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# Dynamics of Headline Inflation in India: A Structural Break Analysis

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***Abstract:***

*Inflation, as a pivotal economic indicator, profoundly influences the stability and growth trajectory of any economy. This study meticulously examines the evolving trends and patterns of headline inflation in India spanning from 1971-72 to 2020-21. Employing sophisticated methodologies such as the Bai-Perron structural break analysis, CUSUM test, and Chow test, our investigation unveils the intricate dynamics shaping India's inflation landscape. Our findings reveal six pivotal structural breaks punctuating the inflation trajectory of the Indian economy, identified through the minimization of Bayesian Information Criterion (BIC) in model 6. Moreover, the CUSUM graph illustrates a notable deviation from stability, with the plotted line surpassing the lower boundary, signaling a lack of inflation stability. The Chow test underscores the significance of these breaks, with p-values consistently below 5 percent at each identified break point, accentuating their statistical significance. Our study underscores the multifaceted nature of headline inflation in India, attributing its fluctuations to a complex interplay of domestic and global factors. Notably, key drivers such as food and fuel prices, alongside fiscal and monetary policy actions and structural reforms, emerge as pivotal influencers of India's inflation dynamics. This article tries to bring out the possible explanations from theory and literature to explain the structural breaks in the economy.*

***Keywords:*** *Headline inflation, Trends and patterns, Structural break analysis, Bai-Perron test, CUSUM test, Chow test*

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## 1. Introduction

The impact of inflation on individuals, businesses, and governments alike makes it an eternal subject of interest and concern in the field of economics. Despite being studied and debated extensively, this phenomenon is crucial in determining a lot of various aspects of economic activity, including investment choices, consumption trends, and monetary policy. In essence, inflation is the process through which a unit of currency becomes less valuable than it was in the past, i.e., the erosion of purchasing power. The essence of inflation lies in its extensive impact across diverse economic sectors, influencing distribution, production, consumption, and resource allocation.

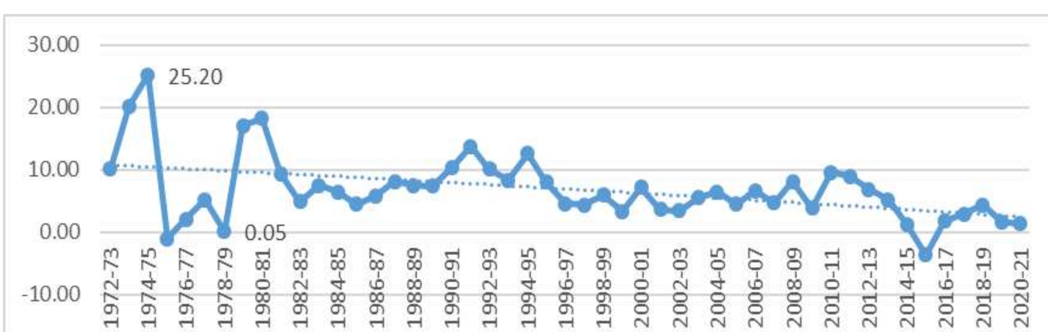
Many underlying causes, often conjoined with broad economic dynamics, give rise to inflation. Excess demand relative to supply—also known as demand-pull inflation—is one of the main causes of inflation. On the other hand, supply-side shocks, such as rising labour or input prices amplify production costs, cause businesses to shift these additional costs onto customers by raising prices. This is termed as cost push inflation. Furthermore, monetary factors, particularly the expansionary monetary policies that central banks pursue, have the potential to drive inflation. Additionally, expectations are vital in determining the dynamics of inflation because projected price changes in the future can have a self-fulfilling effect on present investment, wage setting, and consumption habits. Managing inflation effectively requires a multi-modal policy framework encompassing fiscal, structural, and monetary measures. Central banks, mandated to ensure price stability, employ both conventional instruments—such as adjustments in interest rate and open market operations—and non-traditional measures, including forward guidance and quantitative easing during exceptional circumstances. Fiscal policy, through taxation and public expenditure, complements these efforts by influencing aggregate demand and supply conditions. In this context, the present study examines the trends and patterns of headline inflation in India.

Price indices such as Wholesale Price Index (WPI), Consumer Price Index (CPI), and Producer Price Index (PPI) are used commonly to measure inflation. This study employs annual WPI data from 1971-72 to 2020-21, obtained from the website of the Economic Advisor, Government of India and transformed into a single 2011-12 base series using splicing. Inflation rates were calculated from annual WPI growth, and trend analysis was conducted using the Bai-Perron and Chow tests to identify structural breaks, while the CUSUM test checked data stability. The study further interprets these structural breaks with insights from theory and literature.

