million STRV. Although high, it is still 849,000 STRV less than the base level. In 2011, production is 485,000 STRV less than the base. The ending stocks-to-use ratio equals 34.9 percent.

Increasing minimum access imports when the loan rate has been lowered to 14 cents a pound produces a pattern similar to the 16 cents loan rate scenario for the first 2 years. The raw sugar price in 2004 is above the NAFTA threshold (hence, no high-tier tariff imports), and in 2005 the price is at the 17.99 cents a pound threshold level (NAFTA high-tier imports equal 146,000 STRV in both loan rate scenarios).

In 2006, the price drops by the amount of the NAFTA high-tier tariff reduction to 16.48 cents a pound, whereas in the 16 cents loan rate scenario it could not fall below the 17.86 cents a pound price floor. Imports are 137,000 STRV less, compared with the 16 cents loan rate scenario; and, more markedly, U.S. sugar production in 2007 is 887,000 STRV less.

In contrast to higher loan rate scenarios, the lower, unbreached price floor associated with the 14 cents a pound loan rate implies a greater reduction in cane and beet sugar processing capacity. Capacity reductions of 7 percentage points for beet sugar processing and 11 percentage points for cane sugar milling represent a permanent reduction in the ability to produce domestic sugar. Compared with the base in 2007, production is 1.325 million STRV less—split between 486,000 STRV of beet sugar and 840,000 STRV of cane sugar.

A chief consequence of lower domestic production is an increase in those prices after the bottoming out in 2006. Increasing prices are a result of a TRQ system still placing an upper constraint on third-country imports and a limited Mexican exportable surplus. Increased sugar prices imply a higher real return for growing sugarcane and sugarbeets.

⁵ It is assumed that CCC-owned sugar inventories do not affect sugar pricing.

Sugar crop acreage increases and sugar production manages to grow 2.5 percent relative to 2007 (or 189,000 STRV) by 2011. The ending stocks-to-use ratio in 2011 is projected at 14.3 percent, and the raw sugar price is projected at 21.3 cents a pound.

Conclusion

Increased market access resulting from U.S. sugar trade liberalization would imply changes in the U.S. sugar program. If the present loan rate program were to be retained, the loan rate would have to be reduced substantially in order to prevent large forfeitures to the U.S. Department of Agriculture (USDA). Baseline analysis suggests that a sugar loan rate of 14 cents a pound, 4 cents less than the current loan rate,

would be necessary to prevent sugar forfeitures to the CCC if the U.S. minimum access sugar import commitment were to increase 50 percent.

The narrowing of the margin between the U.S. and world prices may limit high-tier tariff imports from Mexico and put pressure on high-cost quota suppliers. To make the sugar TRQ viable, the current system of allocating shares based on historical trade patterns would likely have to be modified, eliminating countries for whom the world-U.S. price margins are no longer sufficiently wide to make exports viable. A larger portion of U.S. supplies would be sourced from low cost producers such as Brazil and Australia, as well as Mexico.