**Package ‘faoswsLoss-package’**

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**Package:** faoswsLoss

**Type:** Package

**Title:** Package to perform the computation of food loss FAO food balance sheets

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**Description:** This package provides all the functions to perform computation of food loss percentages for the FAO food balance sheets. The first model was developed by

**Previous iterations:** Michael Kao and then modified by Natalia Golini and then replaced by the current version

**URL:** https://github.com/SWS-Methodology/faoswsLoss

**License:** FAO

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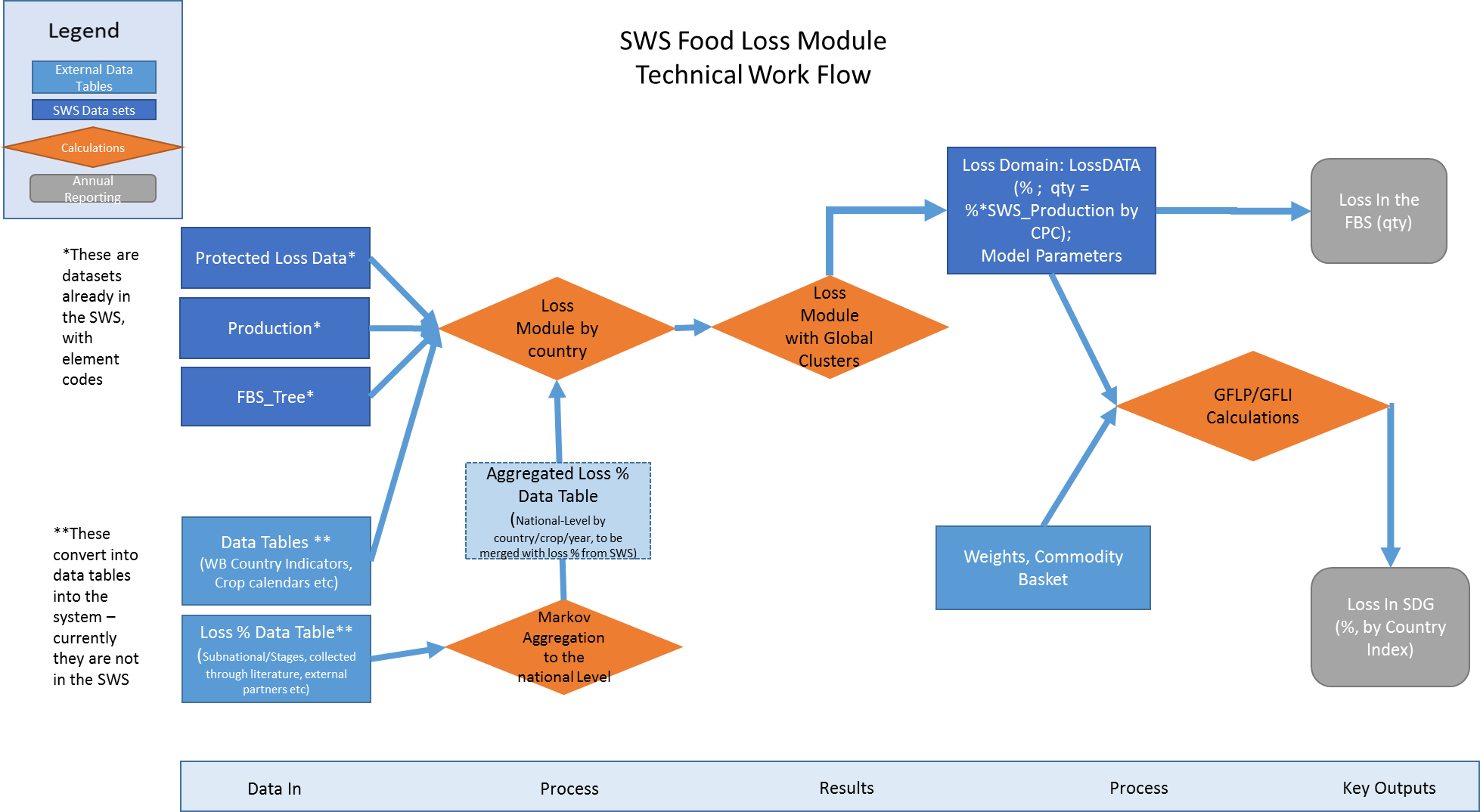
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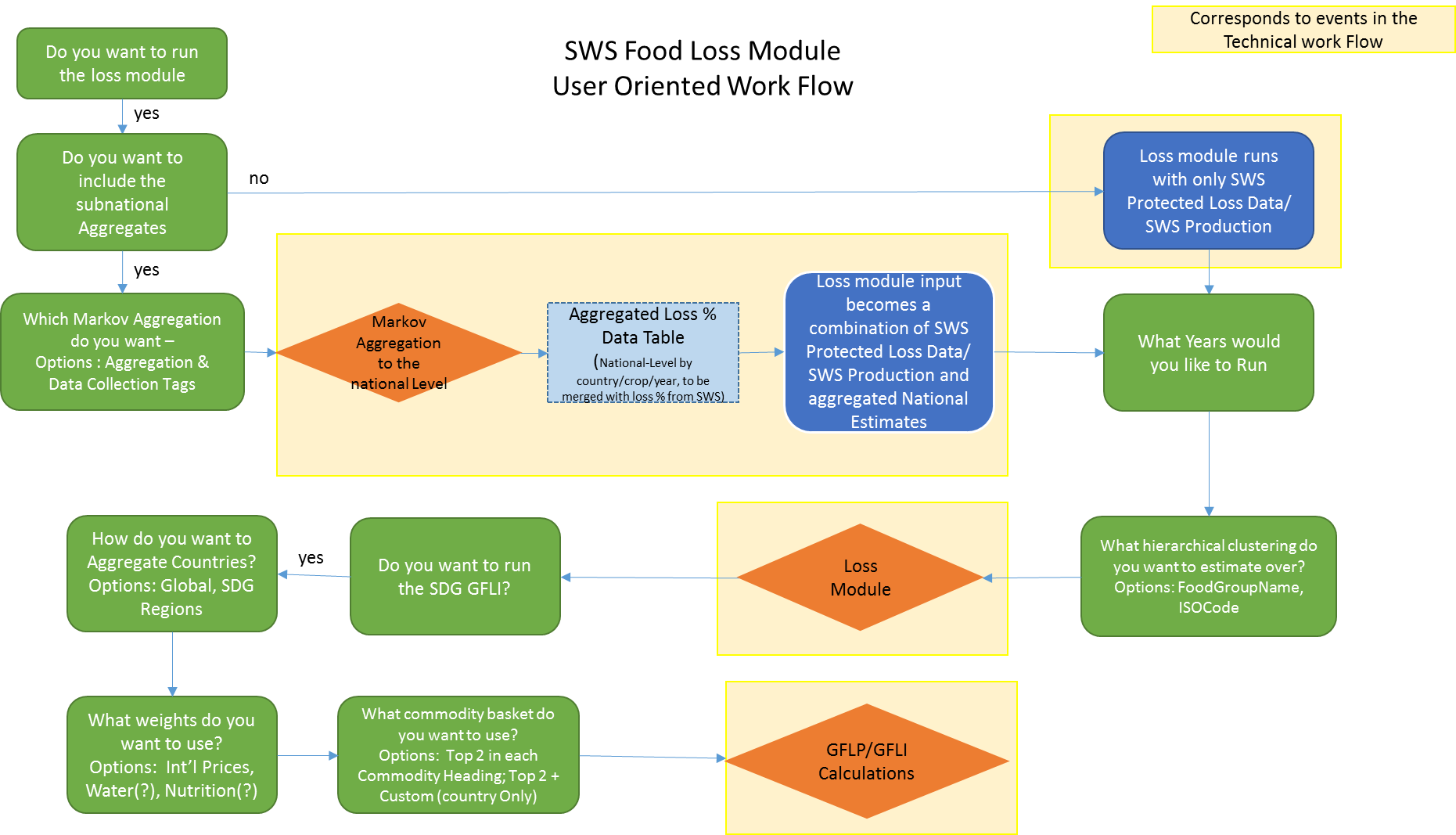
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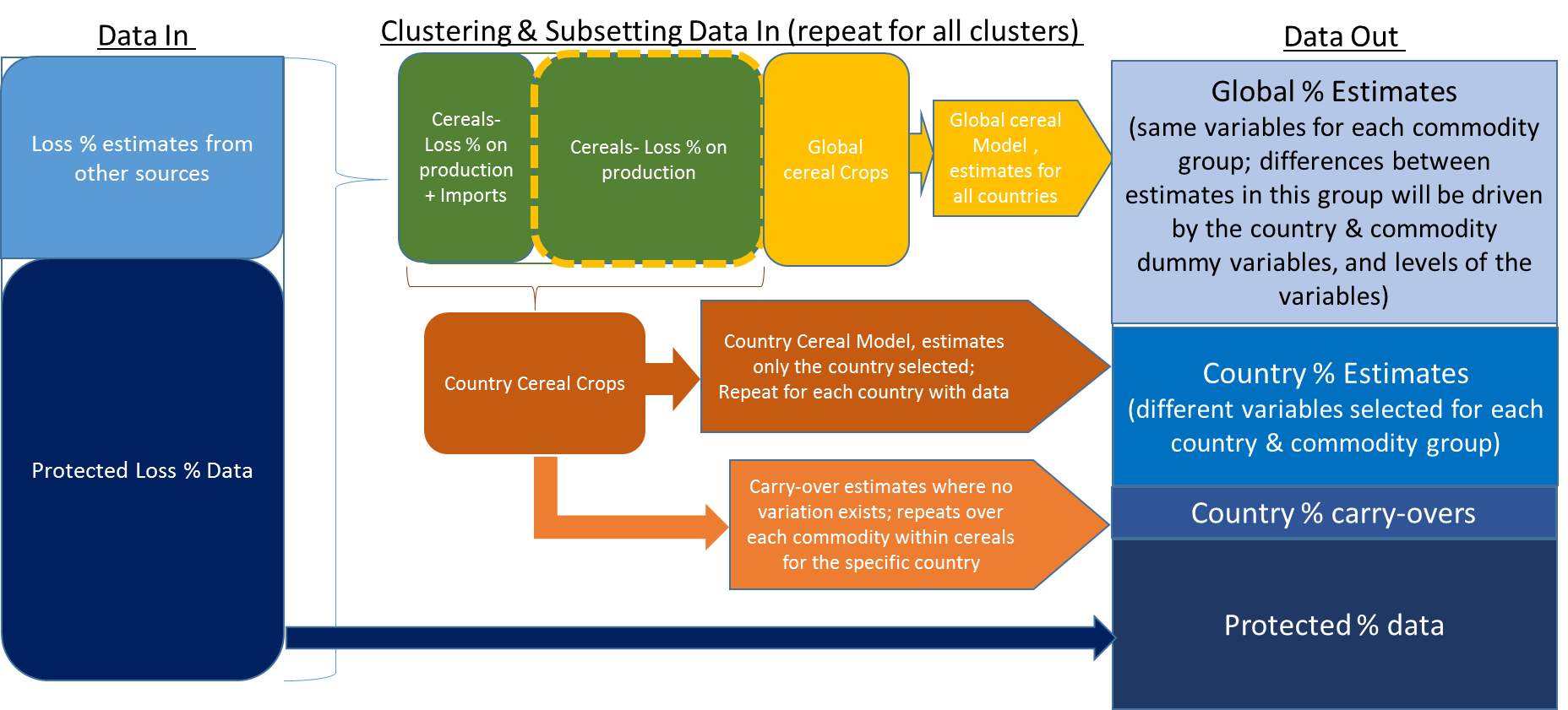
# Information Flows





Visualization of data used in the Models

The model divides the dataset into the clusters, then runs the analysis of the carry-overs, and then the loss model for the country. For countries that have no data within a cluster, their estimates are calculated through the global aggregation of loss estimates for the cluster. Protected data remains as protected, carry-overs and the country estimates are protected temporarily while the global model estimates losses.



# SWS Dependencies

faosws (>= 0.6.1)

swsDatasetDepends:

* agriculture:aproduction,
* agriculture:trade,
* agriculture:alosses (protected)
* fbsTree

swsModuleDepends:

* faoswsProduction,

swsModuleOutputs: LossDomain

* Percentages
* Quantities

The model will estimate losses for country, commodity and years combinations where it has existed in the SWS.

As the datasets improve for the other domains it is likely that this function will also pull in information from the fisheries production datasets and from the Producer Prices domain

# External Inputs

## Loss Factors (Subnational/Stages)

The input for the dependent variables in the model is a combination of data from the SWS and the information collected from loss studies.

