SDG Indicator 2.c.1 – Food price anomalies

Lesson: How to analyse and interpret prices using the Food Price Monitoring and Analysis Tool

Text-only version

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SUSTAINABLE DEVELOPMENT GOALS

working for Zero Hunger

In this lesson

How to analyse and interpret prices using the Food Price Monitoring and Analysis Tool

This lesson provides guidance on how to use the Food Price Monitoring and Analysis (FPMA) Tool developed by the Global Information and Early Warning System on Food and Agriculture (GIEWS) to visualize prices of basic foods at national and international level, and to analyse these data through charts and statistics. It explains how the online tool can be used to reach a better understanding of price trends at national or international level.

Learning objectives

At the end of this lesson, you will be able to:

- understand the main features of the Food Price Monitoring and Analysis (FPMA) Tool and how to use them;
- describe how data can be analysed and interpreted.

Introduction

The **FPMA Tool** (**www.fao.org/giews/food-prices/tool/public/#/home**) is an online application for the visualization and analysis of a large collection of price data.

Global version - The Global Information and Early Warning System (GIEWS) in FAO's Trade and Markets Division maintains a global version of the tool with a large collection of selected up-to-date domestic food price data, as well as series of international prices.

National version - The tool can also be installed by countries for use with national price data collections.

For example, excessively dry conditions have been reported in some countries, causing a decline in foodcrop output. You need to analyse the impact of the drought on food prices in the past month and identify the areas most affected. To carry out the analysis, we need to review prices of wheat in the country's main market for the relevant period of the year, and compare these with the same period in previous years.

The GIEWS FPMA Tool

The data in the **GIEWS FPMA Tool www.fao.org/giews/food-prices/tool** is organized into two main domains: *Domestic prices* and *International Prices*

> 📑 **See annex 1: "How to search for data in the FPMA tool"**
>
> **See annex 2: "Annex: how to visualize and analyze data in the FPMA tool"**

Tips and examples

**Map View and Price Series selection**

If you select the **Map View**, when hovering the mouse over items in the **Legend** panel, the corresponding market marker on the Map View will change colour to highlight its location. Here, the markers of Panama City and Santo Domingo are coloured green and correspond to the price series displayed in the chart.

Displaying Market Season and Price Trend/Volatility

When a single series is selected, you can choose to view it as Market Season or to view a chart displaying price trend and volatility.
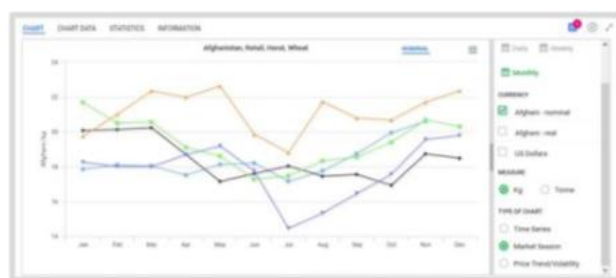
M**arket Season**

This is a year-on-year comparison dividing the time series into 12-month periods which correspond to the period of commercialization of the crop after harvest.

Price Trend/Volatility

This is the chart produced when you select Price Volatility/Trend in the Options panel.

Example: Real and nominal prices - South Sudan and Nigeria

Nominal prices are the actual prices that you observe in the market.

**Real prices** are prices that have been adjusted for inflation.

The real price is the price of a good relative to all goods in the basket.

For example: A kilogram of rice in 2017 could be exchanged for ½ a kilogram of wheat, but in 2010 (the base year) one kilogram of rice was worth 2 kg of wheat.

A food security analyst generally needs to report nominal prices, because these are the prices that people have to pay at the market. But you should analyse both nominal and real prices. This will help to understand drivers of price trends, and if, for example, it's non-food inflation that is driving prices up or down.

Generally, in developing countries, food is the biggest component of the consumer basket when creating Consumer Price Indexes.
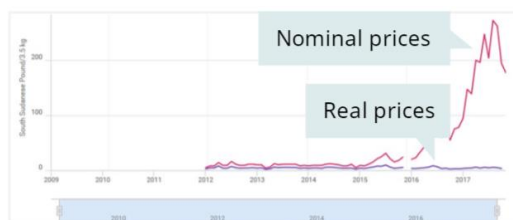
For example: In South Sudan, foods accounts for 71.39% of the national CPI. As a result, when deflating food prices, real prices appear to be flat compared with nominal values, implying that the main driver of the inflation is food.

For importing countries, a depreciation of the national currency makes the cost of food imports, in local currency terms, more expensive. This will push domestic food price upwards. A weak currency in an exporter will also affect food prices, due to increased import demand as goods are relatively less expensive.

A decline in oil revenues and the Central Bank's decision in June 2016 to allow the exchange rate to float led to a sharp depreciation of the local currency. The weaker local currency has supported

regional import demand for Nigerian cereals, which has resulted in increased exports and pushed domestic food prices upwards. Moreover, the currency weakness has increased fuel and transport costs, and led to costlier and reduced imports from neighbouring countries.

As a result…

Domestic prices of maize are more expensive in local currency and higher than in USD, compared with historical trends.

International price domain

See annex 3: "International prices dataset and IPA feature"

Analytical features of the FPMA Tool

Now that we have reviewed the main features of the FPMA Tool, let's look at how to apply these features to our analyses. The tool allows users to make comparisons: across market, across country and across commodity series. Any of these comparisons can combine series from the domestic and international datasets.

Cross-market analysis

For **cross-market analysis**, let's focus on wheat prices in the main Afghanistan markets.

To facilitate your search, you can use the filter boxes in the tool, and:

1. select **Wheat** in the **Commodity** filter box and **Retail** in the **Price Type** box, then

2. select all the four markets available.

This will offer an analysis of market integration in the country.

