Metadata of SDG indicator 2.c.1
Indicator of (food) price anomalies

Please note that this is a temporary file. It will be replaced by a final version that will be published on the UNSD website.

1. Institutional Information

1.1. Agency responsible for global compilation of the indicator or time series specified below:
UN FAO

1.2. Contact Person: *
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1.4. Website: *
http://www.fao.org/giews/food-prices/home/en/

2. Goals and Targets addressed

2.1. : Indicator name and number *
2.c.1: Indicator of food price anomalies (IFPA)

2.2. : Target name and number: *
Target 2.c: Adopt measures to ensure the proper functioning of commodity markets and their derivatives and facilitate timely access of market information, including on food reserves, in order to help limit extreme food price volatility

2.3. : Times series (if applicable):

2.4. : Linkages with any other Goals and Targets:
Any SDG that aims to increase availability and access to key food products could benefit indirectly. A reduction of food waste (SDG12), for example, could result in lower and less volatile prices.

3. Definition and method of computation

3.1. : Definition:
The indicator of food price anomalies (IFPA) identifies markets prices that are abnormally high. The IFPA relies on a weighted compound growth rate that accounts for both within year and across year price growth. The indicator directly evaluates growth in prices over a particular month over many years, taking into account seasonality in agricultural markets and inflation, allowing to answer the question of whether or

not a change in price is abnormal for any particular period.

3.2. : Concepts

The indicator of price anomalies (IFPA) relies on two compound growth rates (CGR's), a quarterly compound growth rate (CQGR) and an annual compound growth rate (CAGR). A CGR is a geometric mean[1] that assumes that a random variable grows at a steady rate, compounded over a specific period of time. Because it assumes a steady rate of growth the CGR smoothes the effect of volatility of price changes. The CGR is the growth in any random variable from time period t_A to t_B, raised to the power of one over the length of the period of time being considered

$$CXGR_t = \left(\frac{P_{t_B}}{P_{t_A}}\right)^{\frac{1}{t_B - t_A}} - 1 \tag{1}$$

Where:

$CXGR_t$ is the quarterly or annual compound growth rate in month t
P_{t_A} is the price at the beginning of the period
P_{t_B} is the price at the end of the period,
$t_B - t_A$ is the time in months between periods A and B.

The quarterly ($QIFPA_{yt}$) and annual ($AIFPA_{yt}$) indicators of food price anomalies are then defined as:

$$\left(\frac{CXGR_{yt} - \overline{W\_CXGR}_t}{\hat{\sigma}_{W\_CXGR_t}}\right) = XIFPA_{yt} \tag{2}$$

Where:

$CXGR_{yt}$ is either the quarterly or annual compound growth rate in month *t* for year *y*

$\overline{W\_CXGR}_t$ is the weighted average of either the quarterly or annual compound growth rate for month *t* across years *y*

$\hat{\sigma}_{W\_CXGR_t}$ is the weighted standard deviation of either the quarterly or annual compound growth rate for month *t* over years *y*,

$XIFPA_{yt}$ is either the quarterly or annual indicator of a price anomaly.

3.3. : Method of computation:

Mathematically the IFPA for a particular year y in month t is calculated as the weighted sum of the quarterly indicator of food price anomalies ($QIFPA_{yt}$), and the annual indicator of food price anomalies($AIFPA_{yt}$) as stated in equation 1.

$$IFPA_{yt} = \gamma QIFPA_{yt} + (1 - \gamma)AIFPA_{yt} \tag{3}$$

Where:
$IFPA_{yt}$ is the indicator of food price anomalies in year y and month t
$QIFPA_{yt}$ is the quarterly indicator of food price anomalies in year y and month t
$AIFPA_{yt}$ is the annual indicator of food price anomalies in year y and month t
γ is a weight with a value of 0.4

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[1] A geometric mean is a type of average, which indicates the typical value of a set of numbers by using the product of their values as opposed to the arithmetic mean which relies on their sum (Wikipedia, 2017)

