Occasional Analytical Note

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Definition(s) and appropriate use of the term "inflation or inflation rate and acceleration in inflation"

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Outline

1.0 Background

Inflation is an economic indicator that is mostly used in economics discussions, but it is often misconstrued. According to the U.S Federal Reserve Bulletin (1919) inflation is defined as the process of making additional increases to currencies without the commensurate increase in the production of goods. Bryan (2007) points out that inflation was not about prices for many years but a stamen about the value of paper money, which in the past three decades, inflation came to be synonymous with a rise in prices. Today, the widely accepted definition of inflation is the general increase in the price level over ti¬me, which is reflected in the fall in the purchasing power of money.

- **demand-pull inflation** – occurs when the productive capacity (supply) of an economy isn't enough to answer to the demand for goods and services in the economy, causing prices to soar, a phenomenon of excess demand.

- **cost-push inflation** – occurs when the cost of producing goods and services rises, forcing businesses to increase the prices of commodities,

- **built-in inflation** – a scenario where workers demand higher wages in response to increasing commodity prices; this leads to businesses increasing prices in trying to answer to the high costs of labour.

2.0 Objectives

This article highlights the concept of inflation, how it is defined and how it is measured. We also clarify whether it is correct to say inflation accelerates or not, as the media and some analysts often do. We will then provide a recommendation on how inflation and acceleration are used in our discussions.

3.0 Different Measures of Inflation

Inflation is not observable and, the common measure of inflation is the inflation rate, which is the annual percentage change in a general price level. Several measures have been proposed to measure it worldwide. But the most commonly used measure is the consumer price index (CPI). However, the United States(US) prefers the personal consumption expenditure over the CPI. Both measures use the underlying consumer expenditure as the basis for calculating inflation. In Lesotho, the most preferred measure of inflation is the rate of change of the consumer price index over time (month, quarterly, or yearly).

4.0 The advantages and disadvantages of each of the Measures

Each measure of inflation has its own advantages and disadvantages of using it.

Advantages

CPI The main advantage of using CPI to estimate inflation in an economy is that it reflects both the inflation rate and the cost of living in a country. It is used by wage boards for adjusting salaries in conjunction with the cost of living. It is also consistent since it measures a fixed basket, despite changing seasonal effects and introduction of new items.

PPI The PPI measures the inflation's real growth, coupled with the reduction in total output of an economy. Since it measures price changes before they reach consumers, it is viewed by most people as an earlier predictor of inflation than CPI.

GDP Deflator The major advantage of the GDP deflator over the other two measures is that it covers all the goods and services that are produced in the economy. It is a more comprehensive measure since it isn't based on a certain fixed basket. It helps capture any patterns in an economy's consumption and investment patterns.

Disadvantages

CPI The CPI can be rather static and miss the price changes of goods that are not part of the fixed basket (introduction of new products is not reflected). It also does not cater for the change in quality of goods within the basket. CPI does not take into account the difference in spending patterns between individual households.

PPI Some values of the PPI can be misleading, especially when business move back into profitability after a setback – the case of COVID-19 lockdown comes into play.

GDP Deflator The biggest disadvantage of the GDP Deflator is that it is very hard to calculate. Instead of having a basket of a few hundred specific items like the CPI, the GDP deflator needs price and quantity data from thousands of different products every year.

5.0 Are we using the words inflation acceleration correctly?

Some analysts, media and professional economists have invariably used the words ***inflation acceleration/ deceleration*** in their reports. But are we using these words correctly?

In order to answer the question of whether or not we are using the words 'inflation acceleration' correctly, we have to take recourse to calculus, since inflation is calculated as the percentage change in general price level (it does not matter how price levels are measured). According to Moxley (2014), high order derivatives are useful in shedding light on the function they describe. He points out that first derivative of a function gives the slope (velocity of that function) with respect to time, while the second derivative gives the rate of change of the slope, which is the acceleration of the object.
In this regard, since inflation is defined in terms of change in CPI among others, it is important to note the following caveats:

- If CPI_t is a function giving general price level at time t,

then $\frac{dCPI_t}{dt}$ =inflation rate , which is the relative change in CPI over time. This is the first derivative of the general price level.

Because CPI is always positive, the inflation rate takes the same sign as the CPI, unless the deflation sets in, in which case, the CPI will still be positive but the change will be negative.

- The second derivative, therefore, describes the acceleration of the general price level in this case. One can think of the second derivative of the CPI as the change in inflation rate, and the change in inflation rate, therefore, can either be positive or negative. In this case, ***the CPI is said to be increasing at a decreasing rate (negative second derivative).*** It is therefore logical to say, the CPI is decelerating, and vice versa if the change in inflation rate is positive.

- The focus is on the measure of the general price level, which is CPI, in this case.

How Is the CPI Basket Chosen in Lesotho?