The chart shows that, although price trends across markets within Afghanistan are relatively homogenous, **large price differentials persist** among different areas of the country.
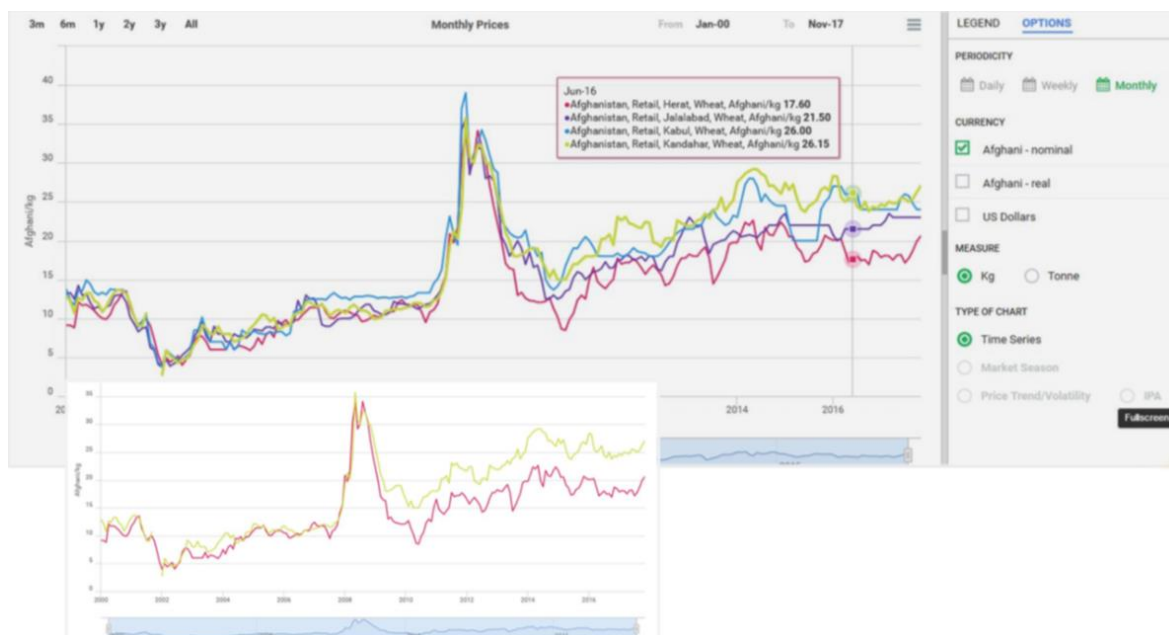
Take a look at this detail of the price series for Herat and Kandahar. Wheat grain tends to be **almost 30% more expensive** in Kandahar - a deficit area in the southeast of the country - than in Herat, which is a major producing area.

In an economy with functioning marketing and transportation links, **price differentials** between different areas **result in the movement of commodities** from one area to another (producing area to deficit area) equating the price. If the difference in prices between locations is large enough to cover transport, handling and all other costs, there is an incentive to move commodities from surplus areas to areas of deficit, leading to a reduction in the price difference.

However, in Afghanistan, internal transport barriers and high marketing costs hamper marketing activities and affect different price levels across the country.

By contrast, take a look at the following chart. It shows that **price differentials of wheat flour are less pronounced** across Afghanistan markets.

This is explained by the fact that, although Afghanistan produces cereals, it is a cereal deficit country and covers its consumption needs through imports, mainly in the form of wheat flour from Pakistan and Kazakhstan, as milling capacity in the country remains limited. The East and Southeast of the country are predominantly wheat deficit regions, and large quantities of wheat flour flow from Pakistan to supply these areas.

Cross-commodity analysis

Cross-commodity comparisons allow users to analyse price differentials across commodities in the same market and the effects of substitution. For our analysis, let's focus on all wheat and wheat products for the Kabul market.

As shown, prices of wheat flour are in general higher than those of wheat grain, due to production costs.

Cross-commodity analysis is also useful to compare the prices of a good with those of substitute and complementary commodities. For example, in Sahelian countries, sorghum and millet are strategic crops for food security, and they are substitutes. The chart shows that prices of the two commodities **tend to follow similar patterns**.

If the price of one increases, then demand for the substitute is likely to rise. Rice tends to compete as a substitute for sorghum/millet in urban areas.

Cross-country analysis

Finally, for **cross-country comparisons**, we can include two or more different countries, or an export price, in the selection. For example, in the FPMA tool, you can:

1. select **Maize (white)** in the **Commodity** filter box and **Wholesale** in the **Price Type** box, then
2. select the markets of Guatemala City (Guatemala), Tegucicalpa (Honduras) and Managua (oriental) (Nicaragua).

For comparison purposes, the tool will automatically convert selected price series to USD.

Maize is the main staple across the three countries and its price series follow similar seasonal patterns.
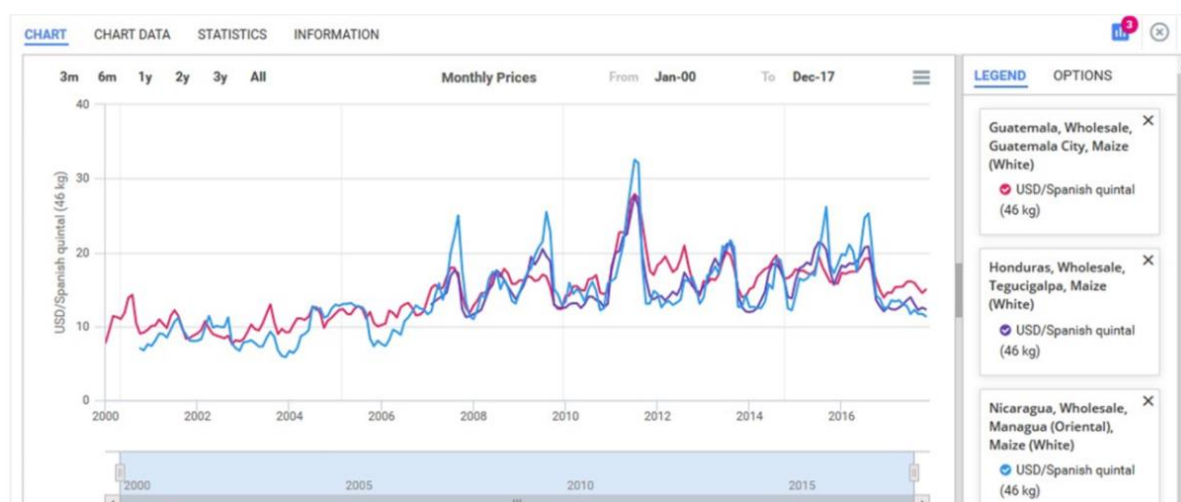
When doing an intra-country analysis it is crucial to **bear in mind exchange rate fluctuations** in countries, which may lead to misleading analysis at country level. Exchange rates in these countries are relatively stable. In such exercises it is also important to take note of the type of price, i.e. wholesale and/or retail.

