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Sugar and Sweeteners Outlook

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U.S. Sugar April 2011

On April 11, 2011, the Secretary of Agriculture increased the quantity of raw cane sugar imports under the raw sugar tariff-rate quota for fiscal year (FY) 2011 by 325,000 short tons, raw value (STRV). With this increase, the overall FY 2011 raw sugar TRQ is now 1,556,497 STRV, or 1,412,030 metric tons, raw value. The Office of the U.S. Trade Representative will allocate this increase among supplying countries and customs areas.

The USDA determined that the FY 2011 cane sector sugar marketing allotments and cane State allotments exceed the amount that can be filled by cane sugar from domestic sources. As required by law, the surplus allocation in all cane producing States was reassigned to raw sugar imports. The FY 2011 sugar marketing allotment program will not prevent any domestic sugarcane processors from marketing all of their FY 2011 sugar supply.

The *World Agricultural Supply and Demand Estimates* (WASDE) was released on April 8, 2011, before the announced increase in the raw sugar TRQ. The U.S. Department of Agriculture (USDA) made no changes to supply or use in either the United States or Mexico. The ending stocks-to-use ratio was forecast at a historically low 10.4 percent. Margins between U.S. and world raw sugar prices had increased about 30 percent since early March to 12.25 cents per pound in the first week of April.

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Approved by the World Agricultural Outlook Board.

Sugar in NAFTA Area

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Projected U.S. sugar supply for fiscal year (FY) 2011 was 12.596 million short tons, raw value (STRV), about 232,000 STRV less than in FY 2010. Processors in Florida forecast production at 1.433 million STRV, about 1 percent less than last month but not enough to affect the WASDE projection.

Imports from Mexico are projected at 1.349 million STRV. According to analysis by the Foreign Agricultural Service (FAS) of U.S. Customs import data, imports through March have amounted to 761,900 STRV. This is about 56.5 percent of the projection for the whole fiscal year. In the first 3 years of the North American Free Trade Agreement (NAFTA), imports in the first half of the fiscal year have averaged only 29.4 percent of the total year imports.

Projected U.S. sugar use is unchanged from last month. Deliveries for human consumption are projected at 11.0 million STRV. Beet sugar deliveries for human consumption for the first 5 months of the fiscal year (October – February) are estimated at 1.921 million STRV, an increase of 4.9 percent over the same period last fiscal year. Cane sugar deliveries are estimated at 2.144 million STRV, about 1.8 percent less than last year.

Total deliveries for human consumption in the *Sweetener Market Data* (SMD) for the first 5 months of the fiscal year are 4.350 million STRV, about 2.2 percent above the same period last year. SMD deliveries plus miscellaneous use items are 4.388 million STRV, 4.3 percent above last year. Using a different methodology for estimating direct consumption imports, the Sugar and Sweetener Team of the Economic Research Service (ERS) estimates deliveries at 4.440 million STRV, an increase of 6.2 percent above last year's total through 5 months. Differences between SMD and ERS approaches are centered in the estimate of direct consumption imports. SMD shows the 5-month total 2.9 percent higher than last year, while the ERS estimate shows a 19.3 percent increase. ERS estimates direct consumption sugar imports from Mexico at more than 185,000 STRV greater than last year through February. The SMD approach does not directly measure increased refined sugar imports from specific countries.

The USDA projects ending year stocks at 1.186 million STRV. The resulting stocks-to-use ratio is a historically low 10.4 percent.

The USDA made no changes in the Mexico sugar supply and use balance. The *Comite Nacional Para El Desarrollo Sustentable de la Cana de Azucar* (CNDSCA) in Mexico released its second estimate of 2010/11 production. Production is estimated at 5.625 million metric tons, raw value (MTRV), about 65,000 MTRV less than the 5.690 million MTRV estimated in November 2010. Although the sugarcane crop was reduced by 5.3 percent to 45.450 million hectares, sucrose recovery in raw value terms was increased to 12.38 percent, up from 11.86 percent.

The U.S. raw sugar price -- the nearby No. 16 Intercontinental Exchange (ICE) contract -- averaged 39.15 cents per pound in the first full week of April, an increase of about 3 percent since early March. The world raw sugar price – the nearby No. 11 ICE contract – decreased from 28.44 cents per pound in early March to 26.88 cents per pound in

the first week of April. Some observers attribute the decrease to expected increases in world sugar supply from India and Thailand. The margin between U.S. and world raw sugar prices increased to about 12.25 cents per pound, up from the 9.37-cent per pound margin a month earlier.

Table 1--U.S. sugar: supply and use, by fiscal year 1/, 4/13/11

Items	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
					1,000 short tons, raw value						
Beginning stocks 2/	2,216	2,180	1,528	1,670	1,897	1,332	1,698	1,799	1,664	1,534	1,510
Total production 3/ 4/	8,769	7,900	8,426	8,649	7,876	7,399	8,445	8,152	7,531	7,975	7,950
Beet sugar	4,680	3,915	4,462	4,692	4,611	4,444	5,008	4,721	4,214	4,575	4,800
Cane sugar	4,089	3,985	3,964	3,957	3,265	2,955	3,438	3,431	3,317	3,400	3,150
Florida	2,057	1,980	2,129	2,154	1,693	1,367	1,719	1,645	1,577	1,646	1,440
Louisiana	1,585	1,580	1,367	1,377	1,157	1,190	1,320	1,446	1,397	1,481	1,400
Texas	206	174	191	175	158	175	177	158	152	112	140
Hawaii	241	251	276	251	258	223	222	182	192	161	170
Puerto Rico	0	0	0	0	0	0	0	0	0	0	
Total imports	1,590	1,535	1,730	1,750	2,100	3,443	2,080	2,620	3,082	3,319	3,135
Tariff-rate quota imports 5/	1,277	1,158	1,210	1,226	1,408	2,588	1,624	1,354	1,370	1,854	1,371
Other program Imports	238	296	488	464	500	349	390	565	308	450	375
Non-program imports	76	81	32	60	192	506	66	701	1,404	1,014	1,389
Mexico 6/							60	694	1,402	807	1,349
Total supply	12,575	11,615	11,684	12,070	11,873	12,174	12,223	12,571	12,277	12,828	12,596
Total exports 3/	141	137	142	288	259	203	422	203	136	211	225
Quota-exempt for reexport	141	137	142	288	259	203	422	203	136	211	225
ther exports	0	0	0	0	0	0					
CC disposal, for export	0	0	0	0	0	0					
Miscellaneous	123	-24	161	23	94	-67	-132	0	0	-45	0
CCC disposal, for domestic non-food use	10	0	0	0	0	0	0	0	0	0	0
efining loss adjustment	0	0	0	0	0	0	0	0	0	-45	0
Statistical adjustment 7/	113	-24	161	23	94	-67	-132	0	0	0	0
Deliveries for domestic use	10,132	9,974	9,711	9,862	10,188	10,340	10,135	10,704	10,607	11,152	11,185
Transfer to sugar-containing products for exports under reexport program	98	156	183	142	121	106	169	141	120	201	145
Transfer to polyhydric alcohol, feed	33	33	24	41	48	51	53	61	46	35	40
Deliveries for domestic food and beverage use 8/	10,000	9,785	9,504	9,678	10,019	10,184	9,913	10,501	10,441	10,917	11,000
Total use	10,396	10,087	10,014	10,172	10,542	10,476	10,424	10,907	10,743	11,318	11,410
Ending stocks 2/	2,180	1,528	1,670	1,897	1,332	1,698	1,799	1,664	1,534	1,510	1,186
Privately owned	1,395	1,316									
CCC	784	212									
					Percent						
Stocks-to-use ratio	20.97	15.15	16.68	18.65	12.63	16.21	17.25	15.26	14.28	13.35	10.39

NOTE: Numbers may not add due to rounding.

1/ Fiscal year beginning October 1. 2/ Stocks in hands of primary distributors and CCC. 3/ Historical data are from FSA (formerly ASCS), *Sweetener Market Data* (SMD), and NASS, Sugar Market Statistics prior to 1992. 4/ Production reflects processors' projections compiled by the Farm Service Agency. 5/ Actual arrivals under the tariff-rate quota (TRQ) with late entries, early entries, and (TRQ) overfills assigned to the fiscal year in which they actually arrived. The 2010/11 available TRQ assumes shortfall of 150,257 tons. 6/ Starting in 2007/08, total includes imports under Mexico's WTO TRQ allocation for raw and refined sugar. 7/ Calculated as a residual. Largely consists of invisible stocks change.

8/ For FY 2008-09, combines SMD deliveries for domestic human use, SMD miscellaneous uses, and the difference between SMD imports and *World Supply and Demand Estimates* imports.