The weight γ establishes the relative importance of quarterly ($QIFPA_t$) anomalies to the year-on-year price variations ($AIFPA_{yt}$). The weight γ $(1 - \gamma)$--SDG indicator 2.c.1 is then calculated as the arithmetic mean over t months of the $IFPA_{yt}$ $IFPA_y = \frac{1}{t}\sum_{i=1}^{t} IFPA_{yt}$

$$(4)$$

Where:
$IFPA_y$ is the annual indicator of food price anomalies in year y
$IFPA_{yt}$ is the indicator of food price anomalies in year y and month t
t is the number of months in a year

3.4. : Rationale and interpretation

The thresholds for the $IFPA_y$ are expressed as the normalized difference of the compound growth rate of prices from their historical mean for the predefined period of time. And three ranges are established: 1) a less than half a standard deviation difference from the mean is considered normal; 2) a difference that is half but less than one standard deviation is considered moderately high; 3) a difference from the historical mean that is at least one standard deviation greater than the mean is considered abnormally high.

$$0.5 \leq IFPA_y < 1 \quad Moderately\ High$$
$$IFPA_y \geq 1 \quad Abnormally\ High$$
$$-0.5 \leq IFPA_y < 0.5 \quad Normal$$

We use one standard deviation as the relevant threshold since we want to minimize the probability of missing a significant market event. Events that deviate by more than one standard deviation from their historical distribution have a low probability of occurring and thus are easier to identify as abnormally high prices.

4. Disaggregation

4.1. : Disaggregation *

The $IFPA_y$ and it's subcomponents

5. Sources and data collection

5.1. : Sources and data collection

The IFPA will be monitored at a national and global level. FAO will rely on official domestic price data that it compiles in its' Food Price Monitoring and Analysis (FPMA) tool to calculate and monitor the indicator at the national level. Five cereal products will be monitored: maize & maize products, wheat & wheat flour, rice, sorghum and millet. While diets across the world have become more diversified with increasing incomes, cereals still account for 45 percent of a person's daily caloric intake, making this commodity group the most important in terms of its contribution to caloric intake, particularly for low income populations (FAOSTAT, 2017). For the global level, FAO will monitor and apply the IFPA to countries' officially reported food price indices as reported in FAOSTAT, which facilitates cross country comparisons as it uses a national level food basket covering all the most important commodities consumed. While the basket differs from country to country, this approach is more reflective of national and global trends as countries have predefined the commodities that have the most impact on local consumers. This approach also facilitates the implementation of the indicator as countries will not be asked to create a new index or modify existing methodologies.

For the Food CPI,

The FAOSTAT monthly CPI & Food CPI database was based on the ILO CPI data untill December 2014. In 2014, IMF-ILO-FAO agreed to transfer global CPI data compilation from ILO to IMF. Upon agreement, CPIs for all items and its sub components originates from the International Monetary Fund (IMF), and the UN Statistics Division(UNSD) for countries not covered by the IMF. However, due to a limited time coverage from IMF and UNSD for a number of countries, the Organisation for Economic Co-operation and Development (OECD), the European statistics (EUROSTAT), the Latin America and the Caribbean statistics (CEPALSTAT), Central Bank of Western African States (BCEAO), Eastern Caribbean Central Bank (ECCB) and national statistical office website data are used for missing historical data from IMF and UNSD food CPI. The FAO CPI dataset for all items(or general CPI) and the Food CPI, consists of a complete and consistent set of time series from January 2000 onwards. It further contains regional and global food CPIs compiled by FAO using population weights to aggregate across countries.

Comments and limitations

5.2. : Comments and limitations

It is appropriate to caution the reader that the indicator is just a guide to understanding market dynamics. As such, one cannot rely on it as the sole element to determine whether a food price in a particular market at a given time is abnormally high or low due to the direct effects of local policies. Results must be weighed with other available information on market fundamentals, macroeconomic context and external shocks.

6. Current data availability/Indicator Tier

Tier I: Indicator conceptually clear, established methodology and standards are available and data is regularly produced by countries.

Tier II: Indicator conceptually clear, established methodology and standards are available and data are not regularly produced by countries.