The IFPA feature

In nationally deployed versions of the FPMA Tool, countries have the option to activate a module to display the **Indicator of Food Price Anomalies (IFPA)** if they choose to. This option is not available on the global version of the tool in FAO GIEWs website. In the Options panel of national versions, you will find the IFPA button to view a chart with both the values of the indicator and prices in real terms.
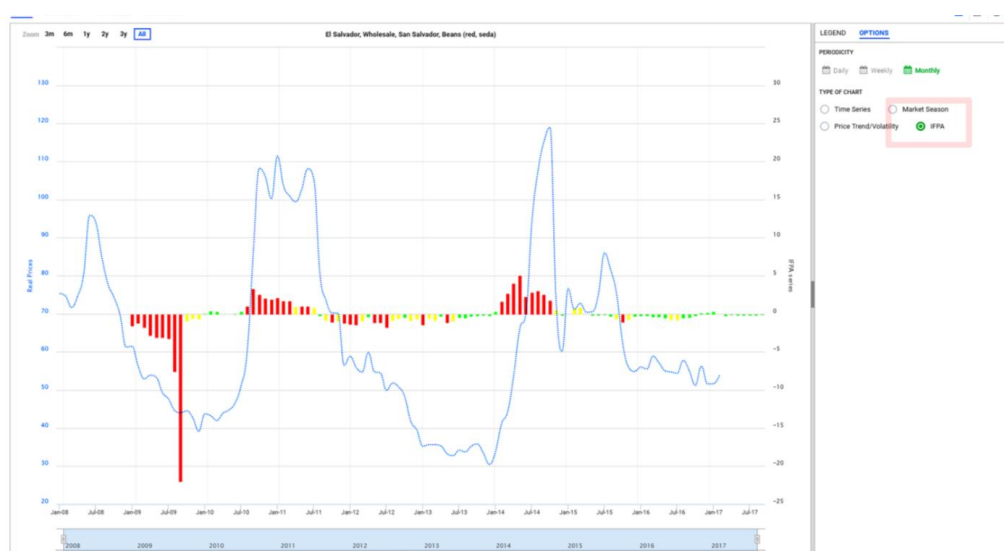
Example: The IFPA feature

This is the chart of the trend of white maize prices in San Salvador, El Salvador from 2006 to 2016. From 2014 to 2016 **prices were at a relatively high level**. The three years were impacted by the El Niño phenomena, particularly the years 2014 and 2015, which caused prolonged dry periods that resulted in a significant reduction in the maize crop. Price levels and volatility began to rapidly decline from late 2015, **due to Government policy**. During this period, the Government of El Salvador relaxed its import regulations so as to make up for domestic supply shortfalls.

It also supported farmers with inputs and credits to recover maize output, and began to disseminate market information, as well as monitoring vendors to prevent excess speculation.
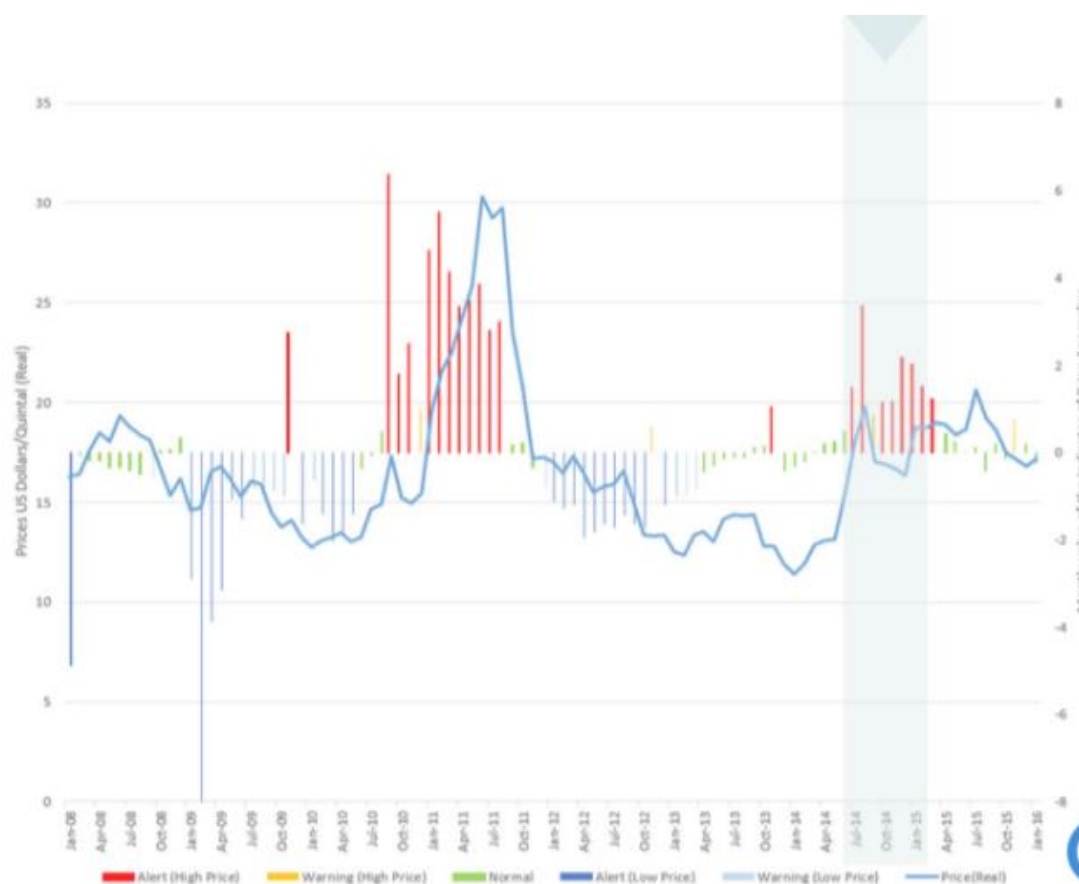
The **IFPA** graph presents both the values of the indicator and prices in real terms.