Following international reporting standards, COICOP, the Bureau of Statistics Lesotho (BoS) choose which goods and services to include in the CPI basket and what their weights should be, on the basis of the information about how much – and on what – households in Lesotho spend their income. If households spend more of their income on one item, that item will have a larger weight in the CPI. From the Lesotho's CPI basket, food and non-alcoholic beverages constitute a larger share, and this implies that households in Lesotho spend a larger share of their incomes on food items. Data on household spending across all items is expected to be updated every five years or so. The weights displayed below are calculated on the basis of the 2010/11 Household Budget Survey (HBS).

a) Divisions in the Lesotho's CPI basket and their weights

DIVISIONS	WEIGHT
1. Food and non-alcoholic beverages	**36.1**
2. Alcohol and Tobacco	**3.3**
3. Clothing & Footwear	**13.1**
4. Housing, water, electricity, Gas and Other fuels	**12.4**
5. Furnishings, Household Equipment and Routine Maintenance of the House	**8.5**
6. Health	**1.5**
7. Transport	**4.8**
8. Communications	**2.1**
9. Recreation and Culture	**5.7**
10. Education	**4.2**
11. Restaurants & Hotels	**1.0**
12. Miscellaneous goods and services	**7.3**

As alluded above, the formal definition of measuring inflation rate is as follows:

$$\pi_t = 100 * \left(\frac{CPI_t - CPI_{t-1}}{CPI_{t-1}}\right)$$

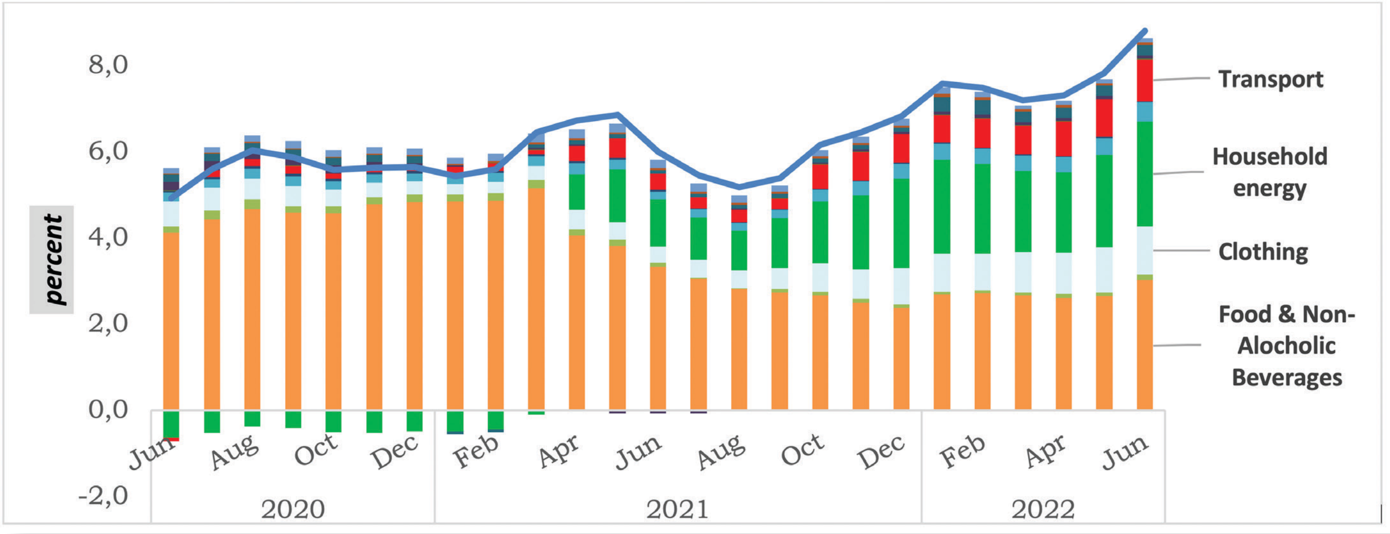
Where π_t denotes inflation rate at time t. This can be calculated on an hourly, daily, weekly, monthly, quarterly or even yearly basis. Inflation rate is expressed as the percentage change for a given time period.

6.0 Analysing Main Components of Inflation

One approach in determining the drivers of inflation is to disaggregate inflation into its main components and determine the most important ones, that is; highlight those components where the price change was greatest (it should be noted that specific component may be a small part in terms of its share in the basket). For example, transport inflation was largest at 20.0 per cent in June 2022, but it only constitutes 4.8 per cent in the basket.

We can also compute the contributions made by each component to the overall inflation. This captures both the size of the price change and importance of that component. As depicted in Figure 1, Food and non-alcoholic beverages, Housing, electricity, water, gas & other fuels (Household energy), Clothing and Transport contributed substantially to the 8.8 per cent inflation recorded in June 2022. Their contributions were 3.0, 2.4, 1.1 and 1.0 percentage points, respectively.

Figure 1: Contributions to Inflation



Source: Central Bank of Lesotho

7.0 Conclusion and Recommendations

The significance of inflation tracking in macroeconomic jargon cannot be overemphasised. It is of high significance, therefore, that it is measured and analysed meaningfully in the guest to inform policy. It is equally important to report unambiguously on inflation developments to avoid misinforming or causing any confusion.

After deliberating extensively on the topic of inflation, we conclude that it is the CPI that accelerates or decelerates, not inflation rate. We, therefore recommend that in all our reports, we should always avoid the use of inflation deceleration or acceleration.

References

Board of Governors of the Federal Reserve System (U. S.). (1919). July 1919 Federal Reserve Bulletin. https://fraser.stlouisfed.org/title/federal-reserve-bulletin-62/july-1919-20591.

Bryan, M. F. (1997). On the Origin and Evolution of the Word Inflation. Federal Reserve Bank of Cleveland, Economic Commentary 10/15/1997.

Moxley, C.C. (2014). QMI Lesson 9: Higher Order Derivatives, Implicit Differentiation, and Differentials. Higher Order Derivatives.

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