Table 2 --U.S. sugar: supply and use (including Puerto Rico), fiscal years, metric tonnes, 1/ 4/13/11

Items	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
					1,000 metric tons, raw value						
Beginning stocks 2/	2,010	1,977	1,386	1,515	1,721	1,208	1,540	1,632	1,510	1,392	1,370
Total production 3/ 4/	7,955	7,167	7,644	7,846	7,145	6,712	7,662	7,396	6,832	7,235	7,212
Beet sugar	4,245	3,552	4,048	4,257	4,183	4,032	4,543	4,283	3,822	4,151	4,354
Cane sugar	3,710	3,615	3,596	3,590	2,962	2,681	3,119	3,113	3,009	3,084	2,858
Florida	1,866	1,796	1,932	1,954	1,536	1,240	1,559	1,492	1,431	1,493	1,306
Louisiana	1,438	1,433	1,240	1,249	1,049	1,079	1,198	1,312	1,267	1,344	1,270
Texas	187	158	173	159	143	159	161	143	138	101	127
Hawaii	219	227	251	228	234	202	201	165	174	146	154
uerto Rico P	0	0	0	0	0	0	0	0	0	0	0
Total imports	1,443	1,393	1,570	1,588	1,905	3,124	1,887	2,377	2,796	3,011	2,844
Tariff-rate quota imports 5/	1,158	1,051	1,098	1,113	1,277	2,348	1,473	1,229	1,243	1,682	1,244
Other Program Imports	216	269	443	421	454	317	354	513	279	408	340
Non-program imports	69	73	29	54	174	459	60	636	1,274	920	1,260
Mexico 6/											
Total Supply	11,408	10,537	10,599	10,949	10,771	11,044	11,088	11,404	11,138	11,637	11,427
Total exports 3/	128	125	129	261	235	184	383	184	123	191	204
Quota-exempt for reexport	128	125	129	261	235	184	383	184	123	191	204
ther exports O	0	0	0	0	0	0	0	0	0	0	0
CCC disposal, for export	0	0	0	0	0	0	0	0	0	0	0
Miscellaneous	112	-22	146	20	85	-61	-120	0	0	-41	0
CCC disposal, for domestic non-food use	9	0	0	0	0	0	0	0	0	0	0
Refining loss adjustment	0	0	0	0	0	0	0	0	0	-41	0
tatistical adjustment / 7 S	103	-22	146	20	85	-61	-120	0	0	0	0
Deliveries for domestic use	9,191	9,048	8,810	8,946	9,243	9,381	9,194	9,710	9,623	10,117	10,147
Transfer to sugar-cont. products for exports under reexport program	89	141	166	129	110	96	153	128	109	183	132
Transfer to polyhydric alcohol, feed	30	30	22	38	44	46	48	56	42	31	36
Deliveries for domestic food and beverage use 8/	9,072	8,877	8,622	8,780	9,089	9,239	8,993	9,527	9,472	9,903	9,979
Total Use	9,431	9,151	9,084	9,228	9,563	9,504	9,457	9,895	9,746	10,267	10,351
Ending stocks 2/	1,977	1,386	1,515	1,721	1,208	1,540	1,632	1,510	1,392	1,370	1,076
Privately owned	1,266	1,194									
CCC	711	192									
						Percent					
Stocks-to-use ratio	20.97	15.15	16.68	18.65	12.63	16.21	17.25	15.26	14.28	13.35	10.39

NOTE: Numbers may not add due to rounding.

1/ Fiscal year beginning October 1. 2/ Stocks in hands of primary distributors and CCC. 3/ Historical data are from FSA (Farm Service Agency), *Sweetener Market Data* (SMD), and NASS, Sugar Market Statistics prior to 1992. 4/ Production reflects processors' projections compiled by the Farm Service Agency. 5/ Actual arrivals under the tariff-rate quota (TRQ) with late entries, early entries, and (TRQ) overfills assigned to the fiscal year in which they actually arrived. The 2010/11 available TRQ assumes shortfall of 136,311 tonnes. 6/ Starting in 2007/08, total includes imports under Mexico's WTO (World Trade Organization) TRQ allocation for raw and refined sugar. 7/ Calculated as a residual. Largely consists of invisible stocks change.

8/ For FY 2008-09, combines SMD deliveries for domestic human use, SMD miscellaneous uses, and the difference between SMD imports and *World Agricultural Supply and Demand Estimates* imports.

Table 3--Mexico: sugar production and supply, and sugar and High Fructose Corn Syrup (HFCS) utilization 4/13/2011

Fiscal Year (Oct/Sept)	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11 1/
					1,000 metric tons						
Beginning stocks	1,063	1,548	1,172	1,194	1,237	1,965	1,294	1,718	1,975	624	973
Production	5,220	5,169	5,229	5,330	6,149	5,604	5,633	5,852	5,260	5,115	5,550
Imports	43	52	63	327	268	240	474	226	160	861	290
Supply	6,326	6,769	6,464	6,851	7,654	7,809	7,401	7,796	7,395	6,600	6,813
Disappearance											
Human consumption	4,481	5,004	5,097	5,380	5,279	5,326	5,133	5,090	5,065	4,615	4,329
Other consumption	142	180	135	220	282	323	390	414	475	302	300
Miscellaneous								-360	-136	-27	
Total	4,623	5,184	5,232	5,600	5,561	5,649	5,523	5,144	5,404	4,890	4,629
Exports	155	413	38	14	128	866	160	677	1,367	737	1,232
Total use	4,778	5,597	5,270	5,614	5,689	6,515	5,683	5,821	6,771	5,627	5,861
Ending stocks	1,548	1,172	1,194	1,237	1,965	1,294	1,718	1,975	624	973	952
Stocks-to-human consumptior	34.5	23.4	23.4	23.0	37.2	24.3	33.5	38.8	12.3	21.1	22.0
Stocks-to-use	32.4	20.9	22.7	22.0	34.6	19.9	30.2	33.9	9.2	17.3	16.2
					1,000 metric tons, dry weight						
HFCS cons. (dry weight)	600	263	130	135	355	667	698	782	653	1,418	1,750

1/ Forecast.

Source: USDA, Foreign Agricultural Service, PSD database (historical data); *World Agricultural Supply and Demand Estimates* (forecast data).

Direct Consumption Sugar Imports

The Farm Service Agency (FSA) surveys processors and refiners ("reporters") on a monthly basis and publishes the results as the *Sweetener Market Data*. Sugarbeet processors, sugarcane processors, and cane sugar refiners report physical quantities of sugar stocks, production, imports, exports, and deliveries to end users. The reported quantities are used to calculate the most important components of the supply-use estimates at the industry level. Intra-industry sales and receipts and adjustments to inventory are also reported and are grouped together as miscellaneous adjustments to the supply-use balance. Individual supply and use tables are published for each sugar sector (the two processing sectors and refiners), and individual items are aggregated across sectors for a composite view of the industry. These data provide the basis upon which supply and use projections/estimates are made and published in the USDA's WASDE. At present, sugar importers that are not either sugar processors or refiners are not surveyed.

Prior to the full implementation of the North American Free Trade Agreement (NAFTA) on January 1, 2008, almost all sugar imported outside the SMD survey channels was refined sugar meant for direct consumption by end users. Personnel at the Foreign Agricultural Service (FAS) would monitor these imports from their examination of data gathered by either the U.S. Customs Service or the U.S. Census Bureau. FAS would estimate the size of these imports and report it to FSA personnel for inclusion as a component of SMD supply (direct consumption imports). This same number, less refined sugar imported directly by cane sugar refiners and beet processors, was reported as a use component. This use component was termed "sugar deliveries" by non-reporters. These deliveries were added to deliveries made by beet processors and cane refiners to determine total sugar deliveries for human use.

In 2010, FSA revised its methodology for deriving direct consumption imports. FSA takes total monthly sugar imports reported by FAS in its analysis of sugar import data from U.S. Customs (fiscal year (FY) 2008-10) or from U.S. Census Bureau (FY 2011), then subtracts out the corresponding month's total of raw sugar imports reported to FSA by cane refiners. (Raw sugar is demanded only by refiners.) This remainder is assumed to be refined sugar imported for direct consumption. This relationship can be expressed:

SMD refined sugar = Census total sugar- SMD raw sugar

This method has resulted in a choppy pattern of refined sugar imports and has at times produced negative estimates of refined imports (fig. 1).

With the adoption of the FSA methodology, estimated monthly sugar deliveries for human consumption after NAFTA implementation became more variable. Use of the new delivery data in projecting future monthly deliveries became less reliable.