As shown in the chart, for a period of nine consecutive months, July 2014 to March 2015, prices were abnormally high. Prices did not begin to normalize until the first agricultural season of 2015.

> **SDG Indicator 2.c.1** is a 12 month average of the IFPA. The FPMA Tool allows users to disaggregate the IFPA into its monthly values. With this more detailed information, countries can better understand the shocks that impacted the annual indicator, as well as have timely warning on market conditions that may affect access.
>
> For more details about the example explained in the video, you can consult Lesson 3.

Example Data and charts

There are the same price series (wholesale prices of wheat in Buenos Aires, Argentina) represented in three different charts.

1. **Price fluctuations from the trend observed in the last year.**
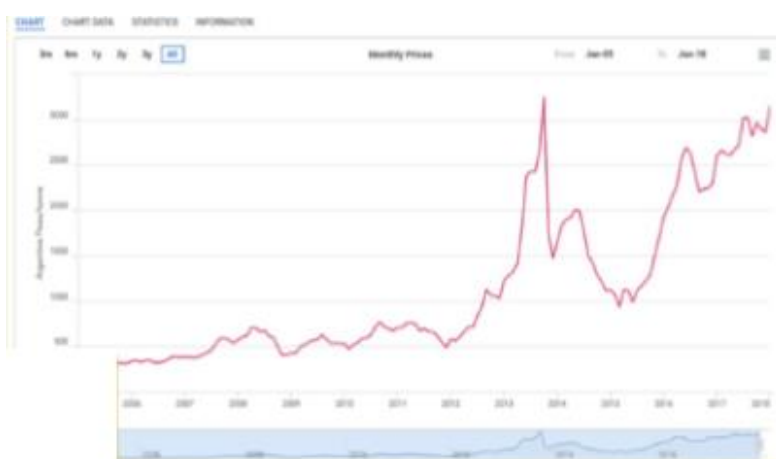
2. **The trend of price series for the whole period.**
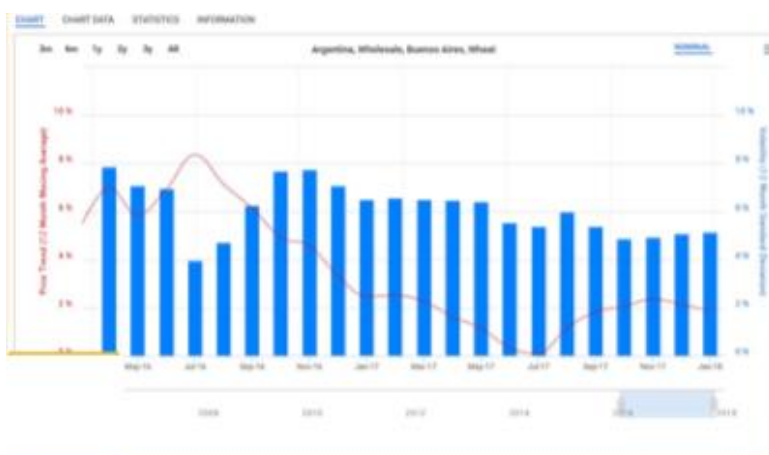
3. **A year-on-year comparison of the same time series all through 12-month periods.**
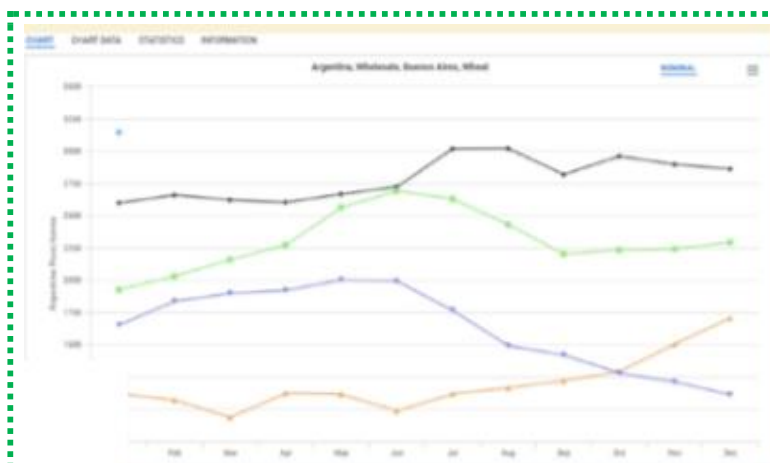
The first chart shows the time series for the whole period and the second chart displays price fluctuations from the trend in the last year. The third graph, **Market Season**, is a year-on-year comparison dividing the time series into 12-month periods.

Summary

The Food and Price Monitoring and Analysis (FPMA) Tool is an online application for the visualization and analysis of price data. An international version is available online. The Tool can also be installed at country level for use with national price data collections.

Research can be conducted in the **Map View** and the **Grid View** by using the filter boxes. Filters can be multiple and applied to all columns in any order.

Features available in the **Options** panel allow users to view price series in real and nominal terms, or in USD, and to select the measure unit of the commodity and the type of chart displayed (Time series, Market Season and Price Trend/Volatility).

The tabs **Chart data** and **Statistics**, available above the working area, allow users to view the data ordered from most recent to oldest, and apply a series of statistics to data shown in the chart. More information on data sources is available by clicking on the **Information** tab.

In the national version of the tool, the **Indicator of Food Price Anomalies (IFPA)** feature is available. The corresponding chart presents both the values of the indicator and prices in real terms.

Annex 1: How to search for data in the FPMA tool

Step by step procedure explained in the first two videos of Lesson 4 to learn how to search for and visualize data in the FPMA Tool.

The GIEWS FPMA Tool is available at this address:

http://www.fao.org/giews/food-prices/tool/public/#/home

The data in the Tool is organized into two main domains:

☝ **Domestic prices**: in the homepage of the Tool, you can see how many series of retail or wholesale prices are available in the domestic dataset across the countries displayed on the map, and for the range of commodities covered.

