

India CPI Inflation Case Study

Overview: In India, the Consumer Price Index (CPI) is used to measure inflation, and it involves a fixed basket of goods and services. This basket is comprehensive and includes a wide array of items that an average Indian consumer uses. These items are not limited to just food and clothing but extend to transportation, medical care, electricity, education, and every other category that involves expenditure of money. The CPI is calculated by comparing the general price level in the markets during a particular time period with a base year. The items in the CPI basket are classified across various categories like food and beverages, clothing, housing, fuel and light, and recreation, among others.

The CPI basket contains categories like food and beverages, housing, apparel, transportation, medical care, and more. The weight of each category in the total index might differ based on its relative importance to the average consumer expenditure but for the purpose of this analysis consider equal weights across all categories.

Dataset Overview:

- The dataset provided is a CPI inflation index extracted from GOI website.
- Each number represents the index value for that month and category.
- There are missing values in the dataset - use suitable imputation technique (like moving averages), if required.
- The CPI is an index and not a direct measure of price levels, but rather a relative indicator used to measure inflation or the average change in prices over time. Consumer Price Index (CPI) values cannot be summed across different months to derive meaningful insights or aggregate measures.
- CPI-U (Urban): Reflects spending patterns for urban consumers.
- CPI-R (Rural): Reflects spending patterns for rural consumers.
- The General Index gives you the overall Inflation for the month for all the categories combined.

Problem Statement:

You are working with the National Statistical Office which is equipped to release inflation numbers in India. As an analyst, you are provided with CPI data and are equipped to find out insights from the data and deep dive into the data to answer the following questions -

1. Based on the latest month's data, identify the contribution of different broader categories (food, energy, transportation, education, etc.) towards the CPI basket. Broader categories (buckets) can be created by combining related categories into one bucket: Ex.: Meals, Beverages, Cereals, can be clubbed to create "Food" category, etc.

- Which broader category has the highest contribution towards CPI calculation.
- Contribution is calculated by evaluating the underlying index values for broader category and should add to 100% when contribution from different broader categories are added.

2. A trend of Y-o-Y increase in CPI (rural + urban) inflation starting 2017 for the entire basket of products combined.

- Create a graph depicting the growth rate Y-o-Y and identify the year with highest inflation rate.
- Highlight the reason the year has the highest inflation (based on research).

3. With India's retail inflation reaching a 3-month high of 5.55% in November 2023, due to a sharp rise in food prices. Analyze the following for 12 months ending May'23:

- Investigate trends in the prices of broader food bucket category and evaluate month-on-month changes. Highlight month with highest and lowest food inflation.
- Identify the absolute changes in inflation over the same 12 months period and identify the biggest individual category contributor (only within broader food category) towards inflation.

4. Investigate how the onset and progression of the COVID-19 pandemic affected inflation rates in India. Analyze the Impact of key pandemic milestone (first lockdown) on the CPI inflation %, specially focus on categories like healthcare, food, and essential services.

Hint: You can consider Mar'20 as the onset of Covid and can compare the inflation trend before and after Mar'20 to see if there is a change in inflation % before and after.

5. Investigate how major global economic events (like imported crude oil price fluctuations) have influenced India's inflation. This can include an analysis of imported goods and their price trends.

- For this analysis, focus only on the imported oil price fluctuations for years 2021 to 2023 (month-on-month).
- Identify trends in oil price change with change in inflation prices of all the categories and identify category whose inflation prices strongly changes with fluctuations in imported oil price (Hint: you can use =correl function).

Other Information:

- **Percentage Change:** To understand inflation or deflation trends, calculate the percentage change in CPI between two periods (e.g., year-over-year or month-over-month). This shows how much prices have increased or decreased relative to the earlier period.

- For example, to calculate the monthly inflation rate between two consecutive months:

- $\text{Monthly Inflation rate} = (\text{CPI in current month} - \text{CPI in previous month}) / \text{CPI in previous month} \times 100$

- **Annual Inflation Rate:** For longer periods, such as yearly inflation, use the CPI values at the start and end of the period. This helps in understanding the overall inflation experienced over the year.

- $\text{Annual Inflation rate} = ((\text{CPI at end of year} - \text{CPI at start of year}) / \text{CPI at start of year}) \times 100$

- Any month can be considered as start of the year, then end of the year month will be considered 12 months after the month you have selected for start of the year.