

**Policy Note: PN 2021-07**

**Measurement of Momentum and Base Effect of CPI Inflation of Bangladesh**

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**Chief Economist's Unit  
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## Measurement of Momentum and Base Effect of CPI Inflation of Bangladesh<sup>1</sup>

### Abstract

*This policy note attempts to figure out the base effect of consumer price index (CPI) inflation in Bangladesh, considering current situation of COVID-19 and its impacts. The note calculates the base effect for four CPI series (i.e. headline, food, non-food and core) and identifies significant level of base effects for various months of the sample period between 2020M01 and 2021M06. The policy note also forecasts the base effect for the next twelve months with a view to providing an insight about the development of CPI headline inflation for FY22. The note concludes that inflation development needs to be assessed in a timely manner that whether the headline inflation originates from underlying inflationary pressure or from the impact of base effects which would help formulate prudent policies for effective inflation management.*

### 1. Introduction

Inflation measurement has two key dimensions which include economic and statistical factors. Economic factors arisen from price movement of different commodities of CPI basket can be ascribed as momentum. On the other hand, the statistical factors are stemmed from the price swing twelve-months earlier which can be attributed as base effect. The base effect in inflation can be positive or negative with different magnitudes. If the change between the price indices of the two consecutive months of the base period is negative, then current inflation will suppress, offsetting the price momentum. The opposite will happen when the price change is positive, uplifting the present measured inflation. Therefore, it is very important to measure the momentum and base effect of inflation which would help forecast robust inflation, providing guidance for price stability.

Base effect has a considerable impact on the development of measuring CPI inflation (CBI, 2007). The base effect also contributes to shape the headline CPI inflation (ECB, 2007). In general, the volatility in inflation can mostly be explained by the developments in the components of consumer price index. However, the changes in CPI inflation in a particular month sometimes refer to not only the recent development in price but also to price fluctuations of the corresponding period in the previous year (ECB, 2007). Hence, this base effect refers to the contribution of price movements in the base period i.e.,  $P_{t-13} - P_{t-12}$  to measure the annual inflation rate. However, sometimes identifying the base effect is a difficult task in practice because only the irregular price changes in the previous year should be considered for determining the base effect (NBR, 2011). RBI (2014) also finds that an extreme or unusual change in CPI inflation might be misleading without considering the base effect.

Therefore, it is critical to understand the base effect in CPI inflation with a view to identifying appropriate policy stance for the inflation. This note tries to look into the effect of base effect on four

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series of CPI inflation, i.e., headline, food, non-food and core, of Bangladesh for the duration of 2020M01 to 2021M06, covering the pandemic period. Furthermore, it also attempts to forecast the inflation rate along with the base effect for the next twelve months during 2021M07 to 2022M06.

## 2. Figuring Base Effect and Momentum

The methodology proposed by ECB (2005) has widely been accepted and used by many central banks for calculating the base effect. This note also calculates the base effect referring to the methodology of the ECB (2005). Inflation is measured in the form of percentage change in the CPI index of a given month ( $I_t$ ) over the index value 12 months earlier ( $I_{t-12}$ ). Thus, the inflation rate in a given month will be calculated as follows:

$$\pi_t = [(I_t - I_{t-12}) / I_{t-12}] * 100 \dots\dots\dots(1)$$

Where I denotes the CPI index.

The change in inflation from one period to another involves two effects which can be approximated as follows:

$$\pi_t - \pi_{t-1} = [(I_t - I_{t-1}) / I_{t-1}] * 100 + [(I_{t-13} - I_{t-12}) / I_{t-13}] * 100 \dots\dots\dots(2)$$

Left hand side of equation 2 exhibits the change between current and previous months' inflation. First part of the right hand side of equation 2 refers to the price momentum. The second part shows the change of price index in 12 months earlier which is the base effect. By rearranging the terms of equation 2, the current month's inflation rate can be derived from the summation of previous month's inflation rate, momentum and base effect, which can be approximated as follows:

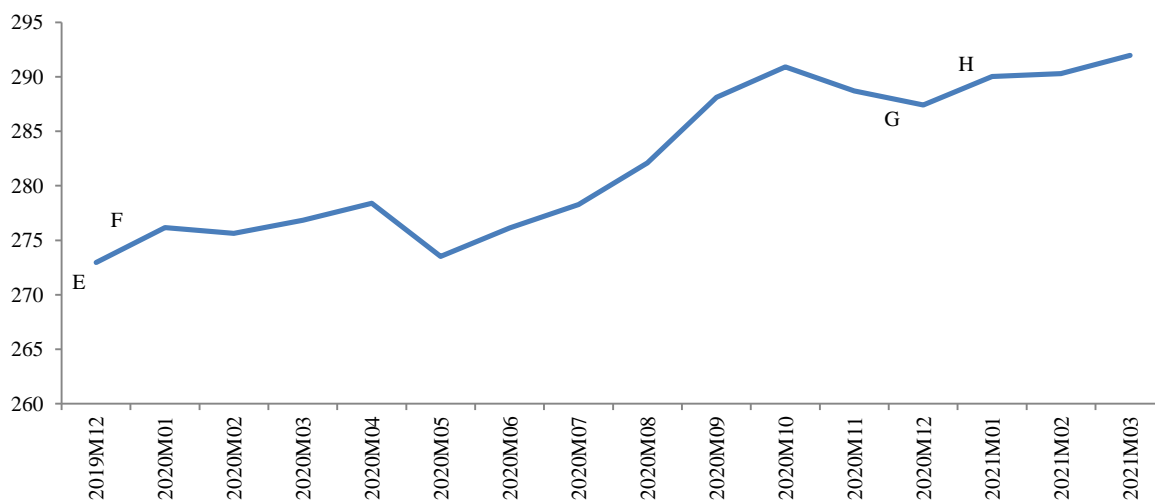
$$\pi_t = \pi_{t-1} + [(I_t - I_{t-1}) / I_{t-1}] * 100 + [(I_{t-13} - I_{t-12}) / I_{t-13}] * 100 \dots\dots\dots(3)$$

This derivation (equation 3) expresses clearly the base effect on current inflation rate. If the base effect is positive, it will be added to the current month's inflation, intensifying the current inflation rate. The opposite will happen when the base effect is negative. Therefore, the base effect appears to be a determinant factor for current inflation.

Chart 1 illustrates the contribution of the month-on-month CPI change in the base period, i.e. the base effect, to the current inflation rate. CPI headline inflation rates (year-on-year) were 5.29 percent (from E to G) in December 2020 and 5.02 percent (from F to H) in January 2021, indicating a decline in the year-on-year inflation rate by -0.27 percentage points between the two periods. On the other hand, the month-on-month change in current CPI or the price momentum (from G to H) has increased by 0.91 percent. The decline in the year-on-year inflation (of 0.27 percentage points) can be explained by the month-on-month rate of change (from F to E) in CPI one year earlier which is the base effect. Here, the contribution of base effect is -1.16 percent which has offset the price momentum of 0.91 percent. Therefore, even the month-on-month inflation (+0.91) increased by 0.91 percent, current inflation rate, in fact, decreased by 0.27 percentage points to 5.02 percent in January 2021 because of adjustment of the negative base effect (-1.16 percent) in base period in January 2020. Therefore, the current inflation for January 2021 can be estimated by equation 3 which becomes as follows:

$$\pi_t = 5.29 + 0.91 + (-)1.16 = 5.02 \text{ (estimated)} \cong 5.04 \text{ (actual)}$$

**Chart 1 : Headline CPI (Base: 2005-06)**



Source: Bangladesh Bureau of Statistics (BBS).