For the data coming from the external sources, the information. In the ***FLW\_LossPercFactors\_*** there are a couple of key columns that are required for merging the data with data in the model,

* Loss\_Per\_clean, This is the clean loss percentage. If for example a range is given for a study, the column calculates the average.
* Identifying: measuredItemCPC, Year
* Disaggregated by subnational stages along the Food Supply Chain (FSC\_Location)
  + The options that are used in the model are: farm, transport, storage, trader, wholesale, processing, retail, wholesupplychain, sws\_total (there should be no spaces)
  + The harvest and pre-harvest data collected will be useful for the next stages of modeling
  + This data is fed into the Markov Aggregation
* Tag\_DataCollection: This is to sort out data that is useful for the modeling efforts. For example, the rapid assessments, field and laboratory trials are useful for parameter estimation at the stages of the food supply chain but not for the aggregation at the national level – and are thusly excluded.

Additionally, there is metadata that has been collected along with the numbers – for example, sample size, region collected, reference and url, causes of losses, etc. The additional data allows for future modeling efforts, improvement to country level technical assistance in finding common causes across countries and so forth.

## Input Data Tables

There are 3 main sources of data for the model, these are collected at the national level by international partners, including,

* World Bank
* IFPRI
* IEA
* WTO
* World Bank/UN/IPCC

The description of all of the variables, including scope, timing of data collection and source which the data can be found, can be found in the supplemental table, including the original table names. These are the data inputs for modeling losses at the country level. The appendix will also be included as an additional excel file.

However, there are several that should be at gradually replaced by the common tables to be consistent across the organization. These are the tables are the ones that will be consistent within the SWS:

|  |  |  |  |
| --- | --- | --- | --- |
| Table Name | Description | Data Folder | Source |
| CPC | CPC codes to create the set of data that needs to be included in the loss predictions | General | FAOSWS |
| FBSTable | The groupings of commodities into commodity groupings from the SWS | General | FAOSWS |
| Int\_$\_Prices\_2005 | Reference Prices for the index for all commodities for 2005 (2015 when available) | General | FAOSTAT |
| Crop Calendar | Covers crops and harvest months by country | General | FAO AIMS |

For data that is external to the organization but likely to have duplicates in other projects:

|  |  |  |  |
| --- | --- | --- | --- |
| Table Name | Description | Data Folder | Source |
| Population | Population numbers by countries to impute per capita measures for aggregates | General |  |
| WB\_indicators\_Metadata | This is the listing of the World Bank Country Indicators that are available through the API. The API uses this list to download the necessary data | General | World Bank |
| WB\_UN\_CoutryCodes | This is the list of the WB country codes that are specific for the mapping between the UN and the World Bank. This is redundant to the mapping but a check to make sure to have all data needed | General | World Bank |
| SDG Country Mapping for the SDG/MDG/ISO3/M49 | Maps the countries to their respective geographic and SDG monitoring groups | General | FAO/WB |
| Rainfall | *Requirement:* The data needs to be monthly averages at the country level  This gridded historical dataset is derived from observational data, and provides quality controlled temperature and rainfall values from thousands of weather stations worldwide, as well as derivative products including monthly climatologies and long term historical climatologies. The dataset is produced by the Climatic Research Unit (CRU) of University of East Anglia (UEA), and reformatted by International Water Management Institute (IWMI). CRU-(Gridded Product). CRU data can be mapped to show the baseline climate and seasonality by month, for specific years, and for rainfall and temperature.; | General | World Bank/UN/IPCC/ |
| Temperature | *Requirement:* The data needs to be monthly averages at the country level  This gridded historical dataset is derived from observational data, and provides quality controlled temperature and rainfall values from thousands of weather stations worldwide, as well as derivative products including monthly climatologies and long term historical climatologies. The dataset is produced by the Climatic Research Unit (CRU) of University of East Anglia (UEA), and reformatted by International Water Management Institute (IWMI). CRU-(Gridded Product). CRU data can be mapped to show the baseline climate and seasonality by month, for specific years, and for rainfall and temperature. | General | World Bank/UN/IPCC/ |

## FLI – Prices, Weights and commodity basket aggregation

For the SDG Global Food Loss Index and aggregated percentages (GFLI/GLFP), there are a couple of additional inputs that are needed. These are

* The international Prices by commodities, coming from FAOSTAT
* Additional weighting schemes
* Population numbers by country

For the SDG monitoring, the international prices are applied to the SWS production data and then within the code, sorted for the highest value, and the top 2 for each of the commodity groupings is chosen for the compiling of the index.

For other baskets (e.g. based on calories or environmental impact), the prices can be switched out and the routine will run the same process as for the SDG reporting. The purpose of doing it internally in the code is to minimize the intermediate tables in the system calculations that would need to be updated.

# Routines

The routines in the Loss module can be separated into those that are related to the Working system and those that are related specifically to the Loss Model.

|  |  |
| --- | --- |
| **SWS related** | **Loss related** |
| addHeadingsCPC.R | FSC\_Markov.R |
| addHeadingsFCL.R | VariablesAdd1.R |
| getFlagMethod.R | LossModel\_ctry.R |
| getFlagObservationStatus.R | LossModel.R |
| getImportData.R | MultiExp.R |
| getLossData.R | dataLag.R |
| getProductionData.R | GFLI\_SDG\_fun.R |
| getLossData\_LossDomain.R |  |

## Computational Parameters

These are options for the person running the loss module, these are defined at the beginning and impact functions in the rest of the module

*Binary*

* updateModel: Whether or not this is a model run, which will rewrite all the data in the loss module
* LocalRun: The model can either run in the SWS or from the github directory if the faoswsloss directory has been forked appropriately.
* SubNationalEstimates: is an option from the Information flows, allows for the user to decide whether or not to use and aggregate up the supply chain the literature review estimates. If 0, then only the protected loss estimates from the SWS are considered.

*Numeric (min,Max)*

* selectedYear = as.character(1991:2015): sets the years for the data pulls from the SWS
* selectedModelYear = as.character(1961:2015): Sets the years for the data to use from the literature reviews

*Predefined Strings*

* DataCollectionTags\_all <- c("SWS","APHLIS","Rapid Assessment","Expert Opinion",
* "Laboratory Trials","Field Trial","Survey","Declarative","Crop-Cutting","Case study")
* DataCollectionTags\_represent <- c("SWS","APHLIS","Expert Opinion","Survey","Declarative")
* ExternalDataOpt <- DataCollectionTags\_represent

These three options take the loss data from the data table in the SWS that contains the loss estimates from the literature and other studies. The \_all option has all of the “types” of data that were collected, and are based on the Global strategy guidelines. The representative data are the ones that the model will use to aggregate. *ExternalDataOpt,* given that there are different options for what the analyst may consider relevant, this can be set to the \_all or \_represent, as to not change any other code

* MarkovOpt <- "aveatFSP" # "model": For aggregating the subnational using the markov function, there are two options, at the moment the averaging as described in the function is "aveatFSP" , but in the case where a model may estimate losses probabilistically in the future, there is space and an option "model".

In future iterations of the model, the way the subnational estimates are aggregated can be modeled in a different manner (e.g. Bayesian)

* HierarchicalCluster <- "foodgroupname" # "isocode", "SDG.Regions"

These are the clustering options for estimating the loss model. The foodgroupname uses the FBSTree to cluster the data based on it’s standard hierarchy. Other options have included the individual country and the sdg regional grouping. The country parameter may be adjusted in future iterations to model at the country level. This is set without the average user being able to change it – its more for development purposes.

## Input Parameters/Datasets

### finalModelData

**Description**

When the model updates the parameters for estimation, the finalModelData, pulls in the production dataset, the loss dataset and creates the data table of all the factors that will need to be estimated and written back into the system.

The ***keys*** for the model are "geographicaream49", "timepointyears", "measureditemcpc". Given the workings of the datatables from the SWS, these are in all lower case, as is most of the variables in the module.

The losses to be estimates are

* countries x *commodities produced* x timepointyears
* Table of estimated and protected loss percentages (timeSeriesDataToBeImputed)
  + This table of percentages is applied to the production (and production+ imports, *see the loss model*) to calculate the Loss Quantities
* This table of estimates is saved to the Loss Domain in the SWS and then used in the FBS (pre-SUA filling).
* This table in the Loss Domain is used for the calculation of the SDG 12.3.1

**Usage**

For updating the entire dataset on losses

**Arguments**

none

**Returns**

timeSeriesDataToBeImputed , which is the full estimation dataset for the model.

Losses are also only estimated for the primary commodities, not the derived commodities or any other utilizations. And the matrix is formed based on the data from the production dataset that is pulled within this section of the model.

### getProductionData

**Description**

Pulls the agricultural production from the SWS. The only keys are "5510", and uses the line to access the production dataset faoswsUtil::getCompleteImputationKey(table = "production").

There are no restrictions on the production.

**Usage**

getProductionData (areaVar,itemVar,yearVar,elementVar, selectedYear)

**Arguments**

areaVar = "geographicAreaM49"

yearVar = "timePointYears"

itemVar = "measuredItemCPC"

elementVar = "measuredElement"

selectedYear: The User can select the Year variables

**Returns**

Production data from the agricultural production dataset in the SWS

### getImportData

**Description**

Pulls the agricultural production from the SWS. The only keys are "5610", and uses the line to access the trade dataset

There are no restrictions on the production.

**Usage**

getImportData (areaVar,itemVar,yearVar, selectedYear)

**Arguments**

areaVar = "geographicAreaM49"

yearVar = "timePointYears"

itemVar = "measuredItemCPC"

selectedYear: The User can select the Year variables

**Returns**

Production data from the agricultural production dataset in the SWS

### getLossData

**Description**

Pulls the losses from the agricultural production from the SWS. The only keys are "5016", and uses the line to access the production dataset

DatasetKey(

domain = "agriculture",

dataset = "aproduction",

dimensions = list(

Dimension(name = "geographicAreaM49",

keys = GetCodeList(domain = "agriculture",

dataset = "aproduction",

dimension = "geographicAreaM49")[type == "country", code]),

Dimension(name = "measuredElement", keys = c("5016")), #"5126"

Dimension(name = "timePointYears", keys = as.character(1990:2015)),

Dimension(name = "measuredItemCPC",

keys = GetCodeList(domain = "agriculture",

dataset = "aproduction",

dimension = "measuredItemCPC")[, code]))

).

**Usage**

getLossData (areaVar,itemVar,yearVar,elementVar,selectedYear,protected = TRUE)

**Arguments**

areaVar = "geographicAreaM49"

yearVar = "timePointYears"

itemVar = "measuredItemCPC"

elementVar = "measuredElement"

selectedYear: The user can choose the years

protected = TRUE – If the losses data is protected

**Returns**

Protected Loss data from the agricultural production dataset in the SWS

Both of the results from these functions are merged by the ***keys*** and the protected losses are divided by agricultural production. This was an assumption that was discussed at length in the development process, that losses as they mostly occur are at the farmgate and transportation and storage, most imports directly go to processing and any losses at this stage will be captured in the conversion factors. The code is the following,

lossData <- merge(production,lossProtected, by.x = keys\_lower, by.y = keys\_lower, all.y= TRUE)

lossData[, loss\_per\_clean := value\_measuredelement\_5016/value\_measuredelement\_5510)]

lossData[, fsc\_location := "SWS"]

## Data Preparation

### addHeadingsCPC

**Description**

Adds the appropriate number of zeros to the CPC code

**Usage**

addHeadingsCPC (measuredItemCPC)

**Arguments**

measuredItemCPC: The CPC codes that don’t have leading zeros

**Returns**

addHeadingsCPC

**Examples**

## Modeling the loss percentages

### MultiExp

**Description**

Allows the interaction of the varaible terms (X) to the specified degree, the function also sorts the data by the type of the variable, so that only the numerical data (and not factors) are interacted.

Necessary for the Random Forest to test the specification against non-linearities in the data, though to expansive data wise for the general data set. Use for the top variables. e.g. X1^1\*X2^0, X1^2\*X2^1. This was used in the testing phase for testing the nonlinear biases of the RandomForest. Given the memory constraints of running the model in full, this isn’t included in the final SWS model, though the code remains for future testing.

**Usage**

MultiExp (X, degree,depVar)

**Arguments**

X: Matrix of variables

Degree: the degree in power terms of the interaction

**Returns**

The expanded set of the multidimensional variables for the model

### FSC\_Markov

**Description**

Collapses the stages of the loss percentages along the subnational supply chains into singular observations at the country level for a given year. The options for this function are the simplified (aveatFSP) aggregation as described in the methodology. Under this heading, as the data progresses, additional options for probabilistic expansion can be considered.