☝ **International prices:** the homepage shows the number of series available and the coverage of commodities.
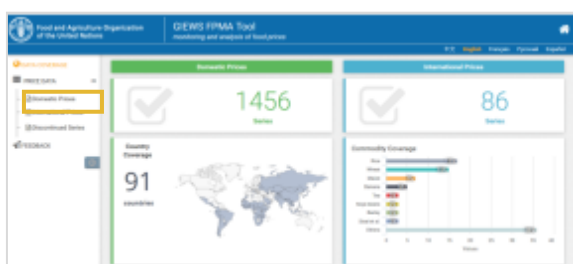
→ To view domestic prices, we select the **Domestic Prices item** from the side menu.

→ By default, the Tool opens on the **Grid View.** Alternatively, it is possible to browse and select available data from the **Map View.**

→ The **Map View** only applies to the Domestic prices domain and gives a global overview of the data available in the Tool.

Besides providing a geographical indication of the series selected from the grid list, it can also be used to select them.

→ To select a price series from the Map View:

1) you can click on a marker of a market/country; and

→

2) in the scroll-down menu that opens, among the series available for that market/country, you can select the series of your interest, to visualize the respective chart and statistics.

💡 *TIP*

You can expand the grid and the map to full screen from the arrows on the top right. Click on these arrows again to return to the default view.

If we go back to the Grid View, we can see that it displays a grid list showing all the available series in the database. By default these series come ordered by country.

To search for a specific series, you can use the column head filter boxes.
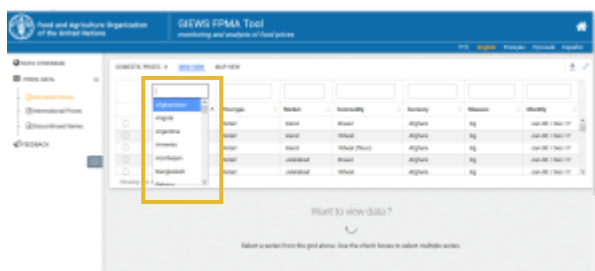
→ You can click inside one of the boxes and pick from the list,

or

→ you can begin to type what you are looking for, and then select it.

Filters can be multiple and applied to all columns in any order.
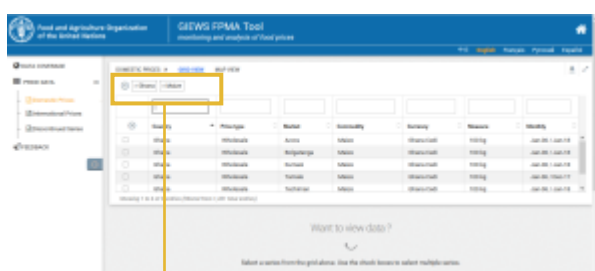
→ To remove a filter, you can cancel it from the list by clicking on the **small x button**.
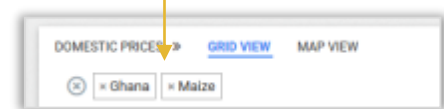
→ To cancel all filters and go back to the complete list of the price series, use the **X button** on the left.
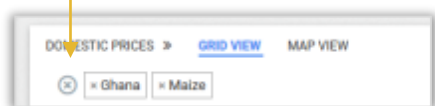
When you have found the series you are looking for, simply click on it in the list, and a chart with this data will appear in the working area below the grid list.
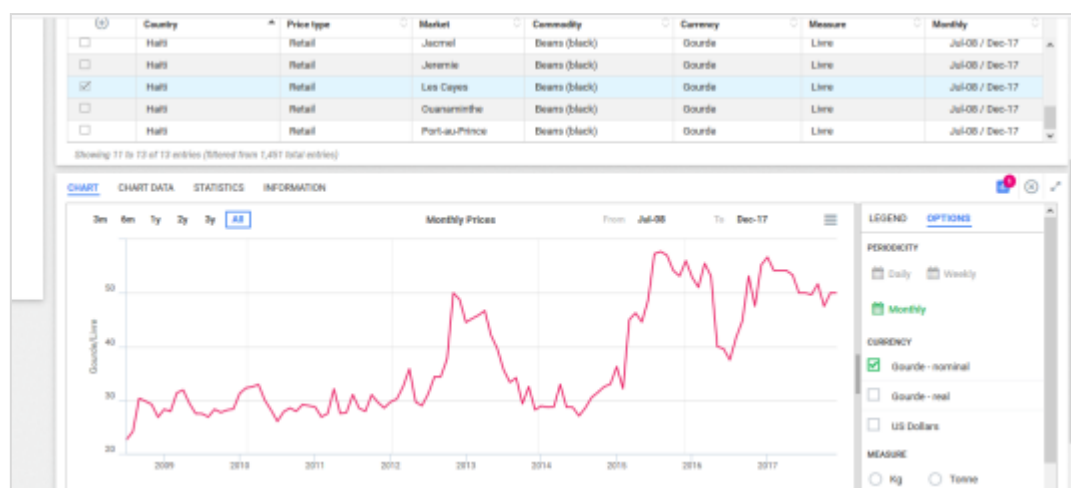
> **TIP**
>
> You can remove the series by clicking another series in the list, or by clicking on the series itself again.

Annex 2: how to visualize and analyze data in the FPMA tool

Step by step procedure explained in videos 3 and 4 of Lesson 4 shows you how to visualize and analyze data in the FPMA Tool.