In an effort to improve sugar delivery forecasting, the Sugar and Sweetener Team of the Economic Research Service (ERS), with the assistance of FAS personnel, developed an alternative direct consumption import series. The methodology is based on an analysis of sugar imports by U.S. port destination, container sizes of imports, and proprietary data not available outside USDA. Import data is examined by the program under which it enters: raw sugar tariff-rate quota (TRQ raw refined sugar), refined sugar tariff-rate quota (TRQ refined refined sugar), sugar imported from Mexico (MEXICO refined sugar), and sugar imported under other Free Trade Agreements (FTA refined sugar). Sugar imports that enter the United States paying the high-tier tariff are examined as well (High-Tier Tariff refined sugar). This series can be expressed:

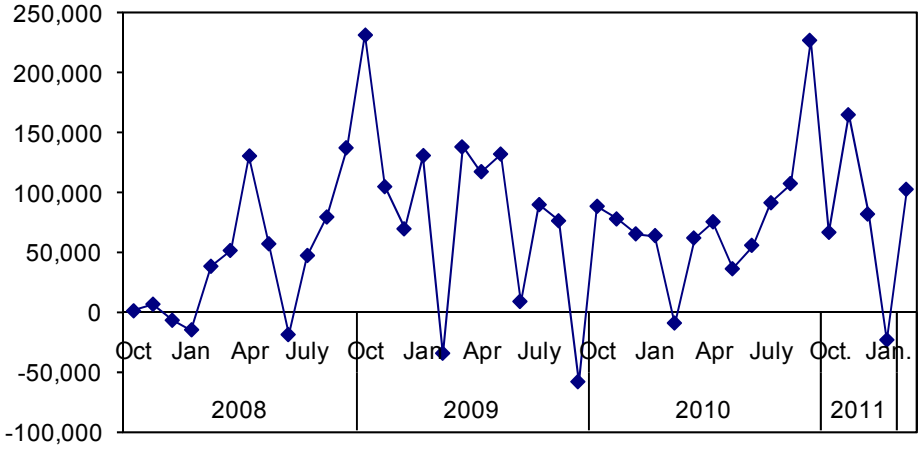
ERS refined sugar = MEXICO refined sugar + FTA refined sugar

+ TRQ raw refined sugar + TRQ ref refined sugar + High-Tier Tariff refined sugar

Figure 1

Sweetener market data (SMD) refined sugar imports

Short tons, raw value

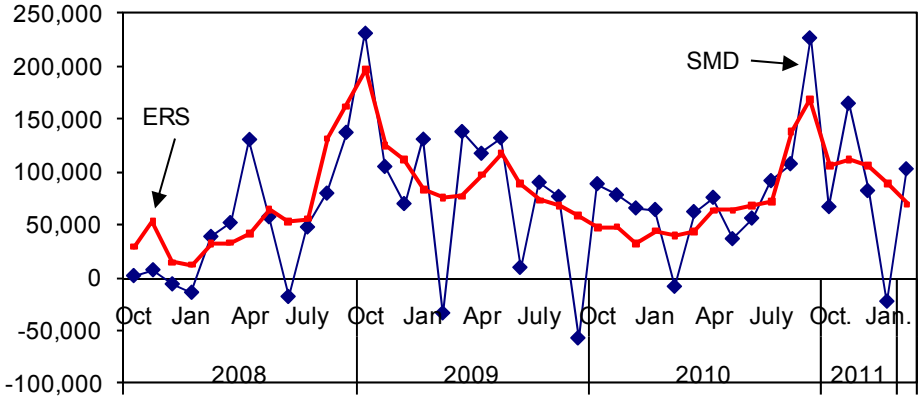


Source: USDA, FSA, *Sweetener Market Data*.

Figure 2

Refined sugar imports from Sugar and Sweetener Team and SMD

Short tons, raw value



Sources: USDA, ERS, Sugar and Sweetener Team; and Foreign Service Agency, *Sweetener Market Data*.

The series is shown in figure 2, superimposed on the SMD series from figure 1. The series is variable and values are, by necessity, positive. Use of this series in place of the SMD series has improved forecasting statistics for projecting sugar deliveries.

An interesting question is why the SMD direct import series is seemingly unstable, with the occasional negative value. The relationship between Census total sugar and SMD raw sugar may be more complex than supposed by the simple equation shown above. A hypothesis is that the series do not necessarily correspond to each other in the same month. Sugar is recorded by the U.S. Customs Service (which is the basis for the U.S. Census estimate) when the sugar enters into U.S. customs territory. The sugar imported by refiners is not recorded until actually unloaded and weighed at the refinery. By necessity, delivery at the refinery comes after the sugar has entered the customs territory.

The relationship to be examined can be expressed:

$$\text{SMD raw sugar} = \varphi 0 * \text{Census raw sugar} + \varphi 1 * \text{Census raw sugar}(-1)$$

$$+ \varphi 2 * \text{Census raw sugar}(-2) + \lambda * \text{Census MEXICO refined sugar} + \varepsilon \text{ (error term)},$$

where: $\varphi 0 + \varphi 1 + \varphi 2 = 1$; $\lambda < 1$; and $\varepsilon \sim$(distributed) normal(mean=0,variance=σ^2).

The negative numbers in the parentheses refer to lagged months in the analysis. Although not the goal of analysis, an additional variable representing refined sugar imports from Mexico is included in the analysis to allow for refiners' importing for further processing Mexican sugar technically classified as refined.

The estimation results are shown in table 4. (The equation also includes shift variables that relate to time-specific events not specifically modeled, but that affected the relationship between SMD and Census raw sugar measures.) The importance of the hypothesized lagged relationship between the import series is established by the estimated coefficients. On average, SMD raw imports are functionally related to 61.2 percent of same-month Census raw imports, 21.0 percent of previous-month Census raw imports, and 14.5 percent of the twice-lagged month of imports.

The sum of the coefficients cannot be statistically distinguished from 1. Also, results indicate that on average, about 30 percent of Mexican sugar imports classified as refined sugar went to refiners for further processing. Overall, about 73 percent of the variance of SMD raw sugar imports are explained by the variables in the estimated equation.

In view of these results, one cannot rule out SMD raw imports exceeding total Census sugar imports, with the resulting (but false) implication of negative refined sugar imports.

One way to reduce the variability of the SMD refined sugar series is to use a weighted average of coefficients summing to 1 for current and lagged SMD values or current and lead (opposite of lagged) values. Suppose that the ERS refined sugar series is the theoretically correct series but that it cannot be used in the SMD because the methodology from which it is derived cannot be made public. Is it possible to use fitted values from an estimated equation that models the relationship between the ERS and SMD refined sugar import series? The answer depends on how well the series are correlated.

The hypothesis can be expressed:

$$\text{SMD refined sugar} \sim \text{function of: (ERS refined sugar,}$$

$$\text{ERS refined sugar}(-1), \ldots \text{ERS ref sugar}(-n))$$

However, if the series is to be used in the SMD, then we want a weighted average of SMD refined sugar imports, which implies the equivalent converse of the equation, that is:

ERS refined sugar ~ as function of (SMD refined sugar,

SMD refined sugar(+1),……SMD refined sugar(+n))

The interpretation here is that refined sugar recorded by the ERS method shows up in the SMD in the current month and possibly as well in the months occurring after actual entry into the customs territory. The lead length is determined by the length which yields the best statistical properties. It should also be the case that the sum of the coefficients cannot be statistically differentiated from 1.

Table 5 shows estimation results. Note that the series includes observations only from 2008 through 2011 because the ERS import series is not defined before 2008. The number of leads on the SMD refined import series is 2. The coefficients sum to about 1, and the significance level on each coefficient is high. Overall, explained variance of the ERS refined sugar series is only 52.4 percent – which ideally should be higher, but is not that bad. Although not shown here, the forecasting properties of using the fitted SMD refined sugar series (that is, 0.507*SMD refined sugar + 0.285*SMD refined sugar(+1) + 0.205*SMD refined sugar (+2) instead of SMD refined sugar) are close to those resulting from using ERS refined sugar.

The problem of implementing this approach is that one has to wait 2 months to have the complete SMD series for SMD reporting. A possible solution could be to use the ERS refined sugar value in the interim 2 months, with an adjustment to the series as new monthly SMD refined sugar values become available.

Table 4--Sweetener Market Data (SMD) raw sugar imports as function of raw imports and refined sugar imports from Mexico as recorded by U.S. Census Bureau, monthly observations

Dependent variable: SMD_RAWIMPORTS
Method: least squares
Date: 04/05/11 Time: 13:16
Sample(adjusted): 1995:03 2011:01
Included observations: 191 after adjusting endpoints

Variable	Coefficient	Std. error	t-Statistic	Prob.
CENSUS_RAWIMPORTS	0.612	0.032	19.225	0.000
CENSUS_RAWIMPORTS(-1)	0.210	0.034	6.149	0.000
CENSUS_RAWIMPORTS(-2)	0.145	0.031	4.650	0.000
CENSUS_REFINEDIMPORTS_MEXICO	0.303	0.091	3.318	0.001
SHIFT VARIABLES: 1/				
D199509	109,545	34,057	3.217	0.002
D199510	-75,961	34,238	-2.219	0.028
D199708TO199711	-81,834	17,610	-4.647	0.000
D200510	-84,768	33,688	-2.516	0.013
D200601TO200605	53,702	15,748	3.410	0.001

R-squared	0.740	Mean dependent variables	165,064
Adjusted R-squared	0.729	S.D. dependent variables	64,380
S.E.of regression	33,512	Akaike info criterion	23.723
Sumsquared residual	2.04E+11	Schwarz criterion	23.876
Log likelihood	-2,257	Durbin-Watson statistics	2.228

1/ Shift variables account for relationships that are explained by non-recurring, one-time factors not specifically analyzed by other variables in the estimated equation. For instance, D199509 refers to September 1995: its value is 1 for that month, zero otherwise.