**Usage**

FSC\_Markov (RawData,opt)

**Arguments**

RawData: Matrix of Conversion Factors

opt: Options for aggregating up to the national level for each country/crop/year

opt = aveatFSP

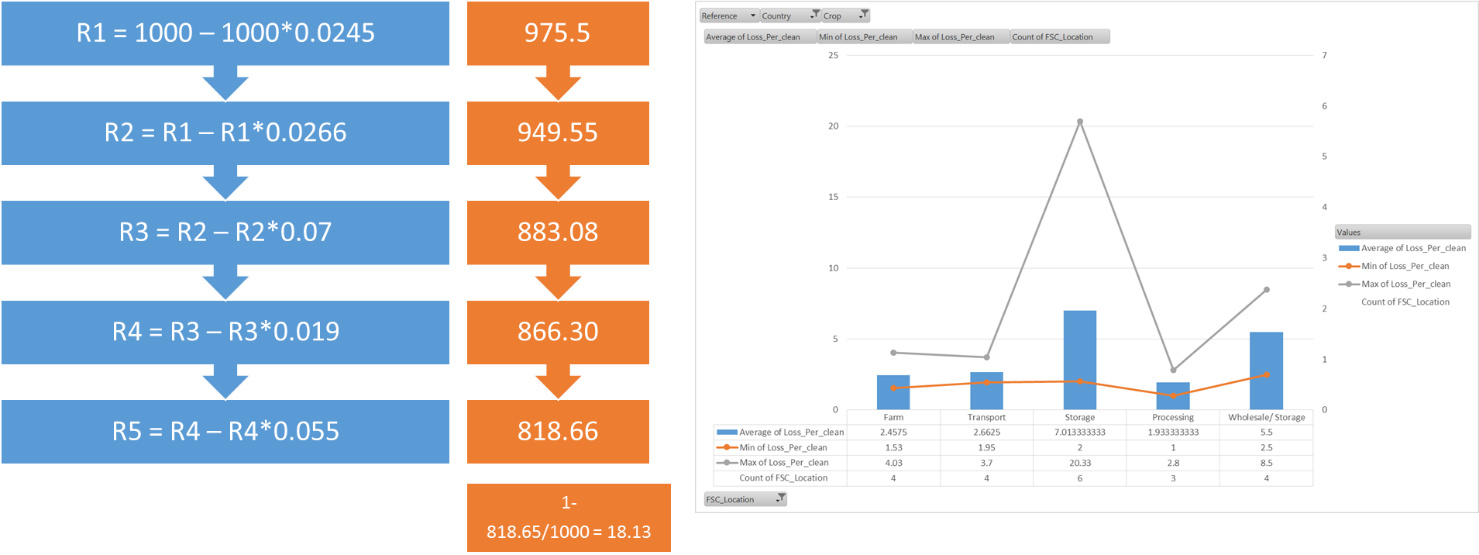
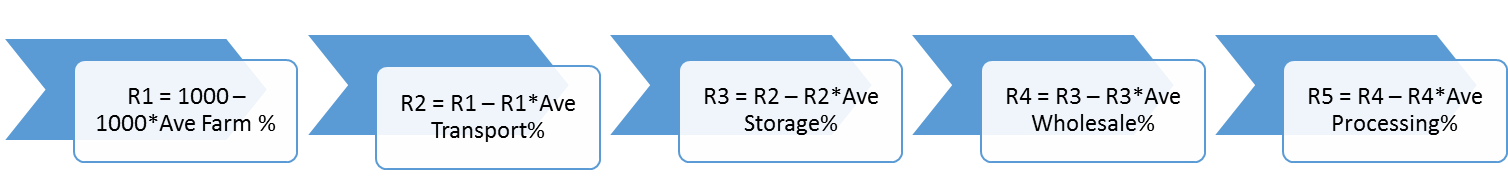
This option averages at each supply chain point for each country,crop,year - delineated by ("farm","storage", "processing", "retail","trader", "transport", "wholesale","whole supply chain", "sws\_total")

From the FLW\_LossPercFactors.xls the column FSC\_Location is the column that is to delineate the stages. If there are datapoints that cover multiple stages, the function splits it at the ‘/’ and attributes it to the first stage provided.

**Returns**

For each country, commodity and year, the function returns a single percentage for use in the loss modeling.

**Examples**



### VariablesAdd1

**Description**

Adds the factors for estimation to the loss factors, these are factors that are included from the literature. As well as other factors that are considered proxies for losses. This function merges the data tables to the loss estimates, by country, crop and year where relevant.

There are three stages to this function, which merge the data for the training or prediction sets with the data that has been assumed to be correlated with losses. The first step takes the crop calendar that is available and merges it with rainfall and temperature data, by the starting month of the harvest season by country. Since losses are at the country level, the rainfall/temperature parameter is averaged over the month and over the country.

The second stage of the function merges the data with the year specific variables. At the moment these country-time variables consist of the world bank pink sheets.

The third stage merges the country and year specific variables. The *LossTablelist\_ctryYr* is the list of datatables that need to be pulled from the working system. The merge is built first on the year/ctry combination and then loops through a merge of this larger table by three lagged years.

For the first running of the model, no data is imputed for missing observations as this has the potential to biasthe random selection and the predicative model based on how the imputation was done.

Each variable also is lagged for a time period of 1,2,3 years and included in the variable set

If countries want to run a country model, then the additional variables can be added to the list of tables pulled from the SWS (LossTablelist\_ctryYr in the R script VariablesAdd1)

Literature provided theoretical basis for the explanatory variables and full explanation of the variables can be found in the Methodology. Used these as proxies to find variables that were collected at the national levels. Focusing on:

* Storage
* Transportation
* Input Costs (Fertilizer, etc.)
* Energy
* Investment/Monetary
* Social/Economic
* Weather/Crop

The list of variables and where they were sourced can be found in the Appendix,

**Usage**

VariablesAdd1 (DataUseInt,keys\_lower,Predvar2)

It can be found in the main run file as well as in the loss module. For the Predictive set it only merges the data that was used in the model for the cluster (and not all variables).

**Arguments**

DataUseInt: Matrix of Loss percentages which is either data\_use\_train or data\_use\_pred

keys\_lower: "geographicaream49", "timepointyears", "measureditemcpc"

Predvar2: a list of blank, if being used for the training set, or the list of used variables for the predicitive set

**Returns**

The full data matrix for estimation

**Assumptions**

Missing data in the explanatory variables occur

* + The datasets used in the explanatory variables are smoothed before undergoing the variable selection for consistency for only temperature and rainfall.
  + Various statistical packages can estimate missing data
    - Smoothed by country
    - *Use sparingly* and consistently
* Example – The Logistics Performance Indicator is only collected every 3 years, data in the interim needs to be imputed, for it to be relevant.

### LossModel and LossModel\_ctry

**Description**

The model operates in 3 parts,

1. Sets the clusters for estimating for countries without data. And it log transforming the data and setting the bounds just above 0 and below 1.
2. Random Forest variable selection. Runs the model across countries within the cluster to find the top preforming variables This has the option for using the Bayesian updating as a future addition. The variable set is pruned for variables that are over 85% correlated. The 8 best fitting variables are then checked that they exist for the country/year that needs to be imputed. If not, the variable is dropped.
3. Heirarchical model. Models the loss percentages on the results of the random forests variable selection and then applies them to the country/commodities/years needed in the output. This cluster uses the FBSTree id3 as the cluster that the model segments its runs on.
4. Model Saves. The data after estimation, takes the parameters for the country and crop dummy variables and for the coefficients of the model. It calculates the dummy variables first for all of the predictive set and sets the flags as I and e for the estimated data. This smaller set of the total set needed predictive values is then merged with the large set (timeSeriesDataToBeImputed), where protected values are excluded.
5. The country model runs for the countries that have data within the 6 clusters, and if there are more 3 observations in each. For countries that don’t have data, the global data is pooled and then clustered by the groups and the model is run on all observations in the cluster.
6. Losses are protected with the protected flags in SWS *flagValidTable*

**Model Structure**

where:

* is the percentage of food losses for the country i, for a given commodity, j, at time t
* is the k-dimensional row vector of time and commodity varying explanatory variables
* is a M-dimensional row vector of time-invariant dummy variables based on the indices i,j
* is the idiosyncratic error term
* is the intercept

Fixed Effects Model

* Within the clusters, the fixed effects are on country and commodity
* Applied first to countries with data to estimate a country model and then to the world
* Vector of 8 variables selected from the larger dataset – chosen by the commodity group
* Model performs better in clusters with more data
* When not enough data exists a simple average is applied

Testing is done for fit ant outliers and a simplified model is run that includes only geographicArea49, CPC and year, in the cases where the fixed effects model does not work.

Commodity Baskets

|  |  |
| --- | --- |
| **Cluster** | **fbsTree** |
| Cereals & Pulses; | 2905,2911 |
| Fruits And Vegetables; | 2919,2918 |
| Roots, Tubers & Oil-Bearing Crops; | 2907,2913 |
| Animals products; Fish and fish products | 2943, 2946,2945,2949,2948 |
| Other crops (stimulants, spices, sugar, etc.) | 2914,2908,2909,2912,2922,2923 |

**Usage**

LossModel (Data,timeSeriesDataToBeImputed,lossData,HierarchicalCluster,keys\_lower)

**Arguments**

* Data is the data used for training the indicator. This should be the final data set, of the loss percentages by country, with data aggregated in the Markov model and with explanatory variables added.
* keys\_lower: "geographicaream49", "timepointyears", "measureditemcpc"
* timeSeriesDataToBeImputed is the data that needs estimates predicted (finalPredictData)
* HierarchicalCluster is for the group/cluster ("foodGroupName" was the best preformer)
  + Options:("foodGroupName","foodPerishableGroup","SDG.Regions",”geographicAreaM49”)

**Returns**

For each country, commodity and year, the function returns the data series for the required crops in percentage terms for use in the FBS and the SDG reporting.

The differences in the two models is that one estimates losses for a country-level cluster and

**Assumptions**

1. Adjusting for import dependent countries

* One adjustment that was made for import dependent countries was to apply losses to production plus imports (105 unique country/commodities)
* Rule applied:
  + This was done if the > 10%
  + This was not done for all countries – as it deflates loss percentages, exacerbating the low loss levels in the system.

These loss percentages including imports are only used for the specific country and commodity cluster and not used in the global dataset The commodities where this assumption holds are found in Table 1.

Table 1 Protected Loss estimates – Adjusting for import dependent countries

|  |  |
| --- | --- |
| Albania | wheat ,apples |
| Armenia | maize (corn) |
| Austria | lettuce and chicory ,chillies and peppers, green (capsicum spp. and pimenta spp.) ,cucumbers and gherkins ,tomatoes ,broad beans and horse beans, green ,mushrooms and truffles ,apricots ,sour cherries ,peaches and nectarines ,strawberries ,linseed |
| Azerbaijan | rice |
| Bahrain | meat of chickens, fresh or chilled |
| Belgium | rye |
| Bosnia And Herzegovina | watermelons |
| Canada | asparagus ,cauliflowers and broccoli ,lettuce and chicory ,watermelons ,cantaloupes and other melons ,chillies and peppers, green (capsicum spp. and pimenta spp.) ,cucumbers and gherkins ,green garlic ,leeks and other alliaceous vegetables ,other vegetables, fresh n.e.c. ,grapes ,pears ,apricots ,cherries ,peaches and nectarines ,plums and sloes ,kiwi fruit ,strawberries ,other fruits n.e.c. ,broad beans and horse beans, dry |
| Cuba | maize (corn) |
| Denmark | mushrooms and truffles ,apples |
| Ecuador | wheat ,oats ,green garlic |
| Egypt | soya beans ,linseed ,sunflower seed ,broad beans and horse beans, dry ,chick peas, dry ,lentils, dry |
| Georgia | wheat |
| Germany | other vegetables, fresh n.e.c. ,soya beans ,linseed |
| Guatemala | wheat ,rice |
| Hungary | lentils, dry |
| Indonesia | soya beans |
| Israel | sorghum ,barley |
| Italy | rapeseed or colza seed |
| Japan | wheat ,maize (corn) ,barley ,soya beans ,beans, dry |
| Jordan | wheat ,barley ,sesame seed |
| Lesotho | maize (corn) |
| Lithuania | other vegetables, fresh n.e.c. , |
| Luxembourg | beans, dry |
| Mali | wheat |
| Malta | wheat |
| Mauritius | maize (corn) |
| Netherlands | maize (corn) ,barley ,rye |
| Norway | wheat |
| Peru | wheat ,barley ,apples ,pears ,apricots ,cherries ,plums and sloes ,soya beans ,pepper (piper spp.), raw ,lentils, dry |
| Poland | soya beans |
| Republic Of Korea | wheat |
| Republic Of Moldova | rye |
| Sri Lanka | maize (corn) ,potatoes |
| Switzerland | chillies and peppers, green (capsicum spp. and pimenta spp.),cucumbers and gherkins ,onions and shallots, green ,onions and shallots, dry (excluding dehydrated) |
| United Kingdom Of Great Britain And Northern Ireland | cherries ,plums and sloes |
| Venezuela (Bolivarian Republic Of) | wheat ,maize (corn) ,grapes ,soya beans ,peas, dry |

1. =In the cases, where the predicted estimate falls above 3 standard deviations of the original input loss data (for the country and commodity group), then the loss percent reverts to the original input loss data average.