### **3. Impact of Base Effect on CPI Inflation in Bangladesh**

The Bangladesh economy witnessed significant fluctuation in the CPI inflation during the COVID-19 pandemic period. This note considers the sample period ranging from 2020M01 to 2021M06 in order to understand the base effect during the COVID-19 pandemic period. Four segments of chart 2 outline the base effect for the four CPI series i.e., headline food, non-food and core. In May 2020, unfavourable (positive) base effect outweighed the fall in price momentum (Chart 2A). However, the fall in price momentum in headline inflation came from negative price momentum in food inflation. Stockpiling of rice following the nation-wide lockdown at the end of March 2020 contributed to the lower demand and negative food price momentum in May 2020. Moreover, fall in the price of fish, vegetables and spices added to the negative price momentum. Although the price momentum is strong, the favourable (negative) base effect kept the headline inflation lower during July-September 2020. The strong price momentum resulted from the rise in the price of rice, fish and vegetables but moderated by the fall in the price of eggs and meat, and spices.

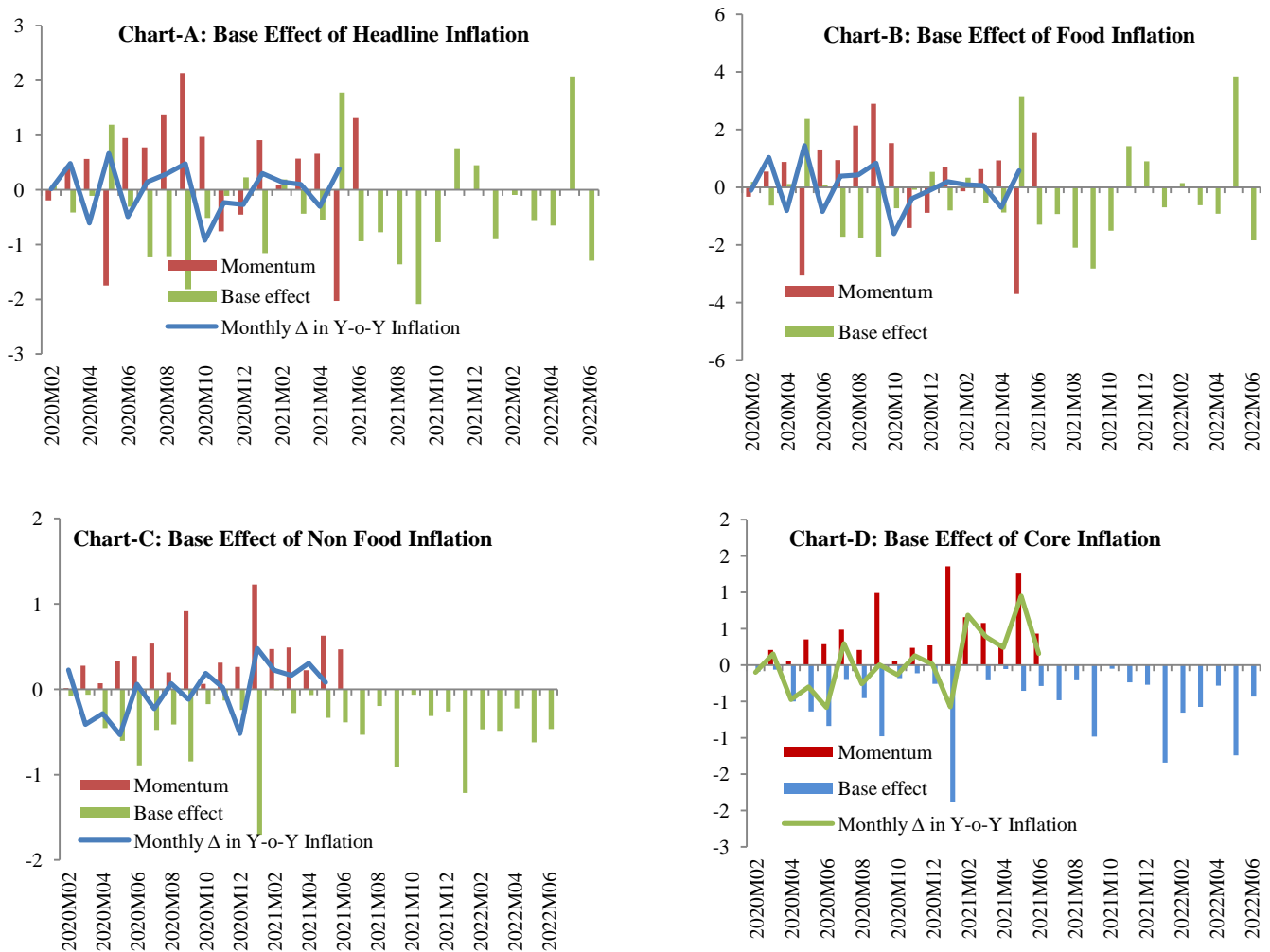
Favourable base effect was diminished during the last three months of 2020 resulted in a spike in headline inflation in October 2020 (Chart 2A). Food price momentum especially prices of rice, fish and vegetables largely contributed to this hike. However, the favourable base effect significantly lowered the headline inflation in January 2021 despite a substantial price momentum.