In the working area you can analyze data, view their trends, and make comparisons among markets, countries and/or commodities.
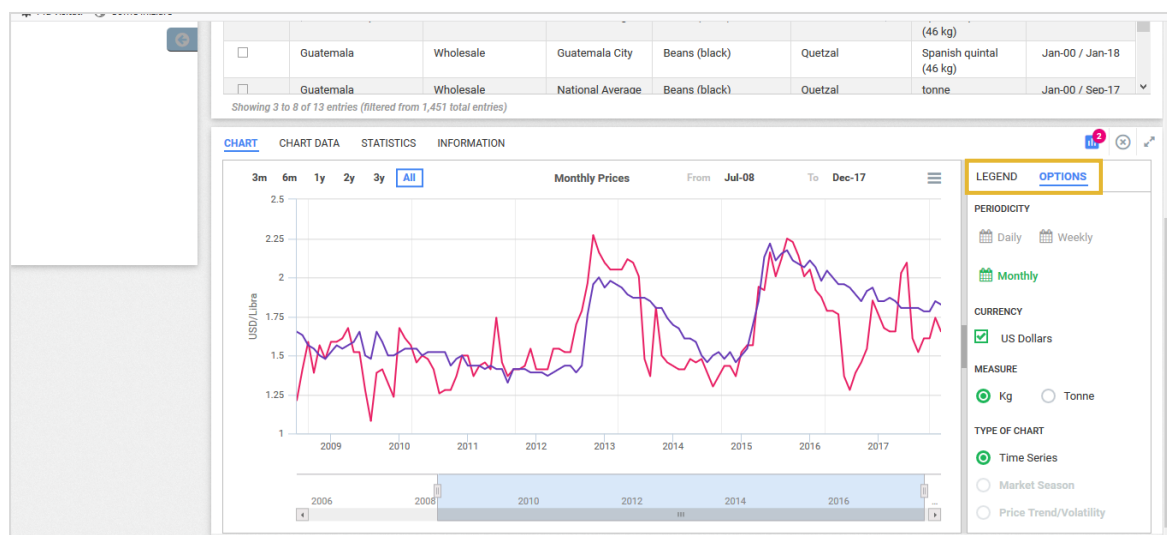
On the right-hand side of the chart, you have:

• the **Legend panel**, and

• the **Options panel**, which is open by default when a series is selected and the chart displayed.

TIP

To facilitate the viewing of the working area the side panel on the left can be collapsed by clicking on the small tab with the arrow.

The Options panel includes several different features:
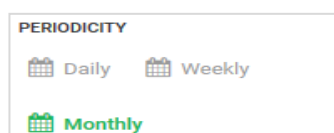
▶ **Periodicity**

In the domestic price dataset, the periodicity of all the data is monthly.

▶ Currency

By default, prices are displayed in nominal terms. You can choose to view them in real terms, deflated by general Consumer Price Index. It is also possible to visualize prices in US dollars.

▶ Measure

The Tool can convert local weight measures to kilograms or tonnes. When price series with different weight units are combined on a chart, the Tool will automatically make the conversion to kilograms, as the common unit of measure.

▶ Type of chart

By default the data are displayed as a Time series. When only one single series of data is selected, you can choose to view the data according to Market Season, or to view a chart displaying the volatility and trend of an individual series.

When the **Options panel** on the right is selected, moving the mouse over the chart shows information on the series in a pop-up box, including the price value of each data point.

The same information can be seen in the **Legend panel** when it is in the foreground: hovering the mouse over the chart will show corresponding prices against the corresponding legend entry.

TIP

Information in the Legend panel can be more convenient when many series are selected simultaneously. When multiple series are selected, hovering the mouse over an entry in the Legend will highlight only the corresponding series on the chart, and will automatically remove the information bar on the chart.

Series can be deleted:

 → individually by clicking on the **x** on the Legend details;

or
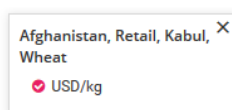
→ by unclicking **them from the grid list;**

or
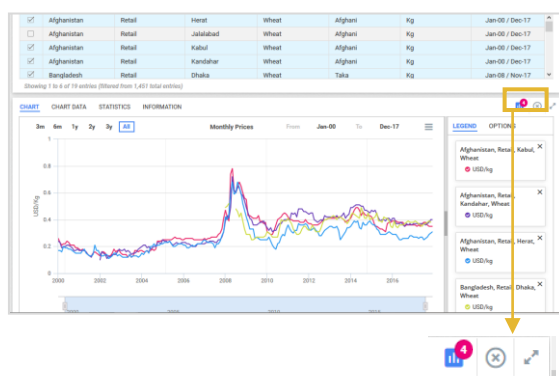
 all together, and thus resetting the working area, by clicking on the **Clear all button**, on the top right-hand side of the working area below the grid list.

On the chart, several options are available to adjust the time span of the price series. By default, all the price data in the Tool are shown, but it's possible to zoom in on a specific period of time:

↘ using the pre-set shortcuts available on the top left or the slider below the chart; or

↘ clicking on the chart and dragging the mouse over the period targeted.

