

Long-Run and Short-Run Dynamics of Inflation in India: An ARDL Investigation of Fiscal and Monetary Policy

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Abstract

This study investigates the long-run and short-run determinants of inflation in India using the Autoregressive Distributed Lag (ARDL) approach with quarterly data from 2012Q1 to 2024Q4. The analysis examines the effects of the repo rate, reverse repo rate, gross value added, and gross fiscal deficit on inflation. The ARDL bounds test confirms the existence of a stable long-run cointegrating relationship among the variables. The results reveal that the repo rate, gross value added, and fiscal deficit significantly influence inflation in the long run, while short-run dynamics indicate delayed effects of monetary policy and fiscal adjustments. Diagnostic and stability tests confirm the robustness of the estimated model. The findings underscore the importance of coordinated monetary and fiscal policies, credible inflation targeting, and sustained productivity growth to achieve long-term price stability in India.

Keywords: Inflation, Monetary Policy, Fiscal Deficit, Repo Rate, Gross Value Added, ARDL Error Correction Model.

JEL Classification: E31 – Price Level Inflation, E52 – Monetary Policy, E62 – Fiscal Policy and C22 – Time-Series Models.

I. INTRODUCTION

Inflation represents one of the most significant macroeconomic challenges faced by developing economies. In the case of India, inflation assumes particular importance due to its direct influence on economic growth, purchasing power, income distribution, and overall financial stability. As the central banking authority of the country, the Reserve Bank of India (RBI) plays a crucial role in maintaining price stability while simultaneously supporting sustainable economic growth. Among the various instruments available to the central bank, interest rate policy—particularly adjustments in the repo rate—serves as the primary mechanism for controlling inflation. The interaction between RBI interest rates and inflation therefore forms a central component of India's monetary policy framework and its broader macroeconomic stability.

Inflation refers to a sustained increase in the general price level of goods and services over a

period of time. While moderate inflation is often considered a natural outcome of economic growth, excessive or volatile inflation can have adverse economic consequences. High inflation erodes purchasing power, discourages savings and investment, and creates uncertainty within the economy. In a developing country such as India, where a substantial proportion of the population belongs to middle- and lower-income groups, increases in the prices of essential commodities—particularly food and fuel—can significantly affect living standards. Consequently, controlling inflation constitutes a primary objective of monetary policy.

To achieve price stability, the RBI follows an inflation-targeting framework. Under this system, the central bank aims to maintain inflation—measured by the Consumer Price Index (CPI)—at a target rate of 4 percent, with a tolerance band of ± 2 percent. The adoption of flexible inflation targeting has strengthened the role of interest rate policy in macroeconomic management. Decisions regarding policy rates are undertaken by the Monetary Policy Committee (MPC), which periodically evaluates prevailing economic conditions and determines appropriate policy adjustments. Within this framework, the repo rate—the rate at which the RBI lends short-term funds to commercial banks—functions as the benchmark policy rate that influences liquidity conditions and credit availability in the economy.

Interest rate policy affects inflation primarily through the aggregate demand channel. When inflationary pressures emerge due to excessive demand in the economy, the RBI may increase the repo rate. A higher repo rate raises the cost of borrowing for commercial banks, which subsequently leads to an increase in lending rates for businesses and households. As borrowing becomes more expensive, both consumption and investment expenditure tend to decline. The

resulting reduction in aggregate demand helps alleviate upward pressure on prices, thereby contributing to inflation control. This process illustrates how contractionary monetary policy can moderate demand in an overheating economy.

Conversely, during periods of low inflation and sluggish economic growth, the RBI may adopt an expansionary monetary stance by reducing interest rates. Lower borrowing costs encourage businesses to undertake new investments and stimulate consumer spending. This policy approach supports economic expansion by increasing aggregate demand and economic activity. However, such policy measures must be implemented cautiously to prevent excessive demand that could lead to renewed inflationary pressures. Consequently, interest rate decisions require a careful balance between maintaining price stability and promoting economic growth.

Another important channel through which interest rate policy influences inflation is through expectations. Inflation is not determined solely by current supply and demand conditions; it is also shaped by the expectations of households, firms, and financial markets. If economic agents anticipate higher future prices, they may increase current spending or demand higher wages, thereby contributing to inflationary pressures. By signaling its commitment to price stability through appropriate and timely adjustments in interest rates, the RBI can anchor inflation expectations. Transparent and credible monetary policy strengthens public confidence and enhances the effectiveness of interest rate interventions.

Interest rate policy also affects inflation through the exchange rate channel. Higher domestic interest rates tend to attract foreign capital inflows as investors seek higher returns on

financial assets. Increased capital inflows can lead to an appreciation of the domestic currency, which reduces the cost of imports. This, in turn, helps mitigate imported inflation, particularly for commodities such as crude oil and other raw materials. In India, where energy imports constitute a significant component of the trade balance, exchange rate stability plays an important role in managing inflationary pressures. Therefore, RBI interest rate decisions indirectly influence inflation by affecting currency valuation and external sector dynamics.

Despite the importance of interest rate policy, its impact on inflation is not immediate. Monetary policy typically operates with significant time lags, meaning that changes in interest rates may take several months to fully influence economic activity and price levels. Furthermore, certain forms of inflation—especially supply-side inflation caused by poor agricultural output, global commodity price shocks, or disruptions in supply chains—may not respond effectively to interest rate adjustments alone. In such circumstances, fiscal policy measures and structural reforms are necessary to complement monetary policy in addressing inflationary pressures.

