Food Balance Sheets

Sugar

Now, let's consider the full process for creating a food balance sheet for sugar. We start off with an empty table:

Name	Production	Imports	Exports	StockChange	Food	Feed	Seed	Tourist	Industrial	Loss
Sugar Beet	-	-	-	-	-	-	-	-	-	-
Sugar Cane	-	-	-	-	-	-	-	-	-	-
Sugar and Syrups nes	-	-	-	-	-	-	-	-	-	-
Beet sugar	-	-	-	-	-	-	-	-	-	-
Refined sugar	-	-	-	-	-	-	-	-	-	-
Molasses	-	-	-	-	-	-	-	-	-	-

Production

For production data, we first fill in the table with any available official figures. In this case, the production value is known for all the primary products and thus no imputation is done. We also have production data for some of the processed commodities:

Name	Production	Imports	Exports	StockChange	Food	Feed	Seed	Tourist	Industrial	Loss
Sugar Beet	**26,210,000**	-	-	-	-	-	-	-	-	-
Sugar Cane	**26,510,000**	-	-	-	-	-	-	-	-	-
Sugar and Syrups nes	**-**	-	-	-	-	-	-	-	-	-
Beet sugar	**-**	-	-	-	-	-	-	-	-	-
Refined sugar	**-**	-	-	-	-	-	-	-	-	-
Molasses	**-**	-	-	-	-	-	-	-	-	-

Trade

For the next example, we'll show how the imputation, mirroring and balancing works. In this case, we just take the country totals and insert into this table.

Name	Production	Imports	Exports	StockChange	Food	Feed	Seed	Tourist	Industrial	Loss
Sugar Beet	26,210,000	**194,500**	**300**	-	-	-	-	-	-	-

Name	Production	Imports	Exports	StockChange	Food	Feed	Seed	Tourist	Industrial	Loss
Sugar Cane	26,510,000	**9,700**	**860**	-	-	-	-	-	-	-
Sugar and Syrups nes	-	**265,400**	**96,200**	-	-	-	-	-	-	-
Beet sugar	-	**10**	**194,800**	-	-	-	-	-	-	-
Refined sugar	-	**1,275,200**	**111,200**	-	-	-	-	-	-	-
Molasses	-	**464,200**	**236,500**	-	-	-	-	-	-	-

Stock Changes

We now estimate the stock changes. Note that for most products, we assume that countries do not hold stocks. Generally, stocks will only be held for primary level products, and not even all of these products. The numbers below represent the estimated stock changes (by the stock imputation methodology described previously) for the example country we're considering.

Name	Production	Imports	Exports	StockChange	Food	Feed	Seed	Tourist	Industrial	Loss
Sugar Beet	26,210,000	194,500	300	**0**	-	-	-	-	-	-
Sugar Cane	26,510,000	9,700	860	**0**	-	-	-	-	-	-
Sugar and Syrups nes	-	265,400	96,200	**0**	-	-	-	-	-	-
Beet sugar	-	10	194,800	**0**	-	-	-	-	-	-
Refined sugar	-	1,275,200	111,200	**79,500**	-	-	-	-	-	-
Molasses	-	464,200	236,500	**0**	-	-	-	-	-	-

Food

The allocation to food, on the other hand, can potentially be considered at any processing level, although some commodities (such as wheat) are assumed to not be eaten as such. We impute food consumption numbers for the example country and update the FBS table below.

Name	Production	Imports	Exports	StockChange	Food	Feed	Seed	Tourist	Industrial	Loss
Sugar Beet	26,210,000	194,500	300	0	**-**	-	-	-	-	-
Sugar Cane	26,510,000	9,700	860	0	**-**	-	-	-	-	-
Sugar and Syrups nes	-	265,400	96,200	0	**-**	-	-	-	-	-
Raw cane or beet sugar	-	-	-	-	**9,795,900**	-	-	-	-	-
Beet sugar	-	10	194,800	0	**-**	-	-	-	-	-
Refined sugar	-	1,275,200	111,200	79,500	**-**	-	-	-	-	-
Molasses	-	464,200	236,500	0	**-**	-	-	-	-	-

Feed

Name	Production	Imports	Exports	StockChange	Food	Feed	Seed	Tourist	Industrial	Loss
Sugar Beet	26,210,000	194,500	300	0	-	**-**	-	-	-	-
Sugar Cane	26,510,000	9,700	860	0	-	**-**	-	-	-	-
Sugar and Syrups nes	-	265,400	96,200	0	-	**-**	-	-	-	-
Raw cane or beet sugar	-	-	-	-	9,795,900	**-**	-	-	-	-
Beet sugar	-	10	194,800	0	-	**-**	-	-	-	-
Refined sugar	-	1,275,200	111,200	79,500	-	**-**	-	-	-	-
Molasses	-	464,200	236,500	0	-	**9,023,600**	-	-	-	-