## 2. Headline inflation in India: Some highlighted facts

Inflation, a critical economic indicator, that shapes economies. In India, its trends from 1971–72 to 2020–21 manifest the influence of monetary and fiscal policies, global conditions, and domestic demand-supply dynamics. Headline inflation, which includes volatile components like food and fuel, often led to inflationary spikes. India experienced hyperinflation in the 1970s and early 1980s, followed by moderate inflation, but it remained a challenge even after the 1990s liberalisation reforms. Understanding these historical patterns is crucial for policymakers and economists to manage inflation and ensure macroeconomic stability.

**Figure 1: Headline inflation in India from 1972 – 73 to 2020 - 21**




*Source: Website of Office of the Economic Advisor (1970-71, 1981-82, 1993-94, 2004-05 & 2011-12 series), Government of India*

**Table:1 Headline inflation from 1971 – 72 to 2020 - 21 (in quinquennium)**

| Period | Headline Inflation | Primary Articles | Fuel & Power | Manufactured Products |
|---|---|---|---|---|
| 1971 - 76 | 10.83 | 10.63 | 16.86 | 9.86 |
| 1976 - 81 | 9.76 | 9.60 | 13.12 | 9.08 |
| 1981 - 86 | 5.82 | 6.51 | 6.75 | 5.26 |
| 1986 - 91 | 9.38 | 9.76 | 7.50 | 9.50 |
| 1991 - 96 | 8.69 | 9.30 | 10.76 | 8.26 |
| 1996 - 01 | 4.86 | 4.40 | 12.39 | 3.01 |
| 2001 - 06 | 5.28 | 5.01 | 8.36 | 4.51 |
| 2006 - 11 | 6.98 | 11.87 | 6.93 | 5.21 |
| 2011 - 16 | 2.22 | 5.21 | -2.90 | 2.05 |
| 2016- 21 | 1.35 | 2.77 | 2.16 | 2.35 |
| Pre-reform | 8.69 | 8.66 | 10.86 | 8.26 |
| Post-reform | 5.16 | 6.56 | 6.29 | 4.28 |
| Overall | 6.68 | 7.59 | 8.18 | 5.98 |

*Source: Website of Office of the Economic Advisor (1970-71, 1981-82, 1993-94, 2004-05 & 2011-12 series), Government of India*

From the figure 1 & table 1, it is obvious that there have been substantial changes in the trends and patterns of headline inflation since independence.

India has experienced periods of relatively low and stable inflation as well as times of high and volatile inflation. Due to a combination of factors, the 1970s were characterised by high inflation. The Indian economy encountered challenges in the 1970s, with inflationary pressures driven on by an array of interconnected factors. The upsurge in prices in the 1970s was primarily driven by the wars between China and India, as well as between India and Pakistan, crop failures driven by drought, growing fiscal deficits, mounting public debt, inadequate public sector savings, inadequate public sector projects, increased money supply, and an almost closed economy (Kalani, 2021).

The country witnessed moderate inflation in the 1980s, averaging 7 percent annually. Following the second global oil crisis, inflation exceeded 10 percent in 1980–81 but remained below that level in other years. Inflation was driven by monetised fiscal expansion and supply shocks, though it was less severe than in the previous decade (Samantaraya & Pattnaik, 2006). The annual average rate of inflation was 5.82 percent in the early 1980s, mainly due to fluctuations in fuel, power, and primary articles prices, but rose to 9.38 percent in the latter half, led by increases in primary and manufactured goods prices. The average annual inflation rate in the first half of the 1990s was 8.69 percent, but it declined to 4.86 percent in the latter half of the decade. High inflation in the early 1990s was inspired by BoP problems, rising procurement costs, supply–demand mismatches in essentials, controlled imports due to low foreign exchange reserves, and perpetual double-digit fuel price hikes. The gradual liberalization of the economy also added to inflationary pressures (Ibid).

India began to see a decrease in inflation rates in the second half of the 1990s. As the economic reforms started to bear fruit, prudent fiscal and monetary policies were implemented to keep the economy stable. Reforms targeting the development of a strong financial market have been in place since the early 1990s, with an emphasis on energising the foreign exchange and government securities markets. Since the latter part of the 1990s, these initiatives along with enhanced monetary-fiscal interface have resulted in more efficient monetary management. It is important to note that the monetary management strategies effectively reduced expectations and curbed inflation despite the significant inflow of outside capital (Samantaraya & Pattnaik, 2006).