Source: USDA, ERS, Sugar and Sweetener Team.

Table 5--ERS refined imports as function of SMD refined imports, monthly observations

Dependent variable: ERS_refined sugar
Method: least squares
Date: 03/28/11 Time: 15:33
Sample(adjusted): 2008:01 2011:02
Included observations: 38 after adjusting endpoints

Variable	Coefficient	Std. error	t-Statistic	Prob.
SMD_refined sugar	0.507	0.070	7.286	0.000
SMD_refined sugar (+1)	0.285	0.070	4.074	0.000
SMD_refined sugar (+2)	0.205	0.067	3.046	0.004

R-squared	0.549	Mean dependent variables	77,344
Adjusted R-squared	0.524	S.D. dependent variables	43,284
S.E. of regression	29,868	Akaike info criterion	23.521
Sumsquared residual	3.21E+10	Schwarz criterion	23.649
Log likelihood	-456	Durbin-Watson statistics	1.359

Source: USDA, ERS, Sugar and Sweetener Team.

World Sugar and High Fructose Syrup Production Costs: 2000/01 - 2009/10

LMC International provides estimates of world sugar and high fructose syrup (HFS) costs of production. The data go back to 1979/80 and extend through 2009/10. Field, factory, and administrative costs are detailed for 35 beet producing countries and for 61 cane producing countries. HFS production costs are presented for 18 countries.[1] Costs of production for regions within certain important producing countries are presented as well. These countries include the United States, Mexico, Brazil, China, Thailand, and South Africa, among others. Articles in *Sugar and Sweetener Outlook* of the Economic Research Service (ERS) reports have previously described data through 2006/07. This report updates the earlier articles.

Competitiveness Analysis and Costs of Production

Analysis of competitiveness in global sugar/sweetener markets is complicated by the fact that markets are generally characterized by domestic and trade-related policy distortions that make it difficult to discern the underlying competitive position of individual market participants. Competitiveness of sugar/sweetener producers reflects many different factors—relative resource endowments and agro-climatic conditions, the impact of macroeconomic policies, sector-specific policies, infrastructure, and supporting institutions. One approach to a comparative economic analysis of competitiveness is the evaluation of production costs associated with farm-level production, processing, transportation, and marketing.

Production cost estimates and cross-country comparisons serve a number of goals. They typically form the basis for comparing competitiveness in production and aid in the calculation of government support to sugar/sweetener industries in many countries. In addition, trends in production costs can be compared with long-term trends in world prices to evaluate the viability of production in markets that may be liberalized. Cost-of-production estimates are also useful in analyzing the consequences for sugar and sweetener industries of changing government support (such as recent reforms in the European Union), as well as of the formation of regional preferential trading areas such as the North American Free Trade Agreement (NAFTA) and the Dominican Republic-Central American Free Trade Area (CAFTA/DR). Finally, information on the contribution of particular cost components to total production and marketing costs can be used to interpret the impact of various factors such as changing exchange rates or input prices on production incentives in different countries—all supporting decisions on production, investment, and policy alternatives and guiding expectations of future market developments

Despite the usefulness of production costs, however, there are many limitations in their use. For instance, the LMC data refer to estimated, averaged costs within individual countries or regions. Economists generally argue that marginal costs are more relevant in predicting supply response changes due to changes in output prices, government support, and input prices. Knowledge of industry structures and the specific production technologies in use are also necessary for predicting supply response changes when underlying price and cost variables change.

Dating back to 1987, ERS has published six reports drawing on proprietary LMC International sugar and HFCS production cost data (Hoff, Angelo, and Fry, 1987; Lord, Barry, and Fry, 1989; Haley, 1998; Haley, 2001; Haley, 2004; and Haley, 2007). The ERS studies focus on yearly trends in costs for various categories of raw cane, beet, and HFS producers, distinguishing between low- and high-cost groupings, different geographical regions, and major exporters other than Brazil. The studies also distinguish between field and factory costs for sugar production. Using the structure of the prior reports and updated data from LMC International as a foundation, this study extends the analysis through 2009/10.

[1] See the Box at the end of this report, "*LMC International Engineering Cost Approach*," for a description of LMC International's methodology for estimating cost of production in countries/regions.

Trends in World Sweeteners and Costs of Production

In their cost-of-production database, LMC International includes most but not all countries that produce sugar and high fructose sweetener (HFS). Table 6 shows a listing of those countries by type of sweetener produced -- cane sugar, beet sugar, and HFS. The table shows also how the ERS Sugar and Sweetener Team classifies countries within each production category. For cane sugar, countries are classified as low-cost, other exporters (i.e., excludes Brazil), Cyclical Asia countries, Other Asia, Other Latin America, NAFTA area, and Other Africa and Middle East. Beet sugar and HFS are each split between low-cost producers and higher cost producers. Figure 3 shows each category's share of total world sweetener production for 2000/01 through 2009/10.

Brazil, by far the world's largest exporter, is divided into two producing areas. The Center/South region, where most Brazilian sugarcane is grown, is included in the low-cost category. The North/East region is included in Other Latin America because its costs are significantly higher. Besides Center/South Brazil, the low-cost category includes producers in Latin America (three) and Africa (six). Other exporters include the five largest exporters after Brazil: Australia, Colombia, Guatemala, South Africa, and Thailand. Cyclical Asia includes China, India, and Pakistan. Production in these countries is volatile, which often causes year-to-year sugar trade fluctuations. The NAFTA region comprises the United States and Mexico.

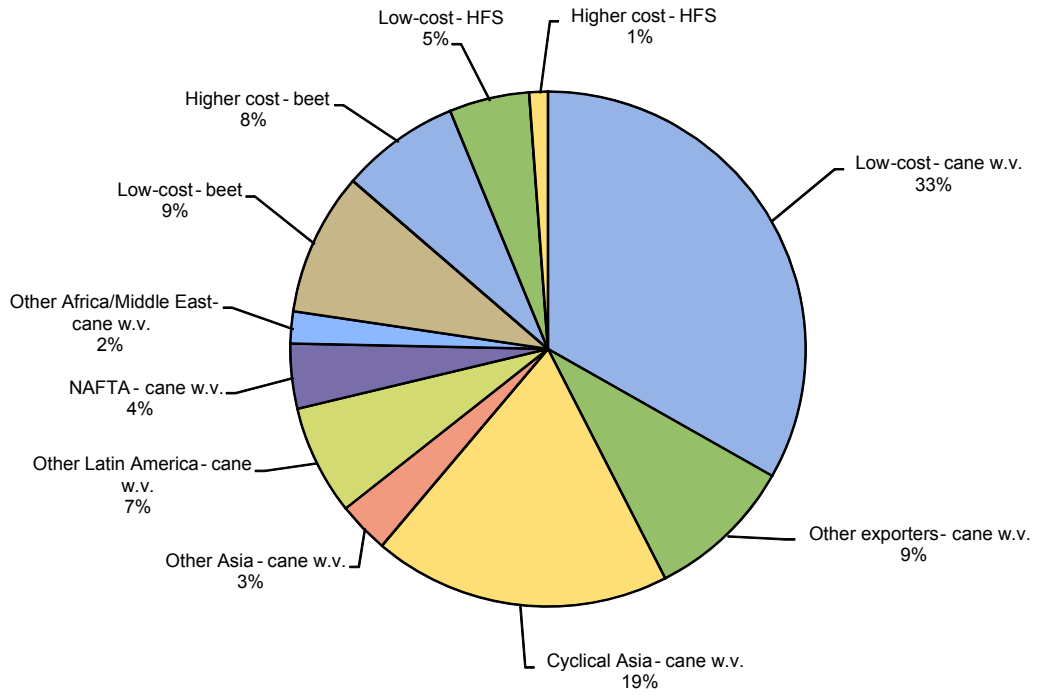
In the dataset, sweetener production grew from about 150 million metric tons (mt) in 2000/01 to 198 million in 2009/10 (fig. 4). Cane sugar, measured in figure 3 in terms of white value, grew 46.9 percent over the period to 155 million mt, about 50 million mt more than in 2000/01. Most of this production gain occurred in Center/South Brazil. Cane sugar's share of combined sweetener production rose from 70.3 percent in 2000/01 to 78.7 percent in 2009/10. Beet sugar production decreased 5.5 percent over the period, mostly due to a 20-percent production reduction in the European Union after its sugar reform, starting in 2005. The beet share of combined sweetener production decreased from 22.0 percent in 2000/01 to 15.2 percent in 2009/10. HFS production rose a modest 4.1 percent over the decade.