Losses

Name	Production	Imports	Exports	StockChange	Food	Feed	Seed	Tourist	Industrial	Loss
Sugar Beet	26,210,000	194,500	300	0	-	-	-	-	-	**205,500**
Sugar Cane	26,510,000	9,700	860	0	-	-	-	-	-	**213,300**
Sugar and Syrups nes	-	265,400	96,200	0	-	-	-	-	-	**-**
Raw cane or beet sugar	-	-	-	-	9,795,900	-	-	-	-	**-**
Beet sugar	-	10	194,800	0	-	-	-	-	-	**-**
Refined sugar	-	1,275,200	111,200	79,500	-	-	-	-	-	**-**
Molasses	-	464,200	236,500	0	-	9,023,600	-	-	-	**-**

Seed

Name	Production	Imports	Exports	StockChange	Food	Feed	Seed	Tourist	Industrial	Loss
Sugar Beet	26,210,000	194,500	300	0	-	-	**-**	-	-	205,500
Sugar Cane	26,510,000	9,700	860	0	-	-	**1,572,200**	-	-	213,300
Sugar and Syrups nes	-	265,400	96,200	0	-	-	**-**	-	-	-
Raw cane or beet sugar	-	-	-	-	9,795,900	-	**-**	-	-	-
Beet sugar	-	10	194,800	0	-	-	**-**	-	-	-
Refined sugar	-	1,275,200	111,200	79,500	-	-	**-**	-	-	-
Molasses	-	464,200	236,500	0	-	9,023,600	**-**	-	-	-

Industrial Utilization

Name	Production	Imports	Exports	StockChange	Food	Feed	Seed	Tourist	Industrial	Loss
Sugar Beet	26,210,000	194,500	300	0	-	-	-	-	**-**	205,500
Sugar Cane	26,510,000	9,700	860	0	-	-	1,572,200	-	**-**	213,300
Sugar and Syrups nes	-	265,400	96,200	0	-	-	-	-	**-**	-
Raw cane or beet sugar	-	-	-	-	9,795,900	-	-	-	**-**	-
Beet sugar	-	10	194,800	0	-	-	-	-	**-**	-
Refined sugar	-	1,275,200	111,200	79,500	-	-	-	-	**-**	-
Molasses	-	464,200	236,500	0	-	9,023,600	-	-	**-**	-