Price momentum dropped considerably in May 2021 due to fall in the price of eggs and meat and spices, although an unfavourable base effect uplifted the headline inflation (Chart 2A and 2B). On the other hand, inflation in June 2021 increased because of strong price momentum from both food and non-food items (Chart 2B, 2C). Similar pattern of price momentum and base effect interaction was observed in food inflation which indicated the strong influence of food inflation on headline CPI inflation. The observed price momentum for CPI headline as well as for food inflation was highly volatile during the COVID-19 period. Commencement of nationwide lockdown at end March 2020 and April 2021 caused the food inflation momentum to fall in the next month, seemingly indicated

that people stockpiled the food items which consequently cut down the demand for food items in the next month.

Charts 2C and 2D indicate that the base effect for non-food inflation remained favorable for the sample period which was very much similar to the core inflation. In addition, strong price momentum in September 2020 and January 2021 mainly stemmed from Medical Care and Health, and Transport and Communication expenses was offset by substantial base effect of non-food inflation.

**Chart 2: CPI Inflation – Momentum and Base Effects**



Source: Authors' calculation by BBS data.

Note: This policy note uses core inflation data (Chart 2D) compiled by Research Department, Bangladesh Bank, on the basis of BBS data.

#### 4. Inflation Outlook for FY22 Focusing on Base Effect

Twelve months ahead base effect can be calculated by the aforesaid method which can be used for giving an insight of the inflation by how much it would be manifested to increase or decrease. From the base effect calculated for the twelve months ahead, it is evident that favorable base effects will dampen the headline infaltion in FY22 because of the negative price changes in the base

period of food inflation except for the months of November and December 2021 and May 2022. Both for food and nonfood inflation, the base effect is significantly negative for the month of September 2021 which suggests that CPI headline inflation would be much lower than the actual price increase. The evolution of the headline inflation during November-December 2021 will likely to be influenced by unfavorable or positive base effects. Thereafter, base effect will become negative or favourable during the first half of 2022 excluding May 2022 (Chart 2A).

## **5. Conclusion**

This policy note attempts to shed light on a very crucial aspect of CPI inflation which is the base effect. The analysis finds that the base effect revealed the true change in the price level. Here, the note finds significant base effect for various months of the sample period of 2020M01 to 2021M06. During July-September 2020 and January 2021, the price momentum was much higher, although the substantial negative base effect offset the momentum. However, significant positive base effect was evident in May 2020 and May 2021, notwithstanding the considerable amount of fall in price momentum. Surprisingly, strong relationship between headline and food CPI as well as between non-food and core CPI was found through the base effect calculations. The note figures out the base effect for the next twelve months which gives an insight to inflation outlook.

Since one of the monetary policy objectives of the Bangladesh Bank is to keep inflation within the targeted level, assessing inflationary pattern is critical to formulate prudent policy stance. The quantification of base effect helps explain the unusual fluctuations in the inflation rate. As a monetary authority, the BB needs to be cautious whether these unusual changes (high inflation or deflation) are for price momentum or for base effect.

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