* This happens even with a reduced commodity and time trended model
* Challenge with the lack of data available or sporadic datasets

1. Estimates from the country models are then merged into the timeSeriesDataToBeImputed, where losses are not protected. The country estimates temporarily protected, in order to not be overwritten by the global model
2. The steps in the global model are the same as the country model, with the following exceptions:

* In addition to dummies for the commodities within the clusters, there is a country dummy.
* Countries that had protected loss data that was applied to production + imports are excluded from the global base
* The country modeled estimates are not used in the global model

**Where to change the data that feeds the model:**

* **Data Coming from the Countries (Aproduction)** 
  + Cases where data exists in the country but hadn’t been collected
* **Loss Estimates (flw\_lossperfactors\_)**
  + Subnational and other studies can be added to this table
  + Semi-official estimates
  + In the process of improving the data collection on losses a dataset has been put together from a variety of sources.
  + These sources have been tagged by how the data was collected, and the following were used in the modeling effort.
  + They can also be viewed internally to FAO HQ at <http://hqlprsws1.hq.un.fao.org:3838/SDG_12_3_LossData/>

|  |  |
| --- | --- |
| Type of Data Collection | Included in the model |
| Expert Opinion | x |
| WRI Protocol |  |
| APHLIS | x |
| Field Trial |  |
| Estimates Existing in the SWS\* | x |
| Survey | x |
| FBS/APQ | x |
| Crop Cutting Field Experiment |  |
| National Stats Yearbook | x |
| Rapid Assessment |  |
| Lit Review | … |
| Laboratory Trials |  |
| Census | x |
| NationalAcctSys | x |
| Case Study |  |
| Modelled |  |

* **SUA Balanced (fbs\_balanced)**
  + Balanced estimates, where no losses data exists and haven’t been estimated
  + At present – does NOT feed back into the model. For discussion - ??
  + E.g. Oranges in the UK (100% imports)
  + Model sets the Priority in the data used:
  + Protected loss data in aproduction
  + Loss estimates

### WorldBankAPIData

**Description**

Can be used to add the variables from an external data API for the World Bank. Future iterations may have this data integrated already into the SWS. However, as this has packages that are not available in the SWS environment. It is included in the github site.

**Usage**

WorldBankAPIData(LossPercentages)

**Arguments**

LossPercentages: Matrix of Loss percentages

**Returns**

The full data matrix for estimation

# Calculating the GFLI/GFLP

Is the main file for calculating the Global Food Loss Index and producing the required reporting requirements. It contains only the function for calculating the Global Food Loss index and the Country indices. The main file is a separate routine in the SWS, from the loss model.

## Computational Parameters

These are options for the person running the loss module, these are defined at the beginning and impact functions in the rest of the module

*Binary*

GFLI\_calc : Calculate or not the new Index

*Predefined Strings*

* aggregation <- "geographicAreaM49" #"sdg\_region", "geographicAreaM49":

This is the aggregation for the regional index, it can either be calculated for just the individual countries or for the SDG regional aggregates.

* weights <- "intl\_prices"

These are the weights for the index. Currently, the weights are the international dollar prices for available commodities across the globe in 2005. As the prices are updated for 2015, the weights will be updated.

* basketN <- "top2perhead\_byCtry" # "top2perhead\_Globatop10","top2\_calories"
* This is how the basket of commodities are selected for the indexes. The "top2perhead\_byCtry" chooses the top 2 commodities in the FBSTree commodities groupings below. The "top2perhead\_Globatop10", chooses the top two by commodity groupings, but across the globe. The "top2\_calories", sorts the commodities by caloric impact.

## Routines

### getLossData\_LossDomain

**Description**

Within the main file there weights are applied to the loss quantities pulled from the Loss Platform using this function, this is the modeled estimates from the platform. In the lossDomain there is the estimated Loss percentages and the estimate loss quantities.

**Usage**

getLossData\_LossDomain(areaVar,itemVar,yearVar,elementVar,selectedYear,'5126')

**Arguments**

areaVar = "geographicAreaM49"

yearVar = "timePointYears"

itemVar = "measuredItemCPC"

elementVar = "measuredElement"

selectedYear: The User can select the Year variables

element code: Can either be '5126' or

**Returns**

Loss percentages on the Loss Domain in the SWS

### getProductionData

Same from the Loss Module

### getImportData

Same from the Loss Module

## Modeling the Food Loss Percentages and Food Loss Index

In the main file the loss quantities are first calculated over the average of three years around the base year of 2015 set by the SDG committee (2014-16). The weights are selected by the routine and applied to the loss percentages, vis the methodology outlined in the SDG. Depending on the aggregation for the function, the dataset is subsetted within *the GFLI\_SDG\_Fun*.

The country FLI shows the change in the

### GFLI\_SDG\_Fun

**Description**

Calculates the Global Food Loss Index and the country/regional index, with the parameters specified. To compile the **Food Loss Percentage (FLP)** of the whole basket of commodities at country level:

* The FLP is composed of several commodities
* The FLP is the average loss of these commodities
* Not all commodities have the same importance - weights

The country **Food Loss Index** is defined as:

Where:

* i = country, t = year
* t0 is the base year (set at 2005 for the moment)
* is the country Food Loss Percentage

Countries’ FLI must be aggregated for SDG monitoring by regions and for the world. The Regional and Global Food Loss Indexes are calculated as the following:

*\*100*

Where:

* are the country weights equal to the total agricultural value of production

These aggregations needed to be repeated in several different aggregations for reporting and other functions. Therefore, this was included as a function within the lossmodel.

**Usage**

GFLI\_SDG\_fun(BaseYear,keys\_lower,"WORLD",basket,basketKeys,DataForIndex)

**Arguments (see above)**

BaseYear: the years selected for the index

keys\_lower: these are the typical, Country, Commodity, year variables outlined throughout.

Aggregation: Using the data table “*a2017regionalgroupings\_sdg\_feb2017*" to set the aggregations, the function can report countries and their time series, regions and their time series and any other column aggregation within this table (e.g. FAO Programatic areas, SDG regions, geographic regions and subregions). WORLD is the way to aggregate to the Global Food Loss Index

Basket: The baskets are specified in the main file and can be economic value (default for the indicator) based on international prices, producer prices, nutrition, using the top 2 in each of the commodity clusters by country or globally.

BasketKeys: the default is c('geographicaream49', "measureditemcpc") as the weights only change by country and commodity, or just by commodity depending on the basket selections

DataForIndex is the overall dataset including losses multiplied on the prices

**Returns**

The function returns the denominator and numerator for the Food Loss Percentage, and the Numerator for the Food Loss Index. For the regional aggregations these are the regional Food Losses percentages and indexes.

There is code to compare two different years in terms of FLP and FLI.

The aggregates corresponding to the reporting for the SDG 12.3 are saved back as a datatable to the loss platform.

# Outputs

There are also corresponding excel tables that are populated by the different outcomes of the loss model.

These losses need to be reported in several formats the following

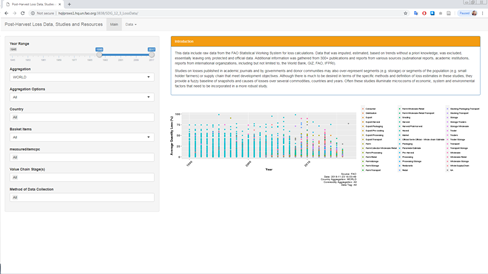
|  |  |
| --- | --- |
| ***Description*** | ***Excel File*** |
| This excel workbooks is the reporting function for the SDG committee | ***SDGDataRequest\_02Feb2017\_original.xlsx*** |
| This excel workbooks is the reporting function for the departmental tracking of the losses | ***Indicator402B\_original.xlsx*** |
| This Excel workbook is the collection of several datatables and datasets within the SWS to provide countries with most of what they need for the collection and organization of data for the SDG indicator. This includes pulling data from production, imports, prices, loss model estimates, loss estimates reported by year, loss data available by stage and then separated by reporting year in the SDG process. The estimates through time are graphed in the second to last worksheet and the sources for all the data are in the last worksheet. | ***FLP-FLI Calculation\_original\_backup.xlsx*** |
| In order to help countries decide what baskets may be useful to measure and monitor against the different basket options are set up so that the country can compare across baskets and years to choose the potential baskets. | ***FLP\_Baskets\_original.xlsx*** |

These tables are populated in scripts that cannot be accessed in the faosws loss package, as they contain libraries that need to be installed on individual machines. They are accessible on the github webpage in the excel file under the SDG.

# Shiny Tools

There are a few shiny tools that are available for the Loss Model;

This dataset is an accumulation of all the loss factors that have been reported, collected from publications and from country work. These loss factors that are the inputs to the model and are presented (soon) externally to the world can be accessed at: http://hqlprsws1.hq.un.fao.org:3838/SDG\_12\_3\_LossData/