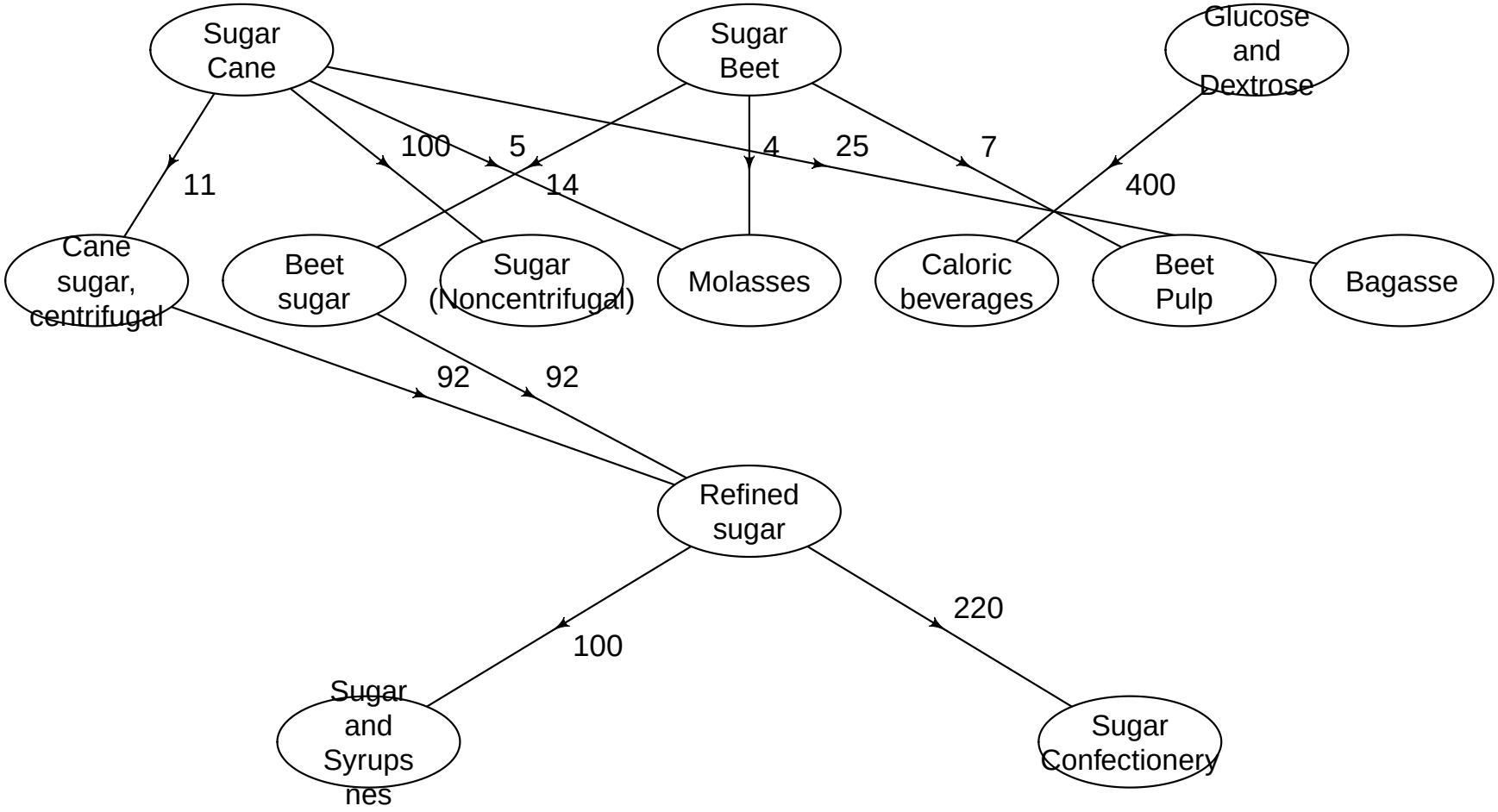
Tourist Consumption

The tourist consumption estimation approach uses tourist data from the WTO as well as last year's consumption patterns to estimate the impact of tourism on local consumption. Note that tourist consumption can be negative; as an extreme example consider a case where many nationals travel abroad but no tourists enter. In this case, the country will have a negative "tourist consumption" because more calories will be assumed abroad than locally.

Name	Production	Imports	Exports	StockChange	Food	Feed	Seed	Tourist	Industrial	Loss
Sugar Beet	26,210,000	194,500	300	0	**-**	-	-	-	-	205,500
Sugar Cane	26,510,000	9,700	860	0	**-**	-	1,572,200	-	-	213,300
Sugar and Syrups nes	-	265,400	96,200	0	**-**	-	-	-	-	-
Raw cane or beet sugar	-	-	-	-	**9,795,900**	-	-	-3,200	-	-
Beet sugar	-	10	194,800	0	**-**	-	-	-	-	-
Refined sugar	-	1,275,200	111,200	79,500	**-**	-	-	-	-	-
Molasses	-	464,200	236,500	0	**-**	9,023,600	-	-	-	-

Standardization and Balancing

Now, suppose we have the following commodity tree:



Note that in this commodity tree, we create cane sugar and beet sugar from sugar cane and sugar beet, respectively, and then both of these raw sugars are processed into refined sugar. In order to simplify reporting, cane sugar and beet sugar are grouped together into one commodity "Raw cane or beet sugar."

Name	Production	Imports	Exports	StockChange	Food	Feed	Seed	Tourist	Industrial	Loss
Sugar Beet	26,210,000	194,500	300	0	-	-	-	-	-	205,500
Sugar Cane	26,510,000	9,700	860	0	-	-	1,572,200	-	-	213,300
Sugar and Syrups nes	-	265,400	96,200	0	-	-	-	-	-	-
Raw cane or beet sugar	-	-	-	-	9,795,900	-	-	-3,200	-	-

Name	Production	Imports	Exports	StockChange	Food	Feed	Seed	Tourist	Industrial	Loss
Beet sugar	-	10	194,800	0	-	-	-	-	-	-
Refined sugar	-	1,275,200	111,200	79,500	-	-	-	-	-	-
Molasses	-	464,200	236,500	0	-	9,023,600	-	-	-	-

The processing for sugar works slightly differently than most commodities. Sugar cane and sugar beet are, in almost every case, converted into cane sugar or beet sugar (i.e. they are not eaten as such nor are they processed into other products). Thus, in this case, rather than standardizing values back to sugar cane and sugar beet, we instead assume all sugar cane and sugar beet is first converted into the corresponding sugar and we perform the balances at this level.