In the 2000s, inflation oscillated between moderate and high levels due to both internal and external factors. In the early years, inflation ranged between 3.4 percent and 6.5 percent, driven mainly by fuel and power prices. The first major hike cropped up in 2004–05, caused by rising crude oil prices and irregular monsoons. A second surge came between June and October 2008, affiliated with escalating crude oil and global commodity prices during the financial crisis. Overall, inflation in this decade was largely shaped by global developments, with the fuel and power category emerging as the key driver following the partial de-administration of oil prices (Ministry of Finance, 2009; Goyal, 2015).

At the beginning of the last decade, India faced high WPI inflation at 8.93 percent in 2011-12, particularly in food prices, which troubled the government until 2013-14 (Ministry of Finance, 2023). Inflation then declined steadily, reaching 1.24 percent in 2014-15, with an average of 2.2 percent in the first half of the decade. A brief deflation occurred in 2015-16 at -3.69 percent, followed by a gradual rise to 4.36 per cent in 2018-19 and a decline to 1.31 percent in 2020-21. Inflation remained below the RBI's 4 percent target between 2017 and 2019, largely due to lower commodity prices (Balakrishnan & Parameswaran, 2022).

In short, India has maintained a moderate inflation rate, averaging 6.7 percent per annum from 1971-72 to 2020-21. Inflation declined over this period, from 13 percent in 1972-73 to 1.31 percent in 2020-21, reflecting a combination of internal and external influences. Episodes of high and volatile inflation occurred, but policy interventions have helped manage it. These trends highlight the delicate balance policymakers maintain between promoting economic growth and ensuring price stability for overall economic well-being.

## 3. Headline Inflation in India: A structural break analysis

Headline inflation in India has exhibited considerable fluctuations over time, driven by factors including policy interventions, supply-side shocks, and global economic conditions. Employing structural break analysis allows for the identification of periods in which the underlying inflation dynamics have undergone significant changes, offering a clearer understanding of the temporal shifts. Such an approach is essential for examining the impact of various events on inflationary trends in the Indian context.

**Table 2: Bai - Perron multiple break test**

| Model | Break Years | | | | | |
|---|---|---|---|---|---|---|
| 1 | | | 1995 | | | |
| 2 | | 1986 | | 2003 | | |
| 3 | 1982 | | 1994 | | 2007 | |
| 4 | 1980 | 1990 | | 2000 | 2010 | |
| 5 | 1978 | 1986 | 1994 | 2002 | 2011 | |
| 6 | 1977 | 1984 | 1991 | 1998 | 2005 | 2012 |

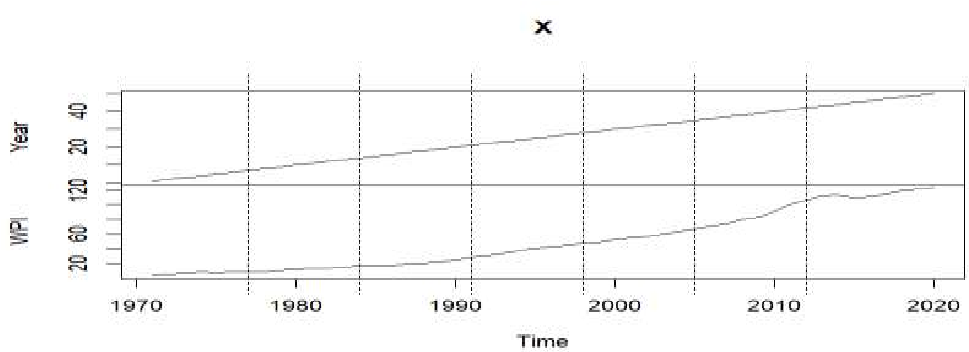
*Source: Author's estimation*

**Table 3: Model fitting & model selection based on Bai- Perron test**

| Break Points & Year | 0 | 1 (1977) | 2 (1984) | 3 (1991) | 4 (1998) | 5 (2005) | 6 (2012) |
|---|---|---|---|---|---|---|---|
| RSS | 10412.5 | 2600.0 | 1156.0 | 650.0 | 412.5 | 288.0 | 210.0 |
| BIC | 416.7 | 355.1 | 322.4 | 301.4 | 286.5 | 276.4 | 268.4 |