# Appendix 1. FLI Commodity Baskets and corresponding CPC codes

|  |  |  |  |
| --- | --- | --- | --- |
|  | **GFLI Basket** | **FBS Group** | **Crop (CPC Heading)** |
| **1** | Cereals & Pulses | Cereals | Wheat (111), Maize (Corn) (112), Rice (113), Sorghum (114), Barley (115), Rye (116), Millet (118), Oats (117), Triticale (1191), Buckwheat (1192), Fonio (1193), Quinoa (1194), Canary Seed (1195), Mixed Grain (1199.02), Other Cereals N.E.C. (1199.9), Bulgur (23140.02), Rice, Milled (Husked) (23161.01), Rice, Milled (23161.02), Rice, Broken (23161.03), Communion Wafers, Empty Cachets Of A Kind Suitable For Pharmaceutical Use, Sealing Wafers, Rice Paper And Similar Products. (23490.01), Uncooked Pasta, Not Stuffed Or Otherwise Prepared (23710) |
| Pulses | Beans, Dry (1701), Broad Beans And Horse Beans, Dry (1702), Chick Peas, Dry (1703), Lentils, Dry (1704), Peas, Dry (1705), Cow Peas, Dry (1706), Pigeon Peas, Dry (1707), Bambara Beans, Dry (1708), Vetches (1709.01), Lupins (1709.02), Other Pulses N.E.C. (1709.9) |
| **2** | Fruits & Vegetables | Fruits | Avocados (1311), Bananas (1312), Plantains And Others (1313), Dates (1314), Figs (1315), Mangoes, Guavas, Mangosteens (1316), Papayas (1317), Pineapples (1318), Other Tropical Fruits, N.E.C. (1319), Pomelos And Grapefruits (1321), Lemons And Limes (1322), Oranges (1323), Tangerines, Mandarins, Clementines (1324), Other Citrus Fruit, N.E.C. (1329), Grapes (1330), Apples (1341), Pears (1342.01), Quinces (1342.02), Apricots (1343), Sour Cherries (1344.01), Cherries (1344.02), Peaches And Nectarines (1345), Plums And Sloes (1346), Other Pome Fruits (1349.1), Other Stone Fruits (1349.2), Currants (1351.01), Gooseberries (1351.02), Kiwi Fruit (1352), Raspberries (1353.01), Strawberries (1354), Blueberries (1355.01), Cranberries (1355.02), Other Berries And Fruits Of The Genus Vaccinium (1355.9), Persimmons (1359.01), Cashewapple (1359.02), Other Fruits N.E.C. (1359.9), Raisins (21411), Plums, Dried (21412), Apricots, Dried (21419.01), Figs, Dried (21419.02), Other Fruit N.E.C., Dried (21419.99), Other Tropical Fruit, Dried (21419.91), Pineapples, Otherwise Prepared Or Preserved (21491), Flour Of Fruits (23170.04), Fruit, Nuts, Peel, Sugar Preserved (23670.02), Homogenized Cooked Fruit, Prepared (23991.03), Must Of Grape (24212.01), Fruit Prepared N.E.C. (F0623 ) |
| Vegetables | Asparagus (1211), Cabbages (1212), Cauliflowers And Broccoli (1213), Lettuce And Chicory (1214), Spinach (1215), Artichokes (1216), Cassava Leaves (1219.01), Watermelons (1221), Cantaloupes And Other Melons (1229), Chillies And Peppers, Green (Capsicum Spp. And Pimenta Spp.) (1231), Cucumbers And Gherkins (1232), Eggplants (Aubergines) (1233), Tomatoes (1234), Pumpkins, Squash And Gourds (1235), Okra (1239.01), Other Beans, Green (1241.9), String Beans (1241.01), Peas, Green (1242), Broad Beans And Horse Beans, Green (1243), Carrots And Turnips (1251), Green Garlic (1252), Onions And Shallots, Green (1253.01), Leeks And Other Alliaceous Vegetables (1254), Onions And Shallots, Dry (Excluding Dehydrated) (1253.02), Mushrooms And Truffles (1270), Green Corn (Maize) (1290.01), Other Vegetables, Fresh N.E.C. (1290.9), Locust Beans (Carobs) (1356), Chicory Roots (1691) |
| **3** | Roots, Tubers & Oil-Bearing Crops | Oil Crops | Soya Beans (141), Groundnuts, Excluding Shelled (142), Cottonseed (143), Linseed (1441), Mustard Seed (1442), Rapeseed Or Colza Seed (1443), Sesame Seed (1444), Sunflower Seed (1445), Safflower Seed (1446), Castor Oil Seeds (1447), Poppy Seed (1448), Melonseed (1449.01), Hempseed (1449.02), Olives (1450), Other Oil Seeds, N.E.C. (1449.9), Coconuts, In Shell (1460), Oil Palm Fruit (1491.01), Palm Kernels (1491.02), Copra (1492), Karite Nuts (Sheanuts) (1499.01), Tung Nuts (1499.02), Jojoba Seeds (1499.03), Tallowtree Seeds (1499.04), Kapok Fruit (1499.05), Kapokseed In Shell (1499.06), Kapokseed, Shelled (1499.07), Groundnuts, Shelled (21421), Coconuts, Desiccated (21429.07), Prepared Groundnuts (21495.01) |
| Roots, Tubers & Products | Potatoes (1510), Cassava, Fresh (1520.01), Cassava, Dried (1520.02), Sweet Potatoes (1530), Yams (1540), Taro (1550), Yautia (1591) |
| **4** | Animals And Animal Products | Animal fats | Fat Of Pigs (21511.01), Pig, Butcher Fat (21511.02), Fat Of Poultry (21511.03), Cattle Fat, Unrendered (21512), Cattle, Butcher Fat (21512.01), Buffalo Fat, Unrendered (21513), Sheep Fat, Unrendered (21514), Fat Of Camels (21519.02), Pig Fat, Rendered (21521), Fat Of Other Camelids (21519.03), Poultry Fat, Rendered (21522), Tallow (21523), Lard Stearine And Lard Oil (21529.02), (21529.03), Degras (21932.01), Wool Grease And Lanolin (F0994 ), Fat Preparations N.E.C. (F1243 ) |
| Eggs | Hen Eggs In Shell, Fresh (231), Eggs From Other Birds In Shell, Fresh, N.E.C. (232), Egg Albumin (23993.01), Eggs, Liquid (23993.02), Eggs, Dried (23993.03) |
| Meat | Snails, Fresh, Chilled, Frozen, Dried, Salted Or In Brine, Except Sea Snails (2920), Meat Of Cattle With The Bone, Fresh Or Chilled (21111.01), Meat Of Cattle Boneless, Fresh Or Chilled (21111.02), Meat Of Buffalo, Fresh Or Chilled (21112), Meat Of Pig With The Bone, Fresh Or Chilled (21113.01), Meat Of Pig Boneless, Fresh Or Chilled (21113.02), Meat Of Sheep, Fresh Or Chilled (21115), Meat Of Rabbits And Hares, Fresh Or Chilled (21114), Meat Of Goat, Fresh Or Chilled (21116), Meat Of Camels, Fresh Or Chilled (21117.01), Meat Of Other Domestic Camelids, Fresh Or Chilled (21117.02), Horse Meat, Fresh Or Chilled (21118.01), Meat Of Asses, Fresh Or Chilled (21118.02), Meat Of Mules, Fresh Or Chilled (21118.03), Meat Of Other Domestic Rodents, Fresh Or Chilled (21119.01), Meat Of Chickens, Fresh Or Chilled (21121), Meat Of Ducks, Fresh Or Chilled (21122), Meat Of Geese, Fresh Or Chilled (21123), Meat Of Turkeys, Fresh Or Chilled (21124), Edible Offal Of Cattle, Fresh, Chilled Or Frozen (21151), Edible Offal Of Buffalo, Fresh, Chilled Or Frozen (21152), Edible Offal Of Pigs, Fresh, Chilled Or Frozen (21153), Edible Offal Of Sheep, Fresh, Chilled Or Frozen (21155), Edible Offal Of Goat, Fresh, Chilled Or Frozen (21156), Edible Offals Of Horses And Other Equines, Fresh, Chilled Or Frozen (21159.01), Edible Offals Of Camels And Other Camelids, Fresh, Chilled Or Frozen (21159.02), Edible Offals And Liver Of Chickens And Guinea Fowl, Fresh, Chilled Or Frozen (21160.01), Edible Offals And Liver Of Geese, Fresh, Chilled Or Frozen (21160.02), Edible Offals And Liver Of Ducks, Fresh, Chilled Or Frozen (21160.03), Edible Offals And Liver Of Turkey,Fresh, Chilled Or Frozen (21160.04), Meat Of Pigeons And Other Birds N.E.C., Fresh, Chilled Or Frozen (21170.01), Game Meat, Fresh, Chilled Or Frozen (21170.02), Other Meat N.E.C. (Excluding Mammals), Fresh, Chilled Or Frozen (21170.92), Offals N.E.C. (Excluding Mammals),Fresh, Chilled Or Frozen (21170.93), Pig Meat, Cuts, Salted, Dried Or Smoked (Bacon And Ham) (21181), Other Meat And Edible Meat Offal, Salted, In Brine, Dried Or Smoked; Edible Flours And Meals Of Meat Or Meat Offal (21183) |
| Milk and Dairy | Raw Milk Of Cattle (2211), Raw Milk Of Buffalo (2212), Raw Milk Of Sheep (2291), Raw Milk Of Goats (2292), Raw Milk Of Camel (2293), Skim Milk Of Cows (22110.02), Skim Milk Of Buffalo (22110.04), Skim Sheep Milk (22110.05), Skim Milk Of Goat (22110.06), Dairy Products N.E.C. (22290), Cream, Fresh (22120), Butter Of Cow Milk (22241.01), Ghee From Cow Milk (22241.02), Butter Of Buffalo Milk (22242.01), Ghee, From Buffalo Milk (22242.02), Butter And Ghee Of Sheep Milk (22249.01), Butter Of Goat Milk (22249.02), |
| **5** | Fish & Fish Products | Fish & Fisheries Products | Cephalopods (2766), Crustaceans (2765), Demersal Fish (2762), Freshwater Fish (2761), Marine Fish, Other (2764), Molluscs, Other (2767), Pelagic Fish (2763), Fish, Seafood (2960), Aquatic Animals, Others (2769), Aquatic Plants (2775), Meat, Aquatic Mammals (2768), Aquatic Products, Other (2961) |
| **6** | Other | Spices | Pepper (Piper Spp.), Raw (1651), Chillies And Peppers, Dry (Capsicum Spp. And Pimenta Spp.), Raw (1652), Nutmeg, Mace, Cardamoms, Raw (1653), Anise, Badian, Coriander, Cumin, Caraway, Fennel And Juniper Berries, Raw (1654), Cinnamon And Cinnamon-Tree Flowers, Raw (1655), Cloves (Whole Stems), Raw (1656), Ginger, Raw (1657), Vanilla, Raw (1658), Other Stimulant, Spice And Aromatic Crops, N.E.C. (1699) |
| Stimulants | Coffee, Green (1610), Tea Leaves (1620), Maté Leaves (1630), Cocoa Beans (1640), Cocoa Paste Not Defatted (23610.01), Coffee, Decaffeinated Or Roasted (23911), Chocolate Products Nes (F0666 ) |
| Sugars & Syrups | Sugar Beet (1801), Sugar Cane (1802), Other Sugar Crops N.E.C. (1809), Natural Honey (2910) |
| Tree Nuts | Almonds, In Shell (1371), Cashew Nuts, In Shell (1372), Chestnuts, In Shell (1373), Hazelnuts, In Shell (1374), Pistachios, In Shell (1375), Walnuts, In Shell (1376), Brazil Nuts, In Shell (1377), Areca Nuts (1379.01), Kola Nuts (1379.02), Other Nuts (Excluding Wild Edible Nuts And Groundnuts), In Shell, N.E.C. (1379.9), Almonds, Shelled (21422), Hazelnuts, Shelled (21423), Cashew Nuts, Shelled (21424), Brazil Nuts, Shelled (21429.01), Walnuts, Shelled (21429.02), Prepared Nuts (F0235 ) |