Table 6–Sweetener cost categories and classification of sweetener producers on national basis

Cane sugar							Beet sugar		High fructose syrup	
Low-cost	Other exporters	Cyclical Asia	Other Asia	Other Latin America	NAFTA	Other Africa/Middle	Low-cost	Higher cost	Low-cost	Higher cost
Argentina	Australia	China	Bangladesh	Barbados	United States	Burundi	Belgium	Austria	Argentina	Bulgaria
Brazil (C.S.)	Colombia	India	Fiji	Belize	Mexico	Cameroon	Chile	Belarus	Belgium	Egypt
El Salvador	Guatemala	Pakistan	Indonesia	Bolivia		Congo	Czech Republic	Bulgaria	Canada	Finland
Ethiopia	South Africa		Japan	Brazil (N.E.)		Congo DR	Denmark	Canada	China	France
Malawi	Thailand		Papua New Guinea	Costa Rica		Côte d'Ivoire	Egypt	China	United States	Germany
Nicaragua			Philippines	Cuba		Egypt	France	Croatia		Greece
Sudan			Sri Lanka	Dominican Republic		Iran	Germany	Finland		Hungary
Swaziland			Taiwan	Ecuador		Kenya	Netherlands	Greece		Italy
Zambia			Vietnam	Guyana		Madagascar	Poland	Hungary		Japan
Zimbabwe				Honduras		Mauritius	United Kingdom	Iran		Mexico
				Jamaica		Morocco	United States	Ireland		Netherlands
				Panama		Mozambique		Italy		Poland
				Paraguay		Réunion		Japan		Slovakia
				Peru		Senegal		Latvia		South Korea
				St Kitts		Tanzania		Lithuania		Spain
				Trinidad		Uganda		Moldova		Taiwan
				Venezuela				Morocco		Turkey
								Portugal		United Kingdom
								Republic of Serbia		
								Romania		
								Russia		
								Slovakia		
								Spain		
								Sweden		
								Switzerland		
								Syria		
								Tunisia		
								Turkey		
								Ukraine		
								Uruguay		

Source: ERS, Sugar and Sweetener Team.

Figure 3 --Total sweetener production shares 2000/01-2009/10

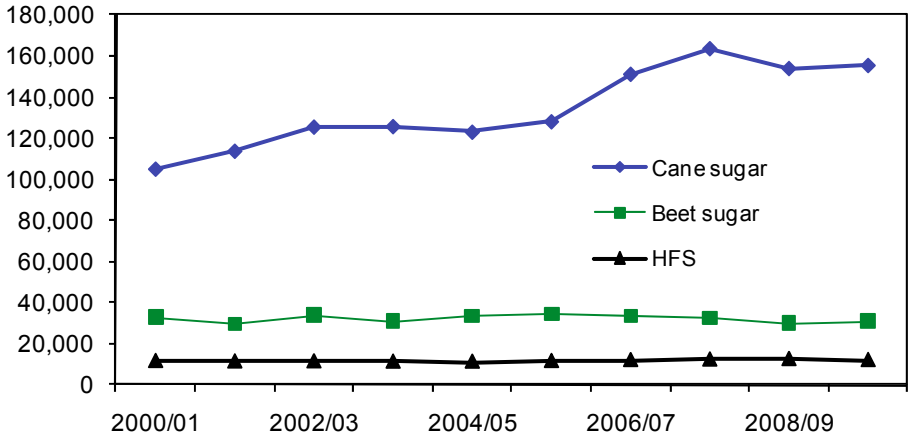


Source: LMC International. WV=White value.

Figure 4

World sweetener production in LMC international cost of production dataset, 2000/01-2009/10

1,000 Metric tons, white value



Source: LMC International.

Growth in World Sweetener Costs of Production

Figure 5 shows the evolution of sweetener costs of production over the decade. The change of each sweetener's cost relative to its value in 2000/01 is highlighted. Cane sugar's 2000/01 cost in white value terms is set at 100.0. Beet sugar's 2000/01 cost is 160.9, meaning that it was 60.9 percent more expensive, on average, to produce beet sugar than cane sugar. The HFS 2000/01 cost is 65.8, indicating that it was 34.2 percent less expensive to produce HFS than cane sugar in 2000/01.

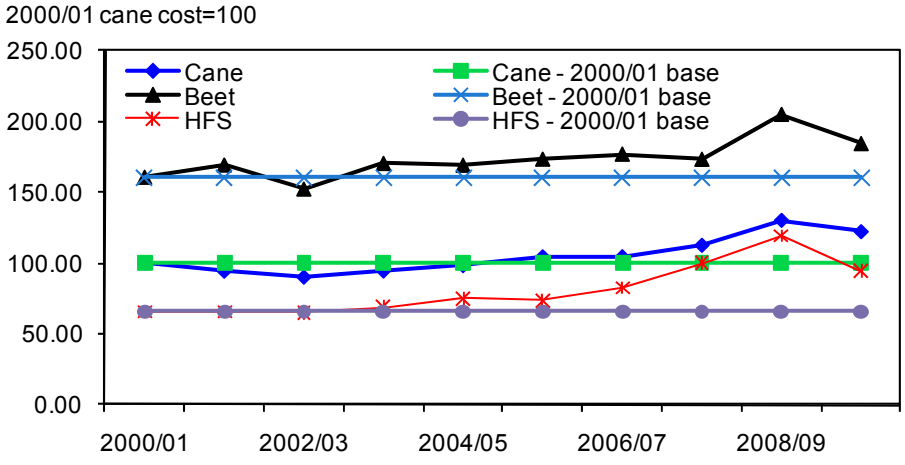
The figure shows that production cost growth was restrained through 2006/07, at which point HFS costs increased about 12.7 percent from the year before. The next year saw an increase of 20.7 percent in HFS costs and the following year an increase of 19.2 percent. Costs were down in 2009/10, but still 43.1 percent higher than in 2000/01.

The rise in cane sugar costs came a year later than the HFS rise: 7.8 percent in 2007/08 and 15.9 percent in 2008/09. Cane costs decreased in 2009/10, although not as much as the corresponding decrease in HFS costs. Cane costs were 22.5 percent higher in 2009/10 than in 2000/01.

The rise in beet sugar costs came in 2003/04, when they increased11.9 percent. However, for the next 4 years beet costs held steady. The largest increase came in 2008/09, at 18.3 percent. As with the other sweeteners, costs came down in 2009/10, leaving beet sugar 2009/10 costs 11.1 percent higher than in 2000/01.

Figure 5

Average total sweetener costs of production relative to total cane sugar 2000/01-2009/10



Source: LMC International.

Factor Growth Costs for Sweeteners

Figure 6 shows a comparison of the components of world cane sugar costs, white value, between the periods 2000/01-2004/05 and 2005/06-2009/10. The chart is scaled to show the share percentage for each component of total cane costs averaged over 2000/01-2004/05.[2] The largest percentage growth was for fuel, chemicals, and fertilizers at 79 percent, followed by labor at 36 percent, and then capital at only 9 percent. Byproduct credits against costs, derived principally from the sale of molasses, increased over 85 percent.

Figure 7 shows changes in cost components for world beet sugar. Similar to figure 6, the chart is scaled to show the beet cost components' share percentage of total cane costs averaged over 2000/01-2004/05. With figure 7 having the same vertical axis scaling as figure 6, we see that beet sugar cost components in all cases are higher than corresponding cane sugar components. The sum of the beet cost component shares is 172.7 for 2000/01-2004/05 and 191.6 for 2005/06-2009/10. This means that total beet costs in the first half of the decade were on average 72.7 percent higher than corresponding cane costs, and total beet costs in the second half of the decade were 91.6 percent higher than in the first half. Overall, average total beet costs grew about 10.9 percent between the two periods: (191.6-172.7)/172.7. Within cost categories, fuel, chemical, and fertilizer costs grew 41.5 percent, labor costs grew 15.6 percent, and capital costs declined -0.7 percent.

Figure 8 shows components of HFS costs between the first and second halves of the decade. Because the HFS cost components are defined differently than for sugar (with the addition of the grain cost category), component costs are shown as a percentage of total HFS costs for 2000/01-2004/05. Averaged total HFS costs grew 38.5 percent between the two periods: sum of cost components for 2005/06-2009/10 = 138.5 and sum of cost components for 2000/01-2004/05 = 100.0. Grain costs grew 56.6 percent, but were partially offset by a 47.9 percent growth in byproduct sales.[3] The share of grain costs minus byproduct sales was 36.4 over 2000/01-2004/05, or less than the fuel cost share of 41.6. In the decade's second half, the grain costs minus the byproduct sales share was 60.1, 13.8 percent higher than the corresponding fuel cost share of 52.8.