Name	Production	Imports	Exports	StockChange	Food	Feed	Seed	Tourist	Industrial	Loss
Sugar and Syrups nes	0	265,400	96,200	0	0	0	0	0	0	0
Raw cane or beet sugar	**6,389,200**	10	194,800	0	9,795,900	0	0	-3,200	0	0
Refined sugar	0	1,275,200	111,200	79,500	0	0	0	0	0	0
Molasses	**2,284,900**	464,200	236,500	0	0	9,023,600	0	0	0	0
Beet Pulp	**1,834,200**	-	-	-	-	-	-	-	-	-
Bagasse	**6,183,700**	-	-	-	-	-	-	-	-	-

The next step in this process is to balance the processed commodities by creating production values. However, we do not have any trade deficits, and thus we do not need to worry about this step.

Now, we must balance the primary products in this table (i.e. sugar cane and sugar beet). To do this, we need to extract the computed standard deviations of each element. The table below shows the expected value and estimated standard deviation for sugar beet (top) and sugar cane (bottom):

Variable	Production	Imports	Exports	StockChange	Food	Feed	Waste	Seed	Industrial	Tourist
Mean	6,389,200	10	194,800	0	9,795,900	0	0	0	0	-3,200
Standard Dev.	17,700	0	0	0	979,600	0	0	0	0	3,200

After balancing the above tables, we're left with the following values. Note that food processing is the element that receives most of the adjustment because it has a substantially higher variability.

Variable	Production	Imports	Exports	StockChange	Food	Feed	Waste	Seed	Industrial	Tourist
Mean	6,390,400	10	194,800	0	6,195,600	0	0	0	0	0
Standard Dev.	17,700	0	0	0	979,600	0	0	0	0	3,200

We can now adjust our SUA table with the updated/balanced values:

Name	Production	Imports	Exports	StockChange	Food	Feed	Seed	Tourist	Industrial	Loss
Sugar and Syrups nes	0	265,400	96,200	0	0	0	0	0	0	0
Raw cane or beet sugar	6,390,400	10	194,800	0	6,195,600	0	0	0	0	0
Refined sugar	0	1,275,200	111,200	79,500	0	0	0	0	0	0
Molasses	2,284,900	464,200	236,500	0	0	9,023,600	0	0	0	0
Beet Pulp	1,834,200	-	-	-	-	-	-	-	-	-
Bagasse	6,183,700	-	-	-	-	-	-	-	-	-

We must now process the changes in the current elements down the tree into the other elements.

Name	Production	Imports	Exports	StockChange	Food	Feed	Seed	Tourist	Industrial	Loss
Sugar and Syrups nes	0	265,400	96,200	0	0	0	0	0	0	0
Raw cane or beet sugar	6,390,400	10	194,800	0	6,195,600	0	0	0	0	0
Refined sugar	**0**	1,275,200	111,200	**79,500**	**0**	0	0	0	0	0
Molasses	2,284,900	464,200	236,500	0	0	9,023,600	0	0	0	0
Beet Pulp	1,834,200	-	-	-	-	-	-	-	-	-
Bagasse	6,183,700	-	-	-	-	-	-	-	-	-

Lastly, some elements have not yet been updated in this process. To ensure a full balance of the SUA, we should go through and balance those rows as well.

Name	Production	Imports	Exports	StockChange	Food	Feed	Seed	Tourist	Industrial	Loss
Sugar and Syrups nes	0	265,400	96,200	0	**169,200**	0	0	0	0	0
Raw cane or beet sugar	6,390,400	10	194,800	0	6,195,600	0	0	0	0	0
Refined sugar	0	1,275,200	111,200	79,500	1,084,600	0	0	0	0	0
Molasses	2,284,900	464,200	236,500	0	0	2,512,500	0	0	0	0
Beet Pulp	1,834,200	-	-	-	-	1,834,200	-	-	-	-
Bagasse	6,183,700	-	-	-	-	-	-	-	6,183,700	-

Now, we standardize all these commodities into their primary equivalents: raw sugar.

Name	Production	Imports	Exports	StockChange	Food	Feed	Seed	Tourist	Industrial	Loss
Raw cane or beet sugar	6,390,400	1,674,600	420,200	86,400	7,558,300	0	0	0	0	0

We can also compute calories, fats, and proteins at this point. First, we apply a calorie/fat/protein content factor to each individual element:

Name	Quantity	Energy	Protein	Fat
Sugar and Syrups nes	169,200	NA	NA	NA
Raw cane or beet sugar	0	NA	NA	NA
Refined sugar	1,084,600	1699	0	0

Standardization of calories is simpler since we don't need to divide by extraction rates: the standardized calories/fats/proteins are the sum of the total calories/fats/proteins for each element. However, this is more complicated than simply adding up calories/fats/proteins because we have to standardize children commodities into multiple parents. For example, as with the quantity standardization, we should standardize refined sugar back into cane sugar and beet sugar according to the proportion from processing:

Commodity	Energy (millions)	Protein (millions)	Fat (millions)
Raw Sugar Equivalent	1800	0	0