## Global Factors Correlated with Post-Harvest Food Losses

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Factors Identified as causing loss** | **Indicator** | **Measurement** | **Source Org** | **Source** | **filename** | **SWS data Table** |
| Building materials | World Lead Prices, Annual Average (Nominal) |  | World Bank | http://www.worldbank.org/en/research/commodity-markets | CMOHistoricalDataAnnual\_sh1 | LEAD |
| Energy Prices | World Natural gas index Prices, Annual Average (Nominal) |  | World Bank | http://www.worldbank.org/en/research/commodity-markets | CMOHistoricalDataAnnual\_sh1 | iNATGAS |
| Energy Prices | World Crude oil, Dubai Prices, Annual Average (Nominal) |  | World Bank | http://www.worldbank.org/en/research/commodity-markets | CMOHistoricalDataAnnual\_sh1 | CRUDE\_DUBAI |
| Energy Prices | World Petrol Prices, Annual Average (Nominal) |  | World Bank | http://www.worldbank.org/en/research/commodity-markets | CMOHistoricalDataAnnual\_sh1 | CRUDE\_PETRO |
| Fertilizer Prices | World Potash Prices, Annual Average (Nominal) |  | World Bank | http://www.worldbank.org/en/research/commodity-markets | CMOHistoricalDataAnnual\_sh1 | POTASH |
| Energy Prices | World Natural gas, Europe Prices, Annual Average (Nominal) |  | World Bank | http://www.worldbank.org/en/research/commodity-markets | CMOHistoricalDataAnnual\_sh1 | NGAS\_EUR |
| Fertilizer Prices | World urea Prices, Annual Average (Nominal) |  | World Bank | http://www.worldbank.org/en/research/commodity-markets | CMOHistoricalDataAnnual\_sh1 | UREA\_EE\_BULK |
| Energy Prices | World Natural gas, US Prices, Annual Average (Nominal) |  | World Bank | http://www.worldbank.org/en/research/commodity-markets | CMOHistoricalDataAnnual\_sh1 | NGAS\_US |
| Building materials | World Nickel Prices, Annual Average (Nominal) | World Bank Pink Sheets | World Bank | http://www.worldbank.org/en/research/commodity-markets | CMOHistoricalDataAnnual\_sh1 | NICKEL |
| Access to markets | Merchandise imports from low- and middle-income economies outside region (% of total merchandise imports) | Merchandise imports from low- and middle-income economies outside region are the sum of merchandise imports by the reporting economy from other low- and middle-income economies in other World Bank regions according to the World Bank classification of economies. Data are expressed as a percentage of total merchandise imports by the economy. Data are computed only if at least half of the economies in the partner country group had non-missing data. | World Bank | http://api.worldbank.org/countries/ | TM\_VAL\_MRCH\_OR\_ZS | TM.VAL.MRCH.OR.ZS |
| Access to markets | Merchandise imports from low- and middle-income economies in East Asia & Pacific (% of total merchandise imports) | Merchandise imports from low- and middle-income economies in East Asia and Pacific are the sum of merchandise imports by the reporting economy from low- and middle-income economies in the East Asia and Pacific region according to the World Bank classification of economies. Data are expressed as a percentage of total merchandise imports by the economy. Data are computed only if at least half of the economies in the partner country group had non-missing data. | World Bank | http://api.worldbank.org/countries/ | TM\_VAL\_MRCH\_R1\_ZS | TM.VAL.MRCH.R1.ZS |
| Building materials | World Zinc Prices, Annual Average (Nominal) | World Bank Pink Sheets | World Bank | http://www.worldbank.org/en/research/commodity-markets | CMOHistoricalDataAnnual\_sh1 | Zinc |
| Poverty/Income | Income share held by second 20% | Percentage share of income or consumption is the share that accrues to subgroups of population indicated by deciles or quintiles. Percentage shares by quintile may not sum to 100 because of rounding. | World Bank | http://api.worldbank.org/countries/ | SI\_DST\_02ND\_20 | SI.DST.02ND.20 |
| Access to markets | Merchandise exports to low- and middle-income economies within region (% of total merchandise exports) | Merchandise exports to low- and middle-income economies within region are the sum of merchandise exports from the reporting economy to other low- and middle-income economies in the same World Bank region as a percentage of total merchandise exports by the economy. Data are computed only if at least half of the economies in the partner country group had non-missing data. No figures are shown for high-income economies, because they are a separate category in the World Bank classification of economies. | World Bank | http://api.worldbank.org/countries/ | TX\_VAL\_MRCH\_WR\_ZS | TX.VAL.MRCH.WR.ZS |
| Building materials | World Tin Prices, Annual Average (Nominal) | World Bank Pink Sheets | World Bank | http://www.worldbank.org/en/research/commodity-markets | CMOHistoricalDataAnnual\_sh1 | Tin |
| Poverty/Income | Income share held by third 20% | Percentage share of income or consumption is the share that accrues to subgroups of population indicated by deciles or quintiles. Percentage shares by quintile may not sum to 100 because of rounding. | World Bank | http://api.worldbank.org/countries/ | SI\_DST\_03RD\_20 | SI.DST.03RD.20 |
| Poverty/Income | Income share held by lowest 20% | Percentage share of income or consumption is the share that accrues to subgroups of population indicated by deciles or quintiles. Percentage shares by quintile may not sum to 100 because of rounding. | World Bank | http://api.worldbank.org/countries/ | SI\_DST\_FRST\_20 | SI.DST.FRST.20 |
| Access to markets | Merchandise imports from low- and middle-income economies within region (% of total merchandise imports) | Merchandise imports from low- and middle-income economies within region are the sum of merchandise imports by the reporting economy from other low- and middle-income economies in the same World Bank region according to the World Bank classification of economies. Data are as a percentage of total merchandise imports by the economy. Data are computed only if at least half of the economies in the partner country group had non-missing data. No figures are shown for high-income economies, because they are a separate category in the World Bank classification of economies. | World Bank | http://api.worldbank.org/countries/ | TM\_VAL\_MRCH\_WR\_ZS | TM.VAL.MRCH.WR.ZS |
| Access to finance/Infrastructure | Primary income on FDI, payments (current US$) | Primary income on foreign direct investment covers payments of direct investment income (debit side), which consist of income on equity (dividends, branch profits, and reinvested earnings) and income on the intercompany debt (interest). Data are in current U.S. dollars. | World Bank | http://api.worldbank.org/countries/ | BX\_KLT\_DREM\_CD\_DT | BX.KLT.DREM.CD.DT |
| Poverty/Income | Adjusted net national income per capita (current US$) | Adjusted net national income is GNI minus consumption of fixed capital and natural resources depletion. | World Bank | http://api.worldbank.org/countries/ | NY\_ADJ\_NNTY\_PC\_CD | NY.ADJ.NNTY.PC.CD |
| Poverty/Income | Income share held by lowest 10% | Percentage share of income or consumption is the share that accrues to subgroups of population indicated by deciles or quintiles. | World Bank | http://api.worldbank.org/countries/ | SI\_DST\_FRST\_10 | SI.DST.FRST.10 |
| Poverty/Income | Net secondary income (BoP, current US$) | Secondary income refers to transfers recorded in the balance of payments whenever an economy provides or receives goods, services, income, or financial items without a quid pro quo. All transfers not considered to be capital are current. Data are in current U.S. dollars. | World Bank | http://api.worldbank.org/countries/ | BN\_TRF\_CURR\_CD | BN.TRF.CURR.CD |
| Access to markets | Merchandise exports to low- and middle-income economies outside region (% of total merchandise exports) | Merchandise exports to low- and middle-income economies outside region are the sum of merchandise exports from the reporting economy to other low- and middle-income economies in other World Bank regions according to the World Bank classification of economies. Data are expressed as a percentage of total merchandise exports by the economy. Data are computed only if at least half of the economies in the partner country group had non-missing data. | World Bank | http://api.worldbank.org/countries/ | TX\_VAL\_MRCH\_OR\_ZS | TX.VAL.MRCH.OR.ZS |
| Access to markets | Merchandise exports to low- and middle-income economies in East Asia & Pacific (% of total merchandise exports) | Merchandise exports to low- and middle-income economies in East Asia and Pacific are the sum of merchandise exports from the reporting economy to low- and middle-income economies in the East Asia and Pacific region according to World Bank classification of economies. Data are as a percentage of total merchandise exports by the economy. Data are computed only if at least half of the economies in the partner country group had non-missing data. | World Bank | http://api.worldbank.org/countries/ | TX\_VAL\_MRCH\_R1\_ZS | TX.VAL.MRCH.R1.ZS |
| Building materials | World Aluminum Prices, Annual Average (Nominal) | World Bank Pink Sheets | World Bank | http://www.worldbank.org/en/research/commodity-markets | CMOHistoricalDataAnnual\_sh1 | ALUMINUM |
| Access to markets | Imports of goods, services and primary income (BoP, current US$) | Imports of goods, services and primary income is the sum of goods imports, service imports and primary income payments. Data are in current U.S. dollars. | World Bank | http://api.worldbank.org/countries/ | BM\_GSR\_TOTL\_CD | BM.GSR.TOTL.CD |
| Access to finance/Infrastructure | Secondary income receipts (BoP, current US$) | Secondary income refers to transfers recorded in the balance of payments whenever an economy provides or receives goods, services, income, or financial items without a quid pro quo. All transfers not considered to be capital are current. Data are in current U.S. dollars. | World Bank | http://api.worldbank.org/countries/ | BX\_TRF\_CURR\_CD | BX.TRF.CURR.CD |
| Poverty/Income | Primary income payments (BoP, current US$) | Primary income payments refer to employee compensation paid to nonresident workers and investment income (payments on direct investment, portfolio investment, other investments). Data are in current U.S. dollars. | World Bank | http://api.worldbank.org/countries/ | BM\_GSR\_FCTY\_CD | BM.GSR.FCTY.CD |
| Access to markets | Exports of goods, services and primary income (BoP, current US$) | Exports of goods, services and primary income is the sum of goods exports, service exports and primary income receipts. Data are in current U.S. dollars. | World Bank | http://api.worldbank.org/countries/ | BX\_GSR\_TOTL\_CD | BX.GSR.TOTL.CD |
| Access to markets | Merchandise imports from low- and middle-income economies in South Asia (% of total merchandise imports) | Merchandise imports from low- and middle-income economies in South Asia are the sum of merchandise imports by the reporting economy from low- and middle-income economies in the South Asia region according to the World Bank classification of economies. Data are expressed as a percentage of total merchandise imports by the economy. Data are computed only if at least half of the economies in the partner country group had non-missing data. | World Bank | http://api.worldbank.org/countries/ | TM\_VAL\_MRCH\_R5\_ZS | TM.VAL.MRCH.R5.ZS |
| Poverty/Income | Income share held by fourth 20% | Percentage share of income or consumption is the share that accrues to subgroups of population indicated by deciles or quintiles. Percentage shares by quintile may not sum to 100 because of rounding. | World Bank | http://api.worldbank.org/countries/ | SI\_DST\_04TH\_20 | SI.DST.04TH.20 |
| Poverty/Income | Primary income receipts (BoP, current US$) | Primary income receipts refer to employee compensation paid to resident workers working abroad and investment income (receipts on direct investment, portfolio investment, other investments, and receipts on reserve assets). Data are in current U.S. dollars. | World Bank | http://api.worldbank.org/countries/ | BX\_GSR\_FCTY\_CD | BX.GSR.FCTY.CD |
| Access to markets | Merchandise exports to low- and middle-income economies in South Asia (% of total merchandise exports) | Merchandise exports to low- and middle-income economies in South Asia are the sum of merchandise exports from the reporting economy to low- and middle-income economies in the South Asia region according to World Bank classification of economies. Data are as a percentage of total merchandise exports by the economy. Data are computed only if at least half of the economies in the partner country group had non-missing data. | World Bank | http://api.worldbank.org/countries/ | TX\_VAL\_MRCH\_R5\_ZS | TX.VAL.MRCH.R5.ZS |
| Poverty/Income | Net primary income (BoP, current US$) | Net primary income refers to receipts and payments of employee compensation paid to nonresident workers and investment income (receipts and payments on direct investment, portfolio investment, other investments, and receipts on reserve assets). Data are in current U.S. dollars. | World Bank | http://api.worldbank.org/countries/ | BN\_GSR\_FCTY\_CD | BN.GSR.FCTY.CD |
| Electricity for Procesing technology | Access to electricity (% of population) | Access to electricity is the percentage of population with access to electricity. Electrification data are collected from industry, national surveys and international sources. | World Bank | http://api.worldbank.org/countries/ | EG\_ELC\_ACCS\_ZS | EG.ELC.ACCS.ZS |
| Access to finance/Infrastructure | Secondary income, other sectors, payments (BoP, current US$) | Secondary income refers to transfers recorded in the balance of payments whenever an economy provides or receives goods, services, income, or financial items without a quid pro quo. All transfers not considered to be capital are current. Data are in current U.S. dollars. | World Bank | http://api.worldbank.org/countries/ | BM\_TRF\_PRVT\_CD | BM.TRF.PRVT.CD |
| Access to markets | Merchandise imports from low- and middle-income economies in Europe & Central Asia (% of total merchandise imports) | Merchandise imports from low- and middle-income economies in Europe and Central Asia are the sum of merchandise imports by the reporting economy from low- and middle-income economies in the Europe and Central Asia region according to the World Bank classification of economies. Data are expressed as a percentage of total merchandise imports by the economy. Data are computed only if at least half of the economies in the partner country group had non-missing data. | World Bank | http://api.worldbank.org/countries/ | TM\_VAL\_MRCH\_R2\_ZS | TM.VAL.MRCH.R2.ZS |
| Poverty/Income | Adjusted net national income per capita (constant 2010 US$) | Adjusted net national income is GNI minus consumption of fixed capital and natural resources depletion. | World Bank | http://api.worldbank.org/countries/ | NY\_ADJ\_NNTY\_PC\_KD | NY.ADJ.NNTY.PC.KD |