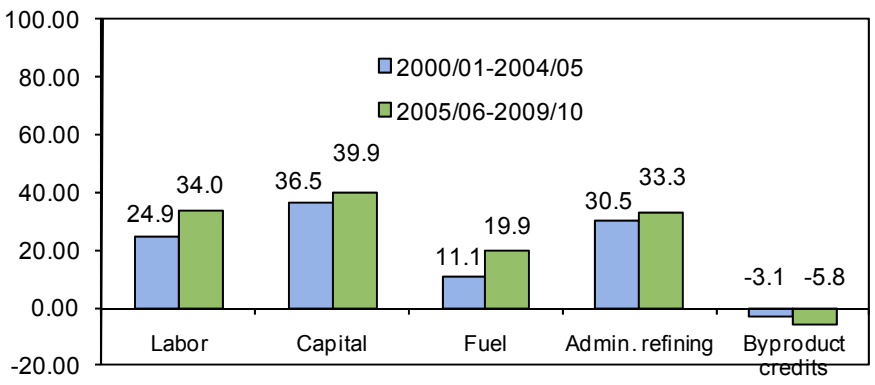
To summarize, increasing fuel and chemical costs were primarily responsible for increases in overall cane and beet sugar costs. While fuel and chemical costs contributed strongly to the rise in HFS costs, the high run-up in grain costs was more important.

[2] In figure 5, labor's value is 24.9 in the first half of the decade. This means labor was 24.9 percent of total averaged cane costs for the period. The value increased to 34.0 in 2005/06-2009/10, meaning that labor's share in 2005/06-2009/10 was 34.0 percent of the total averaged cane costs over 2000/01-2004/05. If we add all components for each of the two periods, we get 100.0 percent for 2000/01-2004/05 and 121.2 percent for 2005/06-2009/10, meaning that total averaged cane costs were 21.2 percent higher in the second half of the decade.

[3] In the United States, these byproducts are corn gluten meal and feed and corn oil. Their prices are highly correlated with grain and oilseed prices.

Figure 6

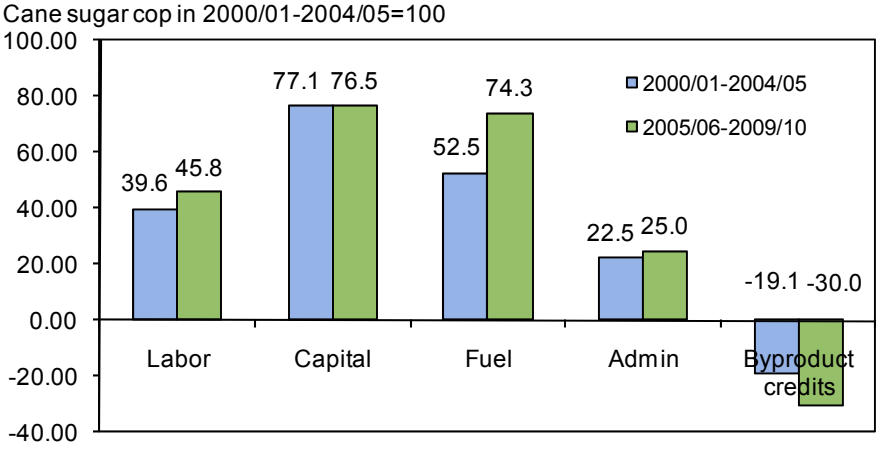
Components of world average cane sugar production costs, white value, 2000/01-2004/05 and 2005/06-2009/10, compared with total world average cane sugar costs 2000/01-2004/05



Source: LMC International.

Figure 7

Components of world average beet sugar production costs, 2000/01-2004/05 and 2005/06-2009/10, compared with total world average cane sugar production costs 2000/01-2004/05



Source: LMC International.

Cost Trends in the Field and Factory

Field costs increased significantly for both cane and beet sugar, while factory costs held steady over the decade. Figure 9 shows the field cost trends. The vertical axis is scaled so that the 10-year average of cane field costs is equal to 100. The corresponding 10-year beet sugar field cost is situated higher, at about 184.0. In both cases, costs have trended upward. Especially noticeable is the rise in field costs in 2008/09. At the end of the period, beet field costs were about 73 percent higher than cane field costs, compared with about 80 percent at the beginning.

Factory costs are shown in figure 10. The vertical scale is defined similarly to that in figure 9 – the cane factory cost average for the decade is set at 100. The average beet factory cost is 139 – proportionally lower than for field costs (i.e., less than the 184 for field costs). Cane factory costs trended upward through the decade, but insignificantly so. Cane factory costs were actually lower in 2009/10 at 103.9 than at the beginning at 105.1. Beet factory costs trended slightly negative over the decade. In both instances, trends were affected by increased fuel and chemical costs in 2008/09, but the fuel and chemical costs were mitigated the next year.

Distribution of Sweetener Costs Across Product/Region/Cost Groupings

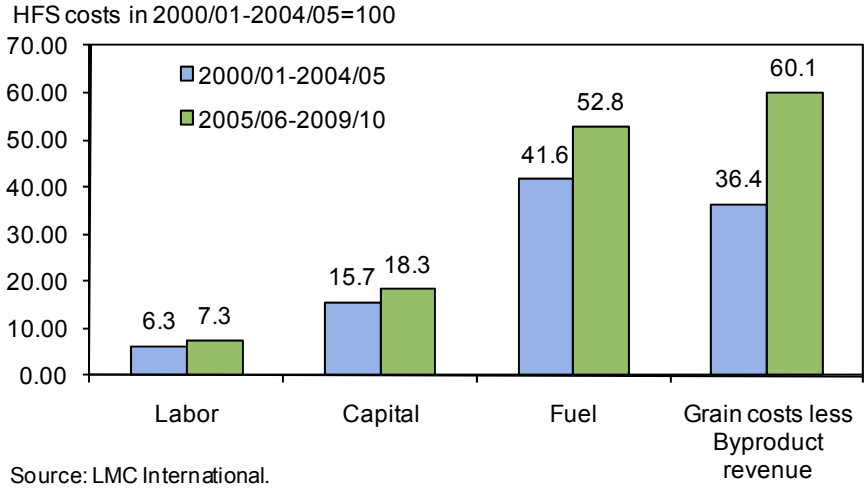
Costs of producing sweeteners differ widely across producing areas. Figure 11 shows relative production costs averaged over 2005/06-2009/10 across sweetener areas as defined in table 6. The index for the low-cost cane area is set at 100, and all other groupings have cost estimates relative to it. The horizontal axis shows cumulative sweetener production across the groupings, giving an indication of how costs are distributed. HFS from low-cost producers is the lowest cost sweetener; however, the quantity produced is relatively low. Next comes low-cost cane sugar, constituted primarily of production from Center/South Brazil. Beet production is relatively more expensive than either cane or HFS production. The low-cost beet sugar producers have average costs more than 60 percent higher than those of the low-cost cane producers. High-cost beet producers have costs more than twice those of the low-cost cane producers.

Table 7 shows cost ranges for some of the groupings for both 2000/01-2004/05 and 2005/06-2009/10. LMC International reports these data in dollars per mt, raw value (top panel). The same data in cents per pound are shown in the bottom panel. The best indicator of change is the minimum of each of the range classifications. Minimum levels for sugar increased about 2 to 3 cents per pound from 2000/01-2004/05 to 2005/06–2009/10.

Within the groupings, production costs in the low-cost cane areas have risen the most over the decade. Figure 12 shows that averaged costs have risen in that grouping by 46.2 percent, much more than for other exporters (25.6 percent) or the Asian cyclical grouping (31.5 percent). Figure 13 shows the yearly cost ratios of competitors relative to the low-cost cane grouping. The predominant trend between 2000/01-2004/05 was increased cost competitiveness for the low-cost producers. In 2004/05, costs of other exporters were about 40 percent higher. This trend was reversing itself, however, in some areas prior to 2004/05. Except for the Asian cyclical area after 2007/08, the low-cost area has continued to lose cost competitiveness in the second half of the decade. By 2009/10, costs of other exporters were down to only 12.7 percent higher than the low-cost cane producers.

Figure 8

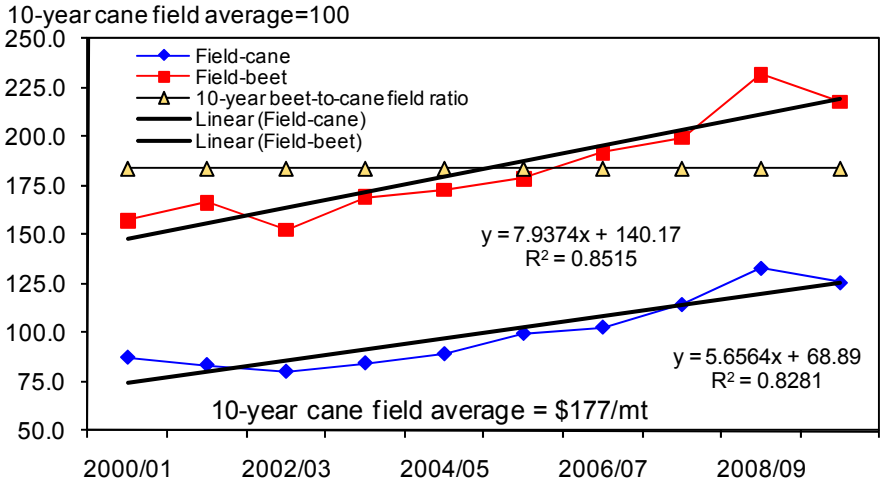
Components of average world HFS production costs, 2000/01-2004/05 and 2005/06-2009/10 compared with total world HFC production costs 2000/01-2004/05



Source: LMC International.