Tier III: Indicator for which established methodology and standards still need to be developed.

6.1. Please mark the box indicating the Tier of this indicator

☐ Tier I
■ Tier II

6.2. : Please indicate for how many countries the data for this indicator are already currently available on a regular basis.

If you can provide regional breakdowns of data availability in this section, that would be preferred.

Breakdown of the number of countries covered by region is as follows(Food Price monitored, Food CPI):

World		**191**
Africa	**37**	**49**
Northern Africa	**2**	**5**
Sub-Saharan Africa	**35**	
Eastern Africa	**10**	**17**
Middle Africa		**6**

Southern Africa	**10**	**5**
Western Africa	**15**	**16**
Americas	**19**	**41**
Latin America and the Caribbean	**18**	**30**
Caribbean	**2**	**19**
Latin America	**15**	**11**
Central America		**8**
Northern America	**1**	**3**
Asia	**20**	**44**
Central Asia		**3**
Eastern Asia		**5**
Southern Asia		**9**
South-Eastern Asia		**9**
Western Asia		**18**
Europe	**5**	**43**
Eastern Europe	**4**	**10**
Northern Europe		**11**
Southern Europe	**1**	**15**
Western Europe		**7**
Oceania		**14**
Australia and New Zealand		**2**
Melanesia		**5**
Micronesia		**3**
Polynesia		**4**

7. Responsible entity

7.1. : Data provider

See attached excel file

7.2. : Data compiler
UN FAO

8. Data collection and data release calendar

8.1. Dates when source collection is next planned.

For the national level analysis data is compiled monthly in the FPMA tool. For the global level, FAO compiles the data in FAOSTAT quarter

8.2. Expected dates of release of new data for this indicator, including the year (or, ideally, the quarter/month when the next data point associated with the indicator will become

available).

The next release for data on this indicator is projected for January 2018

9. Treatment of missing values

9.1. Treatment of missing values

For the purposes of the indicator missing values are only imputed, for the national level data compiled in the FPMA tool, when 3 or less months of data are missing. If more than 3 consecutive months of data are missing the series may be dropped from monitoring.The formula used for this imptutation is as follows

$$Price_{t+1} = Price_{t-1} \times (Price_{t-1}/Price_{t-12})^{(1/12)}$$

Where:

$Price_{t+1}$ is the one period ahead imputed price
$Price_{t-1}$ is the price from the previous period
$Price_{t-12}$ is the price for the same period a year earlie
For the food price index in FAOSTAT used for the global analysis, the data is republished data harvested from other international organizations without imputation of missing values.

9.2. Global/International context only: NOT APPLICABLE

Description of how missing values for individual countries or areas are imputed or otherwise estimated by international agencies to derive regional or global aggregates of the indicator.

10. Sources of differences between global and national figures

10.1. Sources of differences between global and national figures

For the national level analysis the data compiled in the FPMA tool is mostly compiled from official national sources. When a country does not report on local prices for commodities often times information from the private sector is utilized.
For the food price indices compiled in FAOSTAT will be released on monthly base from September 2017 after validation of data including exploring data sources for missing countries.

Global estimates and obtaining data for global monitoring

10.2. Global and regional estimates

Results are organized on a regional basis but are not aggregated as such. This is because the commodities and food baskets monitored across countries are not sufficiently homogenous to aggregate into one price index. Instead during the reporting if a majority of countries within a region presents abnormally high prices, either for a particular commodity or the food price index, this region is quantified as a region suffering from abnormally high levels of price volatility. Similarly at the global level the number of regions presenting high levels of price volatility are quantified.

10.3. Obtaining internationally comparable dat1a for global monitoring : NOT APPLICABLE

Description of the mechanism for collecting data from countries including: (i) the official counterpart(s) at the country level; (ii) a description of any validation and consultation process;

(iii) description of any adjustments with respect to use of standard classifications and harmonization of breakdowns for age group and other dimensions, or adjustments made for compliance with specific international or national definitions.

11. References

11.1. References

http://www.fao.org/giews/food-prices/research/en/