| Access to markets | Merchandise exports to low- and middle-income economies in Europe & Central Asia (% of total merchandise exports) | Merchandise exports to low- and middle-income economies in Europe and Central Asia are the sum of merchandise exports from the reporting economy to low- and middle-income economies in the Europe and Central Asia region according to World Bank classification of economies. Data are as a percentage of total merchandise exports by the economy. Data are computed only if at least half of the economies in the partner country group had non-missing data. | World Bank | http://api.worldbank.org/countries/ | TX\_VAL\_MRCH\_R2\_ZS | TX.VAL.MRCH.R2.ZS |
| Mechanized Technology/Improved Storage /Reusable/Recyclable Packages | Net Capital Stocks (Agriculture, Forestry and Fishing) | As part of the FAO Agricultural Capital Stock database, ESS-FAO publishes country-by-country data on annual physical investment flows in agriculture, forestry and fishery as measured by the System of National Accounts (SNA) concept of Gross Fixed Capital Formation (GFCF).The FAO Capital Stock Database is an *analytical database*. For most countries, published series start in 1990. | FAO -ESS | http://www.fao.org/faostat/en/#data/CS | Investment\_NetCapitalStocks | CapitalStock\_NetCapitalStocks |
| Poverty/Income | Adjusted net national income per capita (annual % growth) | Adjusted net national income is GNI minus consumption of fixed capital and natural resources depletion. | World Bank | http://api.worldbank.org/countries/ | NY\_ADJ\_NNTY\_PC\_KD\_ZG | NY.ADJ.NNTY.PC.KD.ZG |
| Access to Finance/Capital | Net income from abroad (constant LCU) | Net income includes the net labor income and net property and entrepreneurial income components of the SNA. Labor income covers compensation of employees paid to nonresident workers. Property and entrepreneurial income covers investment income from the ownership of foreign financial claims (interest, dividends, rent, etc.) and nonfinancial property income (patents, copyrights, etc.). Data are in constant local currency. | World Bank | http://api.worldbank.org/countries/ | NY\_GSR\_NFCY\_KN | NY.GSR.NFCY.KN |
| Access to Finance/Capital | Net income from abroad (current US$) | Net income includes the net labor income and net property and entrepreneurial income components of the SNA. Labor income covers compensation of employees paid to nonresident workers. Property and entrepreneurial income covers investment income from the ownership of foreign financial claims (interest, dividends, rent, etc.) and nonfinancial property income (patents, copyrights, etc.). Data are in current U.S. dollars. | World Bank | http://api.worldbank.org/countries/ | NY\_GSR\_NFCY\_CD | NY.GSR.NFCY.CD |
| Mechanized Technology/Improved Storage /Reusable/Recyclable Packages | Consumption of Fixed Capital (Agriculture, Forestry and Fishing) | As part of the FAO Agricultural Capital Stock database, ESS-FAO publishes country-by-country data on annual physical investment flows in agriculture, forestry and fishery as measured by the System of National Accounts (SNA) concept of Gross Fixed Capital Formation (GFCF).The FAO Capital Stock Database is an *analytical database*. For most countries, published series start in 1990. | FAO -ESS | http://www.fao.org/faostat/en/#data/CS | Investment\_ConsumptionFixedCapital | CapitalStock\_ConsumptionFixedCapital |
| Access to Finance/Capital | Net income from abroad (current LCU) | Net income includes the net labor income and net property and entrepreneurial income components of the SNA. Labor income covers compensation of employees paid to nonresident workers. Property and entrepreneurial income covers investment income from the ownership of foreign financial claims (interest, dividends, rent, etc.) and nonfinancial property income (patents, copyrights, etc.). Data are in current local currency. | World Bank | http://api.worldbank.org/countries/ | NY\_GSR\_NFCY\_CN | NY.GSR.NFCY.CN |
| Access to Information | Mobile account, income, poorest 40% (% ages 15+) | Mobile account denotes the percentage of respondents who report personally using a mobile phone to pay bills or to send or receive money through a GSM Association (GSMA) Mobile Money for the Unbanked (MMU) service in the past 12 months; or receiving wages, government transfers, or payments for agricultural products through a mobile phone in the past 12 months. | World Bank | http://api.worldbank.org/countries/ | WP15163\_4\_8 | WP15163\_4.8 |
| Mechanized Technology/Improved Storage /Reusable/Recyclable Packages | Gross Fixed Capital Formation (Agriculture, Forestry and Fishing) | As part of the FAO Agricultural Capital Stock database, ESS-FAO publishes country-by-country data on annual physical investment flows in agriculture, forestry and fishery as measured by the System of National Accounts (SNA) concept of Gross Fixed Capital Formation (GFCF).The FAO Capital Stock Database is an *analytical database*. For most countries, published series start in 1990. | FAO -ESS | http://www.fao.org/faostat/en/#data/CS | Investment\_GrossFixedCapitalFormation\_USD | CapitalStock\_GrossFixedCapitalFormation |
| Poverty/Income | Adjusted net national income (annual % growth) | Adjusted net national income is GNI minus consumption of fixed capital and natural resources depletion. | World Bank | http://api.worldbank.org/countries/ | NY\_ADJ\_NNTY\_KD\_ZG | NY.ADJ.NNTY.KD.ZG |
| Access to markets | Merchandise exports to low- and middle-income economies in Middle East & North Africa (% of total merchandise exports) | Merchandise exports to low- and middle-income economies in Middle East and North Africa are the sum of merchandise exports from the reporting economy to low- and middle-income economies in the Middle East and North Africa region according to World Bank classification of economies. Data are as a percentage of total merchandise exports by the economy. Data are computed only if at least half of the economies in the partner country group had non-missing data. | World Bank | http://api.worldbank.org/countries/ | TX\_VAL\_MRCH\_R4\_ZS | TX.VAL.MRCH.R4.ZS |
| Poverty/Income | Annualized average growth rate in per capita real survey mean consumption or income, total population (%) | The growth rate in the welfare aggregate of the total population is computed as the annualized average growth rate in per capita real consumption or income of the total population in the income distribution in a country from household surveys over a roughly 5-year period. Mean per capita real consumption or income is measured at 2011 Purchasing Power Parity (PPP) using the PovcalNet (http://iresearch.worldbank.org/PovcalNet). For some countries means are not reported due to grouped and/or confidential data. The annualized growth rate is computed as (Mean in final year/Mean in initial year)^(1/(Final year - Initial year)) - 1. The reference year is the year in which the underlying household survey data was collected. In cases for which the data collection period bridged two calendar years, the first year in which data were collected is reported. The initial year refers to the nearest survey collected 5 years before the most recent survey available, only surveys collected between 3 and 7 years before the most recent survey are considered. The final year refers to the most recent survey available between 2011 and 2015.  Growth rates for Iraq are based on survey means of 2005 PPP$. The coverage and quality of the 2011 PPP price data for Iraq and most other North African and Middle Eastern countries were hindered by the exceptional period of instability they faced at the time of the 2011 exercise of the International Comparison Program. See PovcalNet for detailed explanations. | World Bank | http://api.worldbank.org/countries/ | SI\_SPR\_PCAP\_ZG | SI.SPR.PCAP.ZG |
| Poverty/Income | Taxes on income, profits and capital gains (current LCU) | Taxes on income, profits, and capital gains are levied on the actual or presumptive net income of individuals, on the profits of corporations and enterprises, and on capital gains, whether realized or not, on land, securities, and other assets. Intragovernmental payments are eliminated in consolidation. | World Bank | http://api.worldbank.org/countries/ | GC\_TAX\_YPKG\_CN | GC.TAX.YPKG.CN |
| Poverty/Income | Adjusted net national income (current US$) | Adjusted net national income is GNI minus consumption of fixed capital and natural resources depletion. | World Bank | http://api.worldbank.org/countries/ | NY\_ADJ\_NNTY\_CD | NY.ADJ.NNTY.CD |
| Energy Prices | World Coal, Colombian Prices, Annual Average (Nominal) | World Bank Pink Sheets | World Bank | http://www.worldbank.org/en/research/commodity-markets | CMOHistoricalDataAnnual\_sh1 | COAL\_COL |
| Mechanized Technology/Improved Storage /Reusable/Recyclable Packages | Gross Capital Stocks (Agriculture, Forestry and Fishing) | As part of the FAO Agricultural Capital Stock database, ESS-FAO publishes country-by-country data on annual physical investment flows in agriculture, forestry and fishery as measured by the System of National Accounts (SNA) concept of Gross Fixed Capital Formation (GFCF).The FAO Capital Stock Database is an *analytical database*. For most countries, published series start in 1990. | FAO -ESS | http://www.fao.org/faostat/en/#data/CS | Investment\_GrossCapitalStocks | CapitalStock\_GrossCapitalStocks |
| Access to Information | Mobile account, income, richest 60% (% ages 15+) | Mobile account denotes the percentage of respondents who report personally using a mobile phone to pay bills or to send or receive money through a GSM Association (GSMA) Mobile Money for the Unbanked (MMU) service in the past 12 months; or receiving wages, government transfers, or payments for agricultural products through a mobile phone in the past 12 months. | World Bank | http://api.worldbank.org/countries/ | WP15163\_4\_9 | WP15163\_4.9 |
| Poverty/Income | Taxes on income, profits and capital gains (% of total taxes) | Taxes on income, profits, and capital gains are levied on the actual or presumptive net income of individuals, on the profits of corporations and enterprises, and on capital gains, whether realized or not, on land, securities, and other assets. Intragovernmental payments are eliminated in consolidation. | World Bank | http://api.worldbank.org/countries/ | GC\_TAX\_YPKG\_ZS | GC.TAX.YPKG.ZS |
| Access to finance/Infrastructure | Present value of external debt (% of exports of goods, services and primary income) | Present value of debt is the sum of short-term external debt plus the discounted sum of total debt service payments due on public, publicly guaranteed, and private nonguaranteed long-term external debt over the life of existing loans. The exports denominator is a three-year average. | World Bank | http://api.worldbank.org/countries/ | DT\_DOD\_PVLX\_EX\_ZS | DT.DOD.PVLX.EX.ZS |
| Poverty/Income | Gross domestic income (constant LCU) | Gross domestic income is derived as the sum of GDP and the terms of trade adjustment. Data are in constant local currency. | World Bank | http://api.worldbank.org/countries/ | NY\_GDY\_TOTL\_KN | NY.GDY.TOTL.KN |
| Access to markets | Merchandise exports to low- and middle-income economies in Latin America & the Caribbean (% of total merchandise exports) | Merchandise exports to low- and middle-income economies in Latin America and the Caribbean are the sum of merchandise exports from the reporting economy to low- and middle-income economies in the Latin America and the Caribbean region according to World Bank classification of economies. Data are as a percentage of total merchandise exports by the economy. Data are computed only if at least half of the economies in the partner country group had non-missing data. | World Bank | http://api.worldbank.org/countries/ | TX\_VAL\_MRCH\_R3\_ZS | TX.VAL.MRCH.R3.ZS |
| Access to Finance/Capital | Account at a financial institution, income, richest 60% (% ages 15+) | Account at a financial institution denotes the percentage of respondents who report having an account (by themselves or together with someone else) at a bank or another type of financial institution. | World Bank | http://api.worldbank.org/countries/ | WP\_time\_01\_9 | WP\_time\_01.9 |
| Access to Finance/Capital | Account at a financial institution, income, poorest 40% (% ages 15+) | Account at a financial institution denotes the percentage of respondents who report having an account (by themselves or together with someone else) at a bank or another type of financial institution. | World Bank | http://api.worldbank.org/countries/ | WP\_time\_01\_8 | WP\_time\_01.8 |
| Access to finance/Infrastructure | Net ODA received (% of imports of goods, services and primary income) | Net official development assistance (ODA) consists of disbursements of loans made on concessional terms (net of repayments of principal) and grants by official agencies of the members of the Development Assistance Committee (DAC), by multilateral institutions, and by non-DAC countries to promote economic development and welfare in countries and territories in the DAC list of ODA recipients. It includes loans with a grant element of at least 25 percent (calculated at a rate of discount of 10 percent). | World Bank | http://api.worldbank.org/countries/ | DT\_ODA\_ODAT\_MP\_ZS | DT.ODA.ODAT.MP.ZS |
| Access to markets | Merchandise exports to low- and middle-income economies in Sub-Saharan Africa (% of total merchandise exports) | Merchandise exports to low- and middle-income economies in Sub-Saharan Africa are the sum of merchandise exports from the reporting economy to low- and middle-income economies in the Sub-Saharan Africa region according to World Bank classification of economies. Data are as a percentage of total merchandise exports by the economy. Data are computed only if at least half of the economies in the partner country group had non-missing data. | World Bank | http://api.worldbank.org/countries/ | TX\_VAL\_MRCH\_R6\_ZS | TX.VAL.MRCH.R6.ZS |
| Access to markets | Merchandise imports from low- and middle-income economies in Latin America & the Caribbean (% of total merchandise imports) | Merchandise imports from low- and middle-income economies in Latin America and the Caribbean are the sum of merchandise imports by the reporting economy from low- and middle-income economies in the Latin America and the Caribbean region according to the World Bank classification of economies. Data are expressed as a percentage of total merchandise imports by the economy. Data are computed only if at least half of the economies in the partner country group had non-missing data. | World Bank | http://api.worldbank.org/countries/ | TM\_VAL\_MRCH\_R3\_ZS | TM.VAL.MRCH.R3.ZS |
| Poverty/Income | Taxes on income, profits and capital gains (% of revenue) | Taxes on income, profits, and capital gains are levied on the actual or presumptive net income of individuals, on the profits of corporations and enterprises, and on capital gains, whether realized or not, on land, securities, and other assets. Intragovernmental payments are eliminated in consolidation. | World Bank | http://api.worldbank.org/countries/ | GC\_TAX\_YPKG\_RV\_ZS | GC.TAX.YPKG.RV.ZS |