Figure 9

World annual beet field production costs compared with 2000/01-2009/10 average cane production field cost

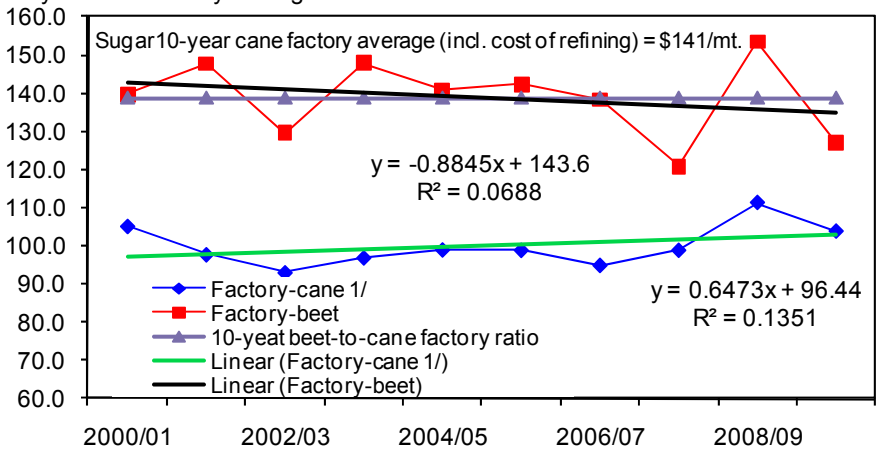


Source: LMC International.

Figure 10

World annual beet factory production costs compared with 2000/01-2009/10 average cane production factory cost

10-year cane factory average=100



1/ Includes cost of refining raw.

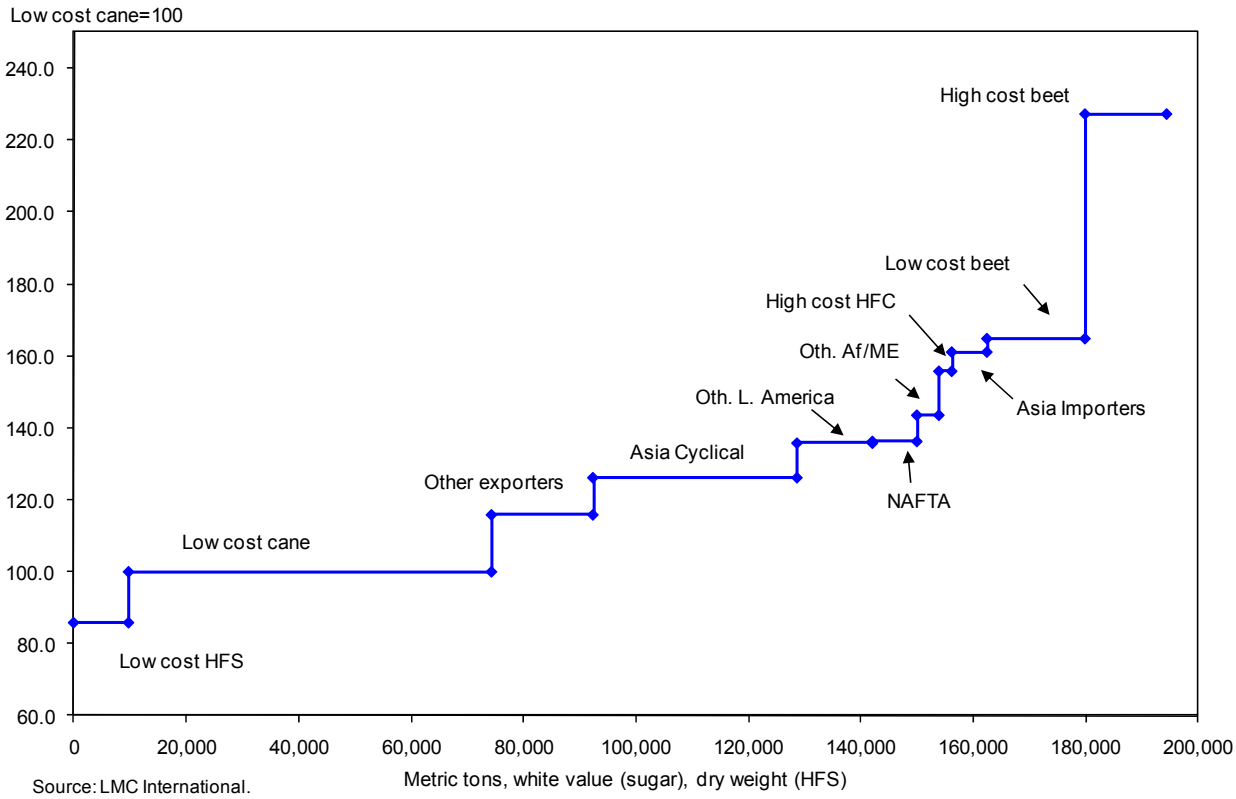
Source: LMC International.

Table 7--Ranges of average costs of producing raw cane sugar, beet sugar, and high fructose syrup, by selected categories of world producers, 2000/01-2009/10

	2000/01-2004/05	2005/06-2009/10
	Dollars/metric ton	
Raw cane sugar		
Low-cost producers	130.06 - 379.81	191.48 - 374.68
Other exporters	181.51 - 303.83	222.89 - 342.16
NAFTA area	254.35 - 473.09	288.37 - 732.83
Weighted world average	224.60 - 256.55	270.79 - 353.74
Cane sugar, white value equivalent		
Low-cost producers	204.17 - 471.40	269.88 - 465.91
Other exporters	259.22 - 390.09	303.49 - 431.11
NAFTA area	337.16 - 571.20	373.56 - 849.13
Weighted world average	305.32 - 339.51	354.74 - 443.50
Beet sugar, refined value		
Low-cost producers	322.42 - 620.12	293.85 - 769.06
Weighted world average	517.62 - 579.38	589.46 - 697.33
High fructose syrup		
Low-cost producers	152.87 - 308.21	184.69 - 500.21
	Cents/pound	
Raw cane sugar		
Low-cost producers	5.90 - 17.23	8.69 - 17.00
Other exporters	8.23 - 13.78	10.11 - 15.52
NAFTA area	11.54 - 21.46	13.08 - 33.24
Weighted world average	10.19 - 11.64	12.28 - 16.05
Cane sugar, white value equivalent		
Low-cost producers	9.26 - 21.38	12.24 - 21.13
Other exporters	11.76 - 17.69	13.77 - 19.55
NAFTA area	15.29 - 25.91	16.94 - 38.52
Weighted world average	13.85 - 15.40	16.09 - 20.12
Beet sugar, refined value		
Low-cost producers	14.62 - 28.13	13.33 - 34.88
Weighted world average	23.48 - 26.28	26.74 - 31.63
High fructose syrup		
Low-cost producers	6.93 - 13.98	8.38 - 22.69

Source: LMC International.

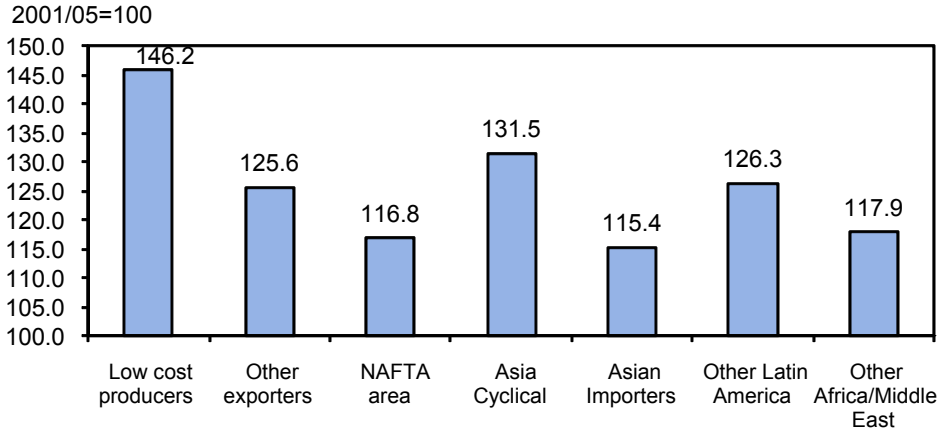
Figure 11
Distribution of sweetener costs of production relative to low cost cane producers, average 2005/06-2009/10



Source: LMC International.