The boxes on the top right will adjust accordingly and inform you of the chart's time frame.
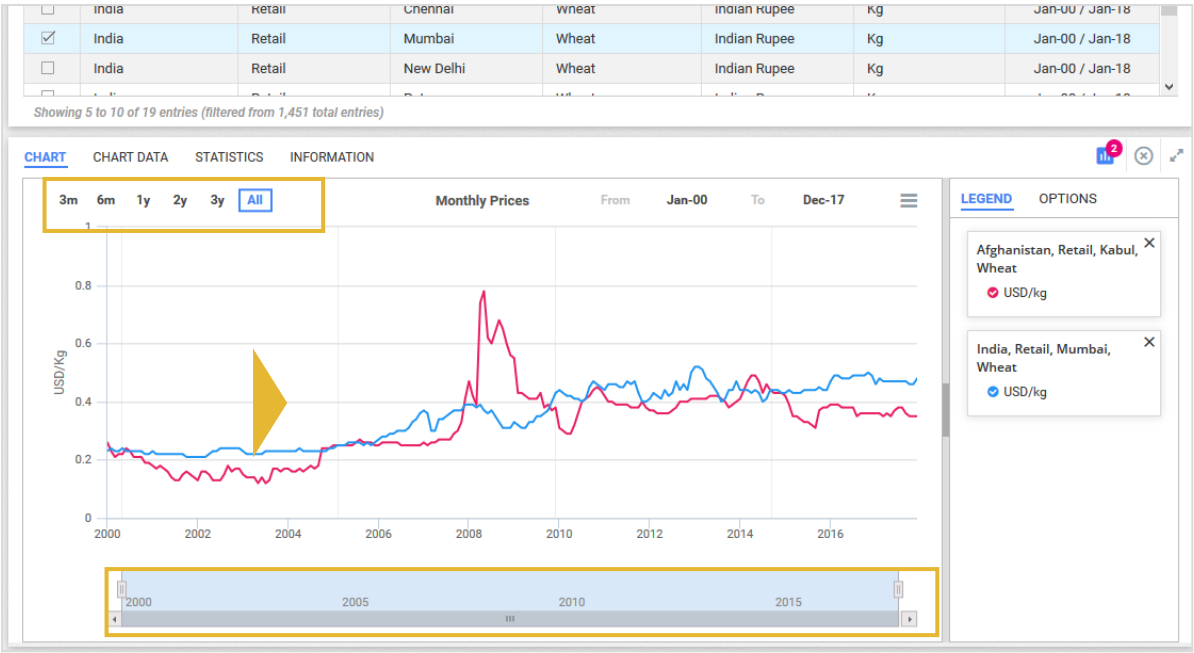
On the top right side, you have a dropdown menu to download the chart, and create a widget or a permalink.
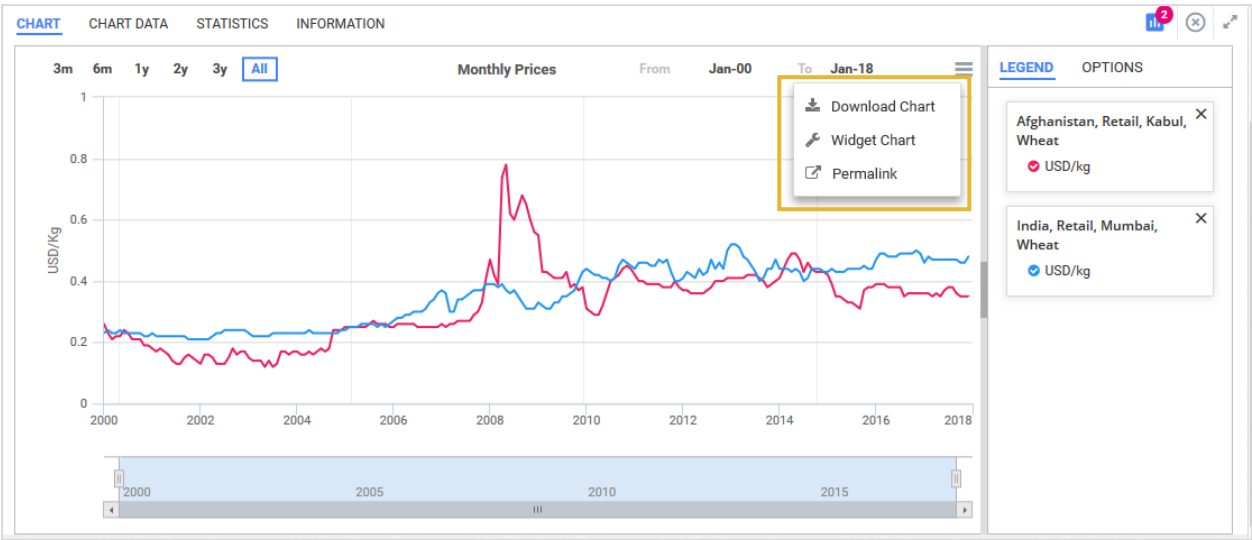
In particular:
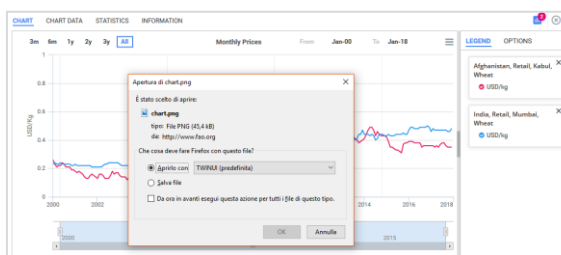
→ the function **Download chart** allows users to open or save a .PNG image, reproducing the chart and its legend;
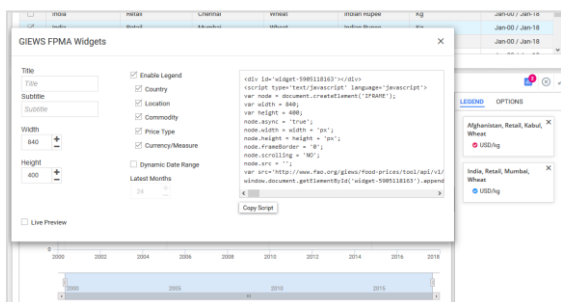
→ by clicking on the function **Widget chart**, an embeddable HTML chart widget can be produced from the Time Series Chart.
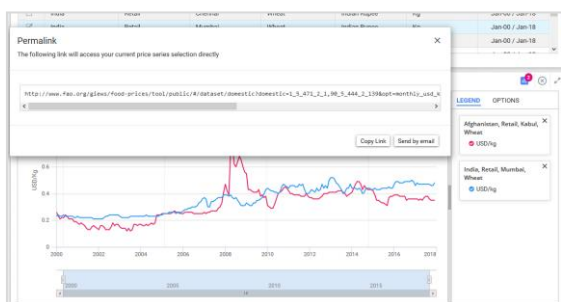
→ by using the function **Permalink**, a permanent link can be generated for the selected price series. Such a link can be saved as a bookmark, enabling a quick return to regularly used analysis, and can be shared (for example, by email) or used as a hyperlink to create a direct link to a particular chart in a web page

Let's focus on the chart in the working area. When the selection is made and the chart visible, we see that the **Chart tab** is active and blue, while other tabs remain grey. They include:

- **Chart data**
- **Statistics**
- **Information tab**

→ **Chart data** shows the data ordered from oldest to newest, starting from the top of the table. It is possible to invert the order by clicking the arrow in the date column header;
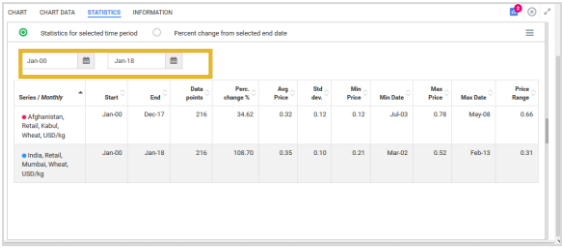
→ Under the tab **Statistics**, two options are provided: **Statistics for selected time** period provide basic statistics for the chosen period of time for each series selected.

The period of focus can be adjusted from the calendar buttons at the top of the panel.
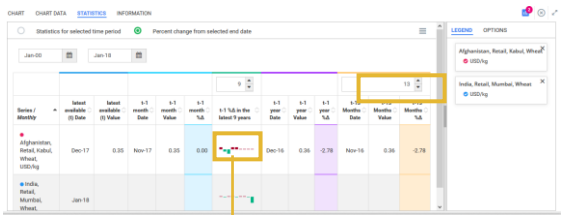

→ The second option, **Percent change from selected end date**, provides pre-set percent change values relative to the latest value in the chosen time period.