*Source: Author's estimation*

**Figure2: Trends in WPI and structural breaks**




*Source: Author's estimation*

The Bai-Perron multiple structural break test results indicate that WPI headline inflation in India has experienced considerable fluctuations over the past 50 years, with six significant structural breaks identified between 1971–72 and 2020–21. The first period of high inflation occurred between 1971–72 and 1977–78, with an average rate of 9.88 percent, peaking in 1974–75. This surge in the 1970s was driven by multiple factors, including wars, droughts, the 1966-rupee devaluation, the Green Revolution, monetary expansion through deficit financing, population growth, and rising global food prices. Inflation declined sharply in 1975–76 and stabilized around 5 percent by 1978–79, aided by good agricultural yields, government interventions, and measures against hoarding and speculation (Bhargava & Balachandran, 1977; Pandit,1978). Overall, the early 1970s illustrate how a combination of domestic and external shocks shaped inflationary trends in India.

The second structural break in inflation occurred during 1984–85, covering the period from 1978–79 to 1984–85, with average inflation rising to 10.47 per cent, slightly higher than the previous phase. WPI headline inflation fluctuated between 0.05 per cent and 18.20 per cent, initially stabilizing in 1978–79 due to two good harvests, which caused sharp declines in agricultural commodity prices. However, supply deterioration over the next two years, lower agricultural production, high exports of fruits and vegetables, and the second global oil crisis of 1979 contributed to rising prices (Economic Survey 1978-79; 1979-80; 1981-82). The economy faced severe strain in 1979–80, with growth contracting to -4.65 per cent and inflation surging to 17.05 per cent, prompting expansionary policies that further fueled inflation, which peaked at 18.20 per cent the following year.

The third structural break in India's inflation occurred in 1991–92, covering the period 1985–86 to 1991–92. During this phase, headline inflation fluctuated around 9 per cent per year, rising from 4.41 per cent in 1985–86 to 13.74 per cent in 1991–92, with double-digit inflation observed in 1990–91 and 1991–92. The bad monsoon of 1986–87 adversely affected kharif crops and other agricultural produce, contributing to higher food prices, while unfavorable balance of payments (BOP) conditions, import dependence, and protectionist policies abroad further fueled inflation in 1987–88. Subsequent declines in inflation during 1988–89 were supported by timely anti-inflationary measures, tight monetary and fiscal policies, improved agricultural output due to good monsoons, and supply-side interventions including public distribution and employment schemes. However, rising import prices of metals, machinery, and paper, along with strong export demand, led to higher inflation in the late 1980s. The twin deficits and resultant macroeconomic crisis prompted stabilization programs and structural reforms in 1991, including a 37 per cent depreciation of the rupee, which, coupled with rising procurement and fuel prices, supply-demand imbalances, and phased economic liberalization, further escalated inflation in the early 1990s (Economic Survey 1987–88 to 1990–91; Samantaraya & Pattnaik, 2006).

The fourth structural break in WPI headline inflation has been observed in the year 1998-99, covering the period between 1992-93 and 1998-99. During this period, inflation moderately declined in comparison with the previous period, from 8.78 per cent to 7.28 per cent. During this period, headline inflation ranged between 12.6 per cent in 1994-95 and 4.40 per cent in 1997-98 and marked a continuous fall in the rate of inflation except in 1994-95 and 1998-99. During this period, lowering of inflation is attributed to large inflow of capital from abroad, improved monetary and fiscal interface, reforms in government security market, liberalisation of internal and external trade and rationalisation of taxes as a consequence of implementation of new economic policy *(Samantaraya & Pattnaik,2006)*.

The next structural break occurred in 2005-06, covering the period 1999-2000 to 2005-06, during which average inflation declined to 5.09 per cent per annum. In 1999-2000, WPI headline inflation fell from 5.95 to 3.27 per cent, driven by a sharp decline in primary articles (12.05% to 1.15%) and manufactured products (4.38% to 2.69%), while fuel and power inflation surged from 3.2 to 9.09% due to a 40% hike in diesel prices following a rise in international crude oil prices. The moderate inflation in manufactured products was further supported by low demand and reduced prices of agricultural raw materials. Headline inflation rose to 7.16 per cent in 2000-01, primarily due to a surge in fuel and power inflation, reflecting escalating global crude oil prices. Inflation decelerated to 3.6 per cent in 2001-02 as fuel and power prices moderated amid low crude prices, weak domestic demand, and industrial slowdown. In 2002-03, despite poor kharif output and rising global oil prices, inflation remained subdued due to food grain releases through public distribution and open market sales. From 2003-04 onwards, inflation increased across all subgroups, driven by primary articles, manufactured food products, and fuel and power, influenced by global oil prices, OPEC production cuts, high coal prices, and Iraq war tensions. In 2004-05, inflation peaked at 6.48 per cent due to supply pressures, high domestic food prices, and rising global oil demand, but declined in 2005-06 to 4.5 per cent following favorable monsoon conditions and monetary and fiscal policy measures (Economic Survey 1999–2005).