Figure 12

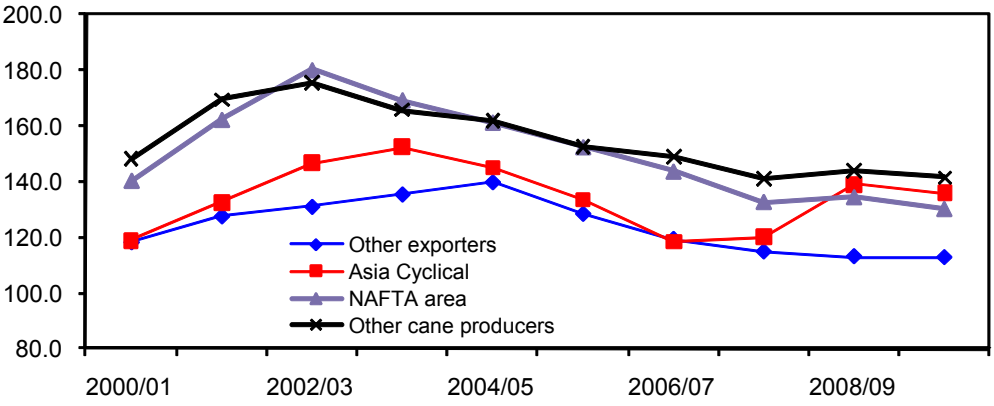
Ratio of average 2005/062009/10 total cane sugar production costs relative to 2000/01-2004/05 levels, by cane sugar producer classification



Source: LMC International.

Figure 13

Average total sugar production costs relative to average low-cost cane producer costs, by year, 2000/01-2009/10



Source: LMC International.

Concluding Summary

This report has summarized sugar and high fructose syrup (HFS) cost developments over the period 2000-2010, based on a review of extensive production cost estimates undertaken by the international consultancy LMC International.

Sugar and HFS are produced worldwide under varying cost and technological conditions. Both products are processed in factories from raw agricultural products. HFS is generally less expensive to produce but is strongly affected by changes in prices of purchased grain inputs, especially corn. Sugar is processed from the primary crops sugarcane and sugarbeets. Sugarcane is produced in regions with tropical and subtropical climates, and sugarbeets tend to be produced in regions with more temperate climate conditions. Both primary crops are highly perishable, meaning that they must be processed soon after harvest and close to where they were grown. Because there is no identifiable market for either crop (due to the perishability), the cost of producing both cane and beet sugar includes the field cost of producing sugarcane and sugarbeets, in addition to the costs of processing.

There have been increases in costs of producing sweeteners over the decade. Splitting the decade into two parts (first, 2000/01-2004/05; second, 2005/06-2009/10), average costs for world cane sugar production, white value (which includes the cost of refining), increased 21 percent, 11 percent for beet sugar production, and 39 percent for HFS production. For both types of sugar, the overall increases derived primarily from increased energy, fuel, and fertilizer costs: 79 percent for cane and 39 percent for beet. Field costs of producing both sugarcane and sugarbeets were primarily affected by increased input costs. Factory cost changes were much more modest. For HFS, energy and fuel costs increased 27 percent, but more important was the increase of purchased grain inputs less byproduct sales of 65 percent. HFS costs were especially high in 2008/09, but were reduced substantially with the decrease in grain prices in the following year.

The range of the weighted world average of costs of raw cane production increased from 10.19 to 11.64 cents per pound in the first half of the decade to 12.28-20.12 cents per pound in the second half. (White value equivalents would be from 13.85-15.40 cents per pound, first half, to 16.09-20.12 cents per pound, second half.) The corresponding beet sugar range increased from 23.48-26.28 cents per pound, first half, to 26.74-31.63 cents per pound, second half. The HFS range, for low-cost producers increased from 6.93-13.98 cents per pound, first half, to 8.38-22.69 cents per pound. Although HFS costs tend to be lower than for either type of sugar, HFS substitutes for sugar, in a limited range of uses and unlike sugar, is costly to trade internationally.

The Center/South region of Brazil remains the lowest cost producer in the world. However, the cost competitiveness of all Brazilian sugar has been affected by the upward valuation of the Brazilian *real* during the 2000s. In 2004/05, all low-cost cane producers (of which Center/South Brazil has the largest production share by far) had costs 29 percent lower than the weighted average of major sugar exporter competitors Australia, Colombia, Guatemala, South Africa, and Thailand. By 2009/10, this advantage had fallen to 11 percent.

LMC International Engineering Cost Approach

LMC International bases its production cost estimates on an engineering cost approach. The approach starts with a detailed listing of inputs used to produce and process cane and beet sugar.
For each physical factor input, a local price is attached to calculate its value. At the aggregate level, cost is measured across the two dimensions of factor use and operational level. Its computations account for the physical input factors of labor, machinery, fuel, chemicals, and fertilizers used in alternative technologies employed in field, factory, and administrative operations, according to the schema:

Factors Operations	Labor	Capital	Fuel, chemicals, fertilizers	Overhead	Byproduct credits
Field	X	X	X		
Factory	X	X	X		-X
Administrative				X	

A separate set of engineering cost models are used for the manufacture of HFS.

At a more detailed level, LMC International separates out distinct processes for production operations. For example, sugarcane farming is divided into the following processes: land preparation, cane planting, cultivation, fertilizer application, weed control, disease control, irrigation, cane cutting, cane loading, and cane transportation. Associated with each of these processes is a set of possible technologies. For cultivation, there are manual and mechanical alterative technology sets. In all cases, the technological alternatives range from those that are extremely labor-intensive to those that are highly capital-intensive. The engineering approach recognizes that it is common to find capital-intensive techniques being used alongside small producer labor-intensive techniques. A process model is, therefore, a hybrid accounting of how a particular stage of production takes place in a particular country or region. The engineering approach requires a detailed understanding of production and processing methods in actual use in a country or region.

LMC International treats processing costs similarly. For cane, this covers all costs from the initial arrival of sugarcane to the delivery of raw sugar into bulk storage at the mill. For beets, these costs account for everything through the delivery of refined white sugar into storage at the factory. For both cane and beets, all byproduct credits from the sale of molasses, beet pulp, and like products are applied against factory costs as a convention. This results in factory costs that are typically lower than field costs. (Because LMC International reports these credits as a separate item in its tables, it is possible to see how costs would be affected if they were attributed in some other way.) As with field costs, factory cost estimates are divided into their labor, capital, and fuel and chemical components. The effects of economies of scale, including the length of the processing season, are accounted for in estimating processing costs. The third stage represents administrative and overhead costs that cannot be adequately included solely as a field or factory expense.

The data are reported in terms of U.S. dollars using official exchange rates.[4] It is possible, therefore, for a country to become a low-cost producer by a depreciation of its currency, and to become the opposite when its currency appreciates. (Although not reported here, LMC International uses various deflators when reporting country estimates in order to give a clearer picture of changing costs.) Capital costs are estimated on the basis of replacement costs. Real interest rates are used in the valuation of capital, and capital gains are excluded from revenue calculations. Because the benefits of capital goods investment flow over a number of years, using current exchange rates may bias depreciation charges. LMC International instead links the cost of capital to the U.S. index of capital goods prices, denominated in U.S. dollars.

The ideal case for tracking land costs is to attach value to the land in its next alternative use, i.e., its opportunity cost. This procedure is more easily followed for sugarbeets, where there are almost always returns from the cultivation of cereals and other crops. Information from land rental systems can be used to attach a value to land use. Where this procedure may prove difficult, costs associated with getting land suitable for sugarcane cultivation is treated as a separate production process.

HFS costs are calculated somewhat differently. Unlike for sugar, the purchase of the raw agricultural product (e.g., corn in most countries) is represented as a factory cost. The close links between growers and processors that typify the sugar industry are largely absent in relations between grain farmers and corn wet-millers. For that reason the cost of producing corn or the alternative feedstock is not included in the analysis as is the cost of growing beets and cane.

The process by which HFS is produced provides several additional products, including ethanol, corn oil, feed products, starches, related sweeteners, and other chemicals. Because of the joint product nature of the production process, LMC International tracks HFS production costs at two stages. The first is the processing of corn into a starch slurry. This process is common to all starch-based products. The second stage is the conversion of the starch slurry into HFS. Byproduct credits are separated out from the costs of processing and applied against corn costs, thereby reducing the net cost of the raw material. Administrative costs are implicitly included in the processing costs, and therefore are not separated out as they are with sugar.

4/ Except for Cuba and Zimbabwe.

Contacts and Links

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Data

Tables from the *Sugar and Sweeteners Yearbook* are available in the Sugar and Sweeteners Briefing Room at http://www.ers.usda.gov/briefing/sugar/. They contain the latest data and historical information on the production, use, prices, imports, and exports of sugar and sweeteners.

Related Websites

Sugar and Sweeteners Outlook http://www.ers.usda.gov/Publications/SSS/
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