For the one-month price change, an in-line chart provides a quick view of the month-on-month price change for the same period over several years.
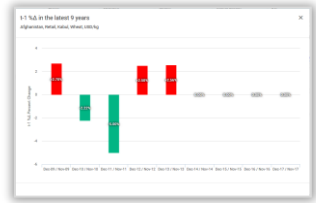
In the far right section, it's possible to adjust the number of months over which the percent change calculation is made.
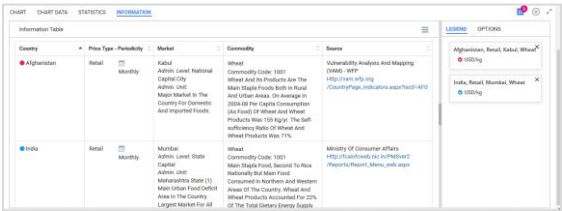
→ The **Information tab** provides information on the commodity and market, as well as the original source of the data, including the link to the source, if available

Annex 3: International prices dataset and IPA feature

Step –by-step procedure explained in videos 5 and 6 of Lesson 4 showing the International Prices dataset and the indicator of price anomalies (IPA).

International prices dataset

The same options for price series in the Domestic Price domain apply in the International Price domain. However, unlike the Domestic Price dataset, the periodicity of the data is also **weekly** for selected series.

For some commodities, price series are available both weekly and monthly. In these cases, the Tool will display weekly data by default.
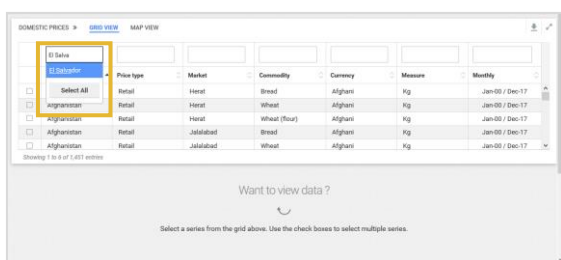
> **TIP**
>
> A comparison across series is only possible for those with the same periodicity.
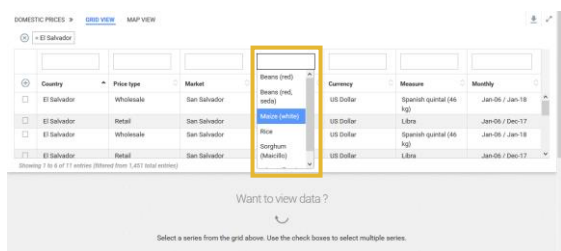
The IPA feature

The example in this section relies on the series of White Maize, Wholesale Price for El Salvador.

Let's start with the Grid list.

→ In the Domestic Price dataset, in the filter box **Country**, choose El Salvador, either by typing the name or scrolling down until you find it.
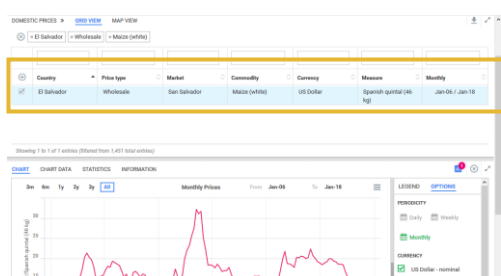
The tool will then display all available commodities for this country.

→ Next, move on to choosing the **commodity**: you can either scroll down to Maize (White) or type the name of the commodity in the corresponding filter box.
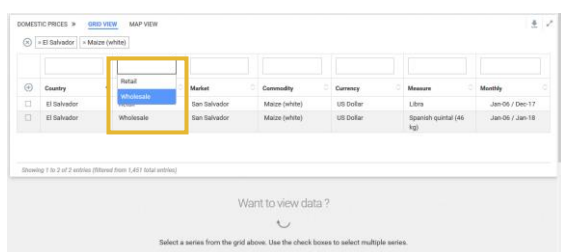
→ Proceed by choosing the price series Wholesale in the **Price type** column.

This will display the series for El Salvador, Maize (White), Wholesale, US Dollars/Spanish quintal.

The graph shows the latest available quotation for this series, and the date varies depending on when the FPMA Tool is searched. Let's focus on the period January 2006 to December 2016.

TIP

To adjust the time period, you can simply move the slider below the graph from the latest quotation to December 2016.


If we consider three specific years, 2014, 2015 and 2016, we can see from the graph that prices during this period were at a relatively high level, reaching nominal values similar to those in 2008, but still below 2011.
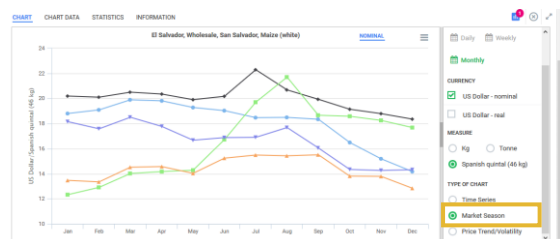
→ To take a closer look at price levels, we can change the displayed chart in the Type of chart section to **Market Season**.

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→ Let's switch to the **Legend panel** on the right-hand column and deselect the years that are not the focus of our analysis. In the resulting figure, we see that prices for 2014 increased rapidly, stabilizing, but at a higher level in 2015.
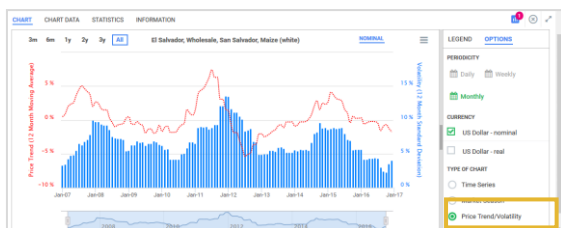
→ Let's select **Options** and tick on the **Price Trend/Volatility** button to switch to the corresponding chart that confirms the high level of prices during the period.

→ Next, let's click on the **IPA button** to open the corresponding graph.

The graph presents both the values of the indicator of food price anomalies and prices in real terms, reconfirming what the previous indicators showed, and giving us confidence in the abnormally high prices.