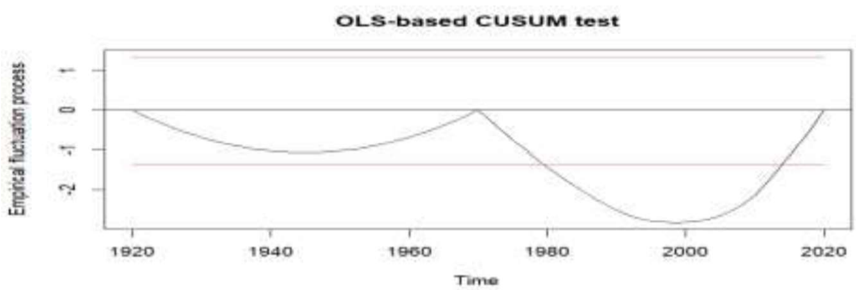
The last structural break in Indian inflation was observed in 2012-13, covering the period from 2006-07 to 2012-13. Headline inflation rose to 6.6 per cent in 2006-07, driven by sharp increases in primary articles and manufactured products, particularly wheat, pulses, and edible oils, due to supply shocks. Inflation declined to 4.67 per cent in 2007-08 following fiscal, monetary, and administrative interventions (Economic Survey, 2007-08). In 2008-09, headline inflation surged to 8.06 per cent, the highest of the decade, largely due to rising prices of edible oils, mineral oils, refinery products, and iron and steel, amid global crude oil price increases. The influence of the 2008 worldwide financial meltdown on India was limited due to the economy's domestic-driven growth and neutral trade policies (Economic Survey, 2008-09). Subsequently, inflation fell sharply to 3.81 per cent in 2009-10, influenced by declines in fuel and manufactured product prices, despite increases in primary articles, reflecting the effects of global slowdown and adverse monsoons (Economic Survey, 2010-11).

However, inflation escalated to 9.56 per cent in 2010-11 due to rising food and fuel prices, including condiments, eggs, milk, and imported edible oils, with international price volatility exacerbating domestic inflation (Economic Survey, 2010-11). The following year, 2011-12, saw a modest decline to 8.93 per cent, attributed to monetary tightening, fiscal measures, and global factors. Prices of primary articles fell from 17.75 to 9.81 per cent, although crude petroleum and minerals recorded higher inflation. Manufactured product prices increased, particularly in metals, chemicals, textiles, and edible oils, reflecting both domestic and global commodity price pressures, including crude petroleum rising to US $110 per barrel by December 2011 (Economic Survey, 2011-12).

After the last structural break in 2012-13, India's headline inflation declined sharply, averaging 1.33 per cent annually, and ranged between 5.24 per cent in 2013-14 and 1.24 per cent in 2014-15, before entering negative territory at -3.69 per cent in 2015-16. The initial moderation was largely due to deceleration in manufactured products (5.30 percent) and fuel and power (7.10 percent), driven by lower international and domestic prices of metals, chemicals, and textiles, while certain primary articles such as minerals and crude petroleum also registered declines (Economic Survey, 2012-13). In 2013-14, inflation eased across most commodity groups except fuel and power, with global commodity price moderation, particularly in energy, contributing to this trend (Economic Survey, 2013-14 & Global

Economic Prospects, October 2014). The sharp fall in 2014-15 and deflation in 2015-16 were primarily influenced by declines in global crude oil and tradable commodity prices, coupled with tight domestic monetary policy, although domestic supply constraints caused selective food price increases, especially pulses (Economic Survey, 2014-15 & 2015-16). From 2016-17 onwards, WPI headline inflation reversed, rising to 1.73 per cent in 2016-17 and 4.36 per cent in 2018-19, reflecting higher global commodity and energy prices and base effects, while fuel and power inflation increased markedly. Food inflation, however, decelerated due to deflation in pulses, condiments, fruits, vegetables, and protein-rich items (Economic Survey, 2016-17;2017-18 & 2018-19). During 2019-20 and 2020-21, headline inflation again moderated, mainly due to deflation in fuel and power, volatility in global crude oil prices amid the COVID-19 pandemic, and a slowdown in primary articles inflation, though manufactured products experienced moderate inflation driven by basic metals, chemicals, and motor vehicles.