| Poverty/Income | Annualized average growth rate in per capita real survey mean consumption or income, bottom 40% of population (%) | The growth rate in the welfare aggregate of the bottom 40% is computed as the annualized average growth rate in per capita real consumption or income of the bottom 40% of the population in the income distribution in a country from household surveys over a roughly 5-year period. Mean per capita real consumption or income is measured at 2011 Purchasing Power Parity (PPP) using the PovcalNet (http://iresearch.worldbank.org/PovcalNet). For some countries means are not reported due to grouped and/or confidential data. The annualized growth rate is computed as (Mean in final year/Mean in initial year)^(1/(Final year - Initial year)) - 1. The reference year is the year in which the underlying household survey data was collected. In cases for which the data collection period bridged two calendar years, the first year in which data were collected is reported. The initial year refers to the nearest survey collected 5 years before the most recent survey available, only surveys collected between 3 and 7 years before the most recent survey are considered. The final year refers to the most recent survey available between 2011 and 2015.  Growth rates for Iraq are based on survey means of 2005 PPP$. The coverage and quality of the 2011 PPP price data for Iraq and most other North African and Middle Eastern countries were hindered by the exceptional period of instability they faced at the time of the 2011 exercise of the International Comparison Program. See PovcalNet for detailed explanations. | World Bank | http://api.worldbank.org/countries/ | SI\_SPR\_PC40\_ZG | SI.SPR.PC40.ZG |
| Poverty/Income | Adjusted net national income (constant 2010 US$) | Adjusted net national income is GNI minus consumption of fixed capital and natural resources depletion. | World Bank | http://api.worldbank.org/countries/ | NY\_ADJ\_NNTY\_KD | NY.ADJ.NNTY.KD |
| Access to markets | Merchandise imports from low- and middle-income economies in Sub-Saharan Africa (% of total merchandise imports) | Merchandise imports from low- and middle-income economies in Sub-Saharan Africa are the sum of merchandise imports by the reporting economy from low- and middle-income economies in the Sub-Saharan Africa region according to the World Bank classification of economies. Data are expressed as a percentage of total merchandise imports by the economy. Data are computed only if at least half of the economies in the partner country group had non-missing data. | World Bank | http://api.worldbank.org/countries/ | TM\_VAL\_MRCH\_R6\_ZS | TM.VAL.MRCH.R6.ZS |
| Access to markets | Merchandise exports to high-income economies (% of total merchandise exports) | Merchandise exports to high-income economies are the sum of merchandise exports from the reporting economy to high-income economies according to the World Bank classification of economies. Data are expressed as a percentage of total merchandise exports by the economy. Data are computed only if at least half of the economies in the partner country group had non-missing data. | World Bank | http://api.worldbank.org/countries/ | TX\_VAL\_MRCH\_HI\_ZS | TX.VAL.MRCH.HI.ZS |
| Poverty/Income | Survey mean consumption or income per capita, total population (2011 PPP $ per day) | Mean consumption or income per capita (2011 PPP $ per day) used in calculating the growth rate in the welfare aggregate of total population. | World Bank | http://api.worldbank.org/countries/ | SI\_SPR\_PCAP | SI.SPR.PCAP |
| Poverty/Income | Survey mean consumption or income per capita, bottom 40% of population (2011 PPP $ per day) | Mean consumption or income per capita (2011 PPP $ per day) used in calculating the growth rate in the welfare aggregate of the bottom 40% of the population in the income distribution in a country. | World Bank | http://api.worldbank.org/countries/ | SI\_SPR\_PC40 | SI.SPR.PC40 |
| Energy Prices | World Crude oil, WTI Prices, Annual Average (Nominal) | World Bank Pink Sheets | World Bank | http://www.worldbank.org/en/research/commodity-markets | CMOHistoricalDataAnnual\_sh1 | CRUDE\_WTI |
| Access to markets | Merchandise imports from high-income economies (% of total merchandise imports) | Merchandise imports from high-income economies are the sum of merchandise imports by the reporting economy from high-income economies according to the World Bank classification of economies. Data are expressed as a percentage of total merchandise imports by the economy. Data are computed only if at least half of the economies in the partner country group had non-missing data. | World Bank | http://api.worldbank.org/countries/ | TM\_VAL\_MRCH\_HI\_ZS | TM.VAL.MRCH.HI.ZS |
| Poverty/Income | Income share held by highest 10% | Percentage share of income or consumption is the share that accrues to subgroups of population indicated by deciles or quintiles. | World Bank | http://api.worldbank.org/countries/ | SI\_DST\_10TH\_10 | SI.DST.10TH.10 |
| Poverty/Income | Income share held by highest 20% | Percentage share of income or consumption is the share that accrues to subgroups of population indicated by deciles or quintiles. Percentage shares by quintile may not sum to 100 because of rounding. | World Bank | http://api.worldbank.org/countries/ | SI\_DST\_05TH\_20 | SI.DST.05TH.20 |
| Access to finance/Infrastructure | Short-term debt (% of exports of goods, services and primary income) | Short-term external debt is defined as debt that has an original maturity of one year or less. Available data permit no distinction between public and private nonguaranteed short-term debt. | World Bank | http://api.worldbank.org/countries/ | DT\_DOD\_DSTC\_XP\_ZS | DT.DOD.DSTC.XP.ZS |
| Energy Prices | World Coal, South Afican Prices, Annual Average (Nominal) | World Bank Pink Sheets | World Bank | http://www.worldbank.org/en/research/commodity-markets | CMOHistoricalDataAnnual\_sh1 | COAL\_SAFRICA |
| Access to finance/Infrastructure | External debt stocks (% of exports of goods, services and primary income) | Total external debt stocks to exports of goods, services and income. | World Bank | http://api.worldbank.org/countries/ | DT\_DOD\_DECT\_EX\_ZS | DT.DOD.DECT.EX.ZS |
| Energy Prices | World Crude oil, Brent Prices, Annual Average (Nominal) | World Bank Pink Sheets | World Bank | http://www.worldbank.org/en/research/commodity-markets | CMOHistoricalDataAnnual\_sh1 | CRUDE\_BRENT |
| Access to finance/Infrastructure | Total debt service (% of exports of goods, services and primary income) | Total debt service is the sum of principal repayments and interest actually paid in currency, goods, or services on long-term debt, interest paid on short-term debt, and repayments (repurchases and charges) to the IMF. | World Bank | http://api.worldbank.org/countries/ | DT\_TDS\_DECT\_EX\_ZS | DT.TDS.DECT.EX.ZS |
| Energy Prices | World Coal, Australian Prices, Annual Average (Nominal) | World Bank Pink Sheets | World Bank | http://www.worldbank.org/en/research/commodity-markets | CMOHistoricalDataAnnual\_sh1 | COAL\_AUS |
| Access to finance/Infrastructure | Public and publicly guaranteed debt service (% of exports of goods, services and primary income) | Public and publicly guaranteed debt service is the sum of principal repayments and interest actually paid in currency, goods, or services on long-term obligations of public debtors and long-term private obligations guaranteed by a public entity. Exports refer to exports of goods, services, and income. | World Bank | http://api.worldbank.org/countries/ | DT\_TDS\_DPPG\_XP\_ZS | DT.TDS.DPPG.XP.ZS |
| Access to finance/Infrastructure | Interest payments on external debt (% of exports of goods, services and primary income) | Total interest payments to exports of goods and services. | World Bank | http://api.worldbank.org/countries/ | DT\_INT\_DECT\_EX\_ZS | DT.INT.DECT.EX.ZS |
| Access to finance/Infrastructure | Debt service (PPG and IMF only, % of exports of goods, services and primary income) | Debt service is the sum of principle repayments and interest actually paid in currency, goods, or services. This series differs from the standard debt to exports series. It covers only long-term public and publicly guaranteed debt and repayments (repurchases and charges) to the IMF. Data for Heavily Indebted Poor Countries (HIPC) are from HIPC Initiative's Status of Implementation Report. | World Bank | http://api.worldbank.org/countries/ | DT\_TDS\_DPPF\_XP\_ZS | DT.TDS.DPPF.XP.ZS |
| Energy Prices | World Liquefied natural gas, Japan Prices, Annual Average (Nominal) | World Bank Pink Sheets | World Bank | http://www.worldbank.org/en/research/commodity-markets | CMOHistoricalDataAnnual\_sh1 | NGAS\_JP |
| Education |  | ASTI’s national agricultural research expenditure data is categorized as salary-related expenses, operating and program costs, and capital investments by government, nonprofit, and higher education agencies. Data on spending by private entities are excluded, due to lack of availability | IFPRI | http://www.asti.cgiar.org/data | spendingOnag\_IFPRI\_com | spendingOnag\_IFPRI\_com |
| Energy Prices | Sankey Energy Blalance by country | Final Consumption- Agriculture and Forestry | IEA | https://www.iea.org/Sankey/ | Sankey\_Diagram\_IEA20Apr17 | IEA\_Oil, IEA\_Electricity, IEA\_OilProducts,IEA\_Biofuelsandwaste, IEA\_Naturalgas,IEA\_Coal,IEA\_Heat,IEA\_Geothermal |
| Access to finance/Infrastructure | Credit to Agriculture (broad definition which includes Forestry and Fishing) | Total Credit | FAO -ESS | FAOSTAT | CredittoAg | FAOSTAT |
| Access to finance/Infrastructure | *the Logistic performance Index* | *- Efficiency of clearance process (i.e. speed, simplicity and predictability of formalities) by border control agencies - Quality of trade and transport related infrastructure (e.g. ports, railroads, roads, information technology) - Ease of arranging competitively priced shipments - Competence and Quality of logistics services (e.g., transport operators, customs brokers) - Ability to track and trace consignments - Timeliness of shipments in reaching destination within the scheduled or expected delivery time* | *World Bank* | *https://lpi.worldbank.org/* | *LPIDATA* | *https://lpi.worldbank.org/* |
| Infrastructure | Trade for Iron and Steel | WTO Time series for Merchandise Trafe by Commodity for Iron and Steel for Imports into the country from the world | WTO | <http://stat.wto.org/StatisticalProgram/WSDBStatProgramSeries.aspx?Language=E> | IronSteelIMport7055475 | <http://stat.wto.org/StatisticalProgram/WSDBStatProgramSeries.aspx?Language=E> |
| Infrastructure | *Crop Calendar* | *Covers crops and harvest months by country* | *FAO* | [*ht****tp://www.fao.org/agriculture/seed/cropcalendar/welcome.do***](http://www.fao.org/agriculture/seed/cropcalendar/welcome.do) | *Crop Calendar* | [*http://www.fao.org/agriculture/seed/cropcalendar/welcome.do*](http://www.fao.org/agriculture/seed/cropcalendar/welcome.do) |
| Explanatory | Loss Meta Data | Loss Factors from studies, FBS data collection etc. | FAO |  | Loss Meta Data |  |
| Explanatory | *CPC* | *CPC codes to create the set of data that needs to be included in the loss predictions* | *FAOSWS* |  |  |  |
| Explanatory | Int\_$\_Prices\_2005 | Reference Prices for the index for all commodities for 2005 | FAOSTAT | http://sdwebx.worldbank.org/climateportal/index.cfm?page=downscaled\_data\_download&menu=historical | Int\_$\_Prices\_2005 |  |
| Explanatory | *Rain* | *This gridded historical dataset is derived from observational data, and provides quality controlled temperature and rainfall values from thousands of weather stations worldwide, as well as derivative products including monthly climatologies and long term historical climatologies. The dataset is produced by the Climatic Research Unit (CRU) of University of East Anglia (UEA), and reformatted by International Water Management Institute (IWMI). CRU-(Gridded Product). CRU data can be mapped to show the baseline climate and seasonality by month, for specific years, and for rainfall and temperature.* | *World Bank/UN/IPCC/* | *http://sdwebx.worldbank.org/climateportal/index.cfm?page=downscaled\_data\_download&menu=historical* | *Rain\_climate* |  |
| Explanatory | Temperature | This gridded historical dataset is derived from observational data, and provides quality controlled temperature and rainfall values from thousands of weather stations worldwide, as well as derivative products including monthly climatologies and long term historical climatologies. The dataset is produced by the Climatic Research Unit (CRU) of University of East Anglia (UEA), and reformatted by International Water Management Institute (IWMI). CRU-(Gridded Product). CRU data can be mapped to show the baseline climate and seasonality by month, for specific years, and for rainfall and temperature. | World Bank/UN/IPCC/ | http://www.fao.org/faostat/en/#data/QV | Temp\_climate |  |
| Explanatory | *Top10byNetProdValue\_24Apr17\_CB* | *This is the top ten economically produced commodities by countries* | *FAOSTAT* | *http://api.worldbank.org/indicators* |  |  |
| Explanatory | WB\_indicators\_Metadata | This is the listing of the World Bank Country Indicators that are available through the API. The API uses this list to download the necessary data | World Bank | https://datahelpdesk.worldbank.org/knowledgebase/articles/898590-api-country-queries |  |  |
| Explanatory | *WB\_UN\_CoutryCodes* | *This is the list of the WB country codes that are specific for the mapping between the UN and the World Bank. This is redundant to the mapping but a check to make sure to have all data needed* | *World Bank* | *http://www.fao.org/faostat/en/#data/QV* |  |  |
| Explanatory | Top10\_GrossProductionValue.csv | The data set includes data on gross and net production values, in constant international US$, and gross production values, in constant and current US$ and Local Currency Units, for various food and agriculture commodities and aggregates thereof, expressed in both total value and value per capita. | FAO | http://www.fao.org/faostat/en/#data/FBS | Top10\_GrossProductionValue |  |
| Index Related | *Top10\_Foodsupplykcal.csv* | *Food Balance Sheet presents a comprehensive picture of the pattern of a country's food supply during a specified reference period. The food balance sheet shows for each food item - i.e. each primary commodity and a number of processed commodities potentially available for human consumption - the sources of supply and its utilization. The total quantity of foodstuffs produced in a country added to the total quantity imported and adjusted to any change in stocks that may have occurred since the beginning of the reference period gives the supply available during that period. On the utilization side a distinction is made between the quantities exported, fed to livestock, used for seed, put to manufacture for food use and non-food uses, losses during storage and transportation, and food supplies available for human consumption. The per caput supply of each such food item available for human consumption is then obtained by dividing the respective quantity by the related data on the population actually partaking of it. Data on per caput food supplies are expressed in terms of quantity and - by applying appropriate food composition factors for all primary and processed products - also in terms of caloric value and protein and fat content.* | *FAO* |  | *Top10\_Foodsupplykcal* |  |