**Figure 3: CUSUM test**




*Source: Author's estimation*

The CUSUM test is used for assessing the stability of data. By utilising the CUSUM test, WPI for the period 1971-72 to 2020-21 has been tested. The test result shows that there exist six structural breaks in WPI headline inflation in India for the reference period because the plotted line exceeds the lower boundary of the graph and concludes that there is no stability in inflation. Alternatively, the Chow test has been carried out on each structural break in order to determine whether the breaks are significant or not. The results display that breaks are significant as the p-values are less than 5% at each break-point as well as the calculated values of F statistic are more than the table value. The negative sign of the coefficients of the Chow test indicates a downward trend of inflation over the breaks.

**Table 4: Chow test result**

| Break Year | Coefficient | Calculated Values of F-statistic | Table Value of F-statistic | P-value | Decision |
|---|---|---|---|---|---|
| 1977 | −30.7477 | 19.0644 | 3.199 | 0.0000 | Significant |
| 1984 | −43.5509 | 71.8023 | 3.199 | 0.0000 | Significant |
| 1991 | −53.1228 | 128.371 | 3.199 | 0.0000 | Significant |
| 1998 | −62.8740 | 108.971 | 3.199 | 0.0000 | Significant |
| 2005 | −60.3011 | 74.5931 | 3.199 | 0.0000 | Significant |
| 2012 | 39.2473 | 27.8879 | 3.199 | 0.0000 | Significant |

*Source: Author's estimation*

## 4. Conclusions

Inflation plays a significant role in every economy as a crucial measure of economic stability and growth. In the 1970s and early 1980s, India experienced periods of hyperinflation, which was punctuated by periods of moderate inflation. With an average inflation rate of about 6% annually, India is still among the economies that are experiencing lower inflation. However, the WPI headline inflation exhibits temporal fluctuations, as evidenced by the Bai-Perron multiple structural break test. The test identified six major structural breaks in the inflation trajectory of the Indian economy. Alternatively, the CUSUM test also supported the occurrence of structural breaks in the inflation data set of the country. The Chow test result signifies each break identified by the Bai- Perron multiple break test.

The twin wars, the severe drought in the mid-1960s, the introduction of a new agricultural strategy, the devaluation of the Indian rupee in 1966, and the Government of India's deficit financing policy were all blamed for the first break period's average annual inflation of nearly 10 percent. Over the next period, which spanned from 1978–1979 to 1984–1985, the WPI headline inflation grew gradually and averaged 10.47 percent. The main causes of this spike in inflation are domestic supply shocks, as well as rising costs for essential inputs like steel, iron, and imported crude oil. There was a slight decrease in average annual inflation to 8.78 percent between 1985–1986 and 1991–1992. The primary causes of inflation during this phase were supply shocks brought on by a poor monsoon, an unfavorable BoP, and global factors like a drop in oil production, protectionist policies abroad, higher import prices of metals, machinery, and paper goods, along with the introduction of reform policies. During 1992–93, WPI inflation declined moderately from 8.78 to 7.28 percent, driven by rupee depreciation under economic reforms, rising costs of essential commodities, supply-demand imbalances in items like edible oils and pulses, and a sharp increase in fuel prices. Between 1999–2000 and 2005–06, India's annual inflation declined to 5.09 percent, primarily driven by rising costs of electricity, fuel, and non-food commodities such as minerals, crude oil, and natural gas. However, WPI headline inflation increased to 6.97 percent during 2006–07 to 2012–13, primarily driven by rising costs of manufactured goods, primary articles, and fuel. However, following the structural break in 2012–13, the average annual inflation rate declined sharply to 1.33 percent.

In short, from 1971–1972 to 2020–21, the WPI headline inflation shows a declining trend. To explain the structural breaks in the inflation trajectory of the Indian economy, this study extensively used the existing theories and literature. It is evident from the above discussion that inflation in India is not driven by a single factor, but a bi-product of multifaceted factors, like food and fuel prices, variations in global commodity prices, monetary and fiscal policy actions, structural reforms, technological advancement etc.

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