The role of interest rate policy in controlling inflation has been evident during various episodes of high inflation in India. During periods characterized by rising food and fuel prices, the RBI has often adopted a tighter monetary stance to contain inflationary expectations and prevent second-round effects. Similarly, during global economic shocks and financial disruptions, the central bank has calibrated its policy rate decisions carefully to maintain both price stability and financial resilience. These experiences demonstrate the adaptive and responsive nature of RBI's monetary policy framework.

In conclusion, interest rate policy plays a fundamental role in controlling inflation in India. Through adjustments in the repo rate and related policy instruments, the RBI regulates liquidity conditions, influences borrowing and spending behavior, shapes inflation expectations, and contributes to exchange rate stability. Although interest rate policy alone cannot address all sources of inflation, it remains the cornerstone of India's monetary strategy. Effective implementation of monetary policy—supported by institutional credibility and coordination with fiscal authorities—ensures that inflation remains within manageable limits, thereby promoting sustainable economic growth and long-term financial stability.

II. LITERATURE REVIEW

Inflation remains one of the principal indicators of macroeconomic stability and a primary objective of monetary policy. Since the adoption of flexible inflation targeting, the Reserve Bank of India (RBI) has relied predominantly on policy interest rates to maintain price stability while supporting sustainable economic growth. Nevertheless, the effectiveness of monetary policy in controlling inflation is influenced by several factors, including fiscal policy, economic activity, inflation expectations, and the efficiency of the monetary transmission mechanism. Consequently, the determinants of inflation have attracted considerable attention in both theoretical and empirical research, although the magnitude and persistence of these relationships differ across countries and over time.

The theoretical literature, largely based on the New Keynesian framework, argues that policy interest rates influence inflation through multiple transmission channels, including aggregate demand, credit conditions, exchange rates, and inflation expectations. Rather than acting independently, these channels operate

simultaneously to influence the general price level. Clarida et al. (2018) demonstrate that systematic monetary policy responses to inflation are essential for maintaining macroeconomic stability, while Ascari and Sbordone (2016) show that the effectiveness of monetary policy depends on the prevailing inflation environment. Svensson (2020) further argues that credible inflation-targeting regimes strengthen monetary policy by anchoring inflation expectations. More recent theoretical studies acknowledge that unconventional policy instruments, such as quantitative easing and negative interest rate policies, have become increasingly relevant under low-interest-rate environments (Dell'Ariccia et al., 2018; Bernanke et al., 2019). Collectively, these studies establish the theoretical basis for using policy interest rates as the principal instrument for inflation stabilization, while also recognising that policy effectiveness depends on broader macroeconomic conditions.

Empirical evidence generally supports the proposition that monetary policy exerts a significant influence on inflation, although the strength and timing of the transmission mechanism vary across economies. Gertler and Karadi (2015) demonstrate that monetary policy shocks affect credit markets and aggregate demand through the financial transmission channel, whereas Nakamura and Steinsson (2018) provide evidence that policy-induced interest rate changes have persistent effects on both inflation and real economic activity. Cross-country evidence reported by Ha et al. (2022) indicates that tighter monetary policy contributes to lower inflation in emerging and developing economies, although the magnitude of the response depends on institutional quality and financial market development. Similarly, Hofmann et al. (2021) identify the exchange rate as an important channel through which monetary policy influences domestic inflation, particularly in open

economies. Recent assessments by the International Monetary Fund (2023) further confirm that post-pandemic monetary tightening successfully moderated inflationary pressures in many economies, albeit with heterogeneous outcomes reflecting country-specific structural characteristics.

Although international evidence consistently confirms the importance of monetary policy in controlling inflation, empirical findings for India remain comparatively limited and inconclusive. Early evidence by Chakraborty and Varma (2015) shows that both demand-side and supply-side factors significantly influence inflation in India and argues that inflation cannot be explained solely by monetary variables. Using the ARDL framework, Rasool and Tarique (2018) find a stable long-run relationship between inflation and its macroeconomic determinants, highlighting the importance of estimating both long-run equilibrium and short-run adjustments. More recently, Das et al. (2024) demonstrate that inflation in India is jointly influenced by money supply, lending interest rates, exchange rates, oil prices, output growth, and external sector variables, suggesting that inflation arises from the interaction of monetary and real-sector factors rather than from a single policy instrument. Similarly, Kumari and Kumar (2025) report that monetary policy instruments significantly affect price stability in both the short run and the long run using an ARDL framework, while also emphasising the importance of accounting for structural changes in India's monetary policy regime. These findings collectively indicate that inflation in India is shaped by multiple macroeconomic forces whose effects evolve over time.

Despite these contributions, several gaps remain in the existing literature. First, many studies examine either monetary policy variables or fiscal

variables in isolation, providing limited evidence on their combined influence on inflation. Second, a substantial proportion of previous research employs VAR, SVAR, or panel estimation techniques, which primarily focus on dynamic responses to policy shocks but provide comparatively limited evidence on both long-run equilibrium relationships and short-run adjustment processes. Third, much of the available evidence relies on annual data or predates important institutional developments, including the adoption of the flexible inflation-targeting framework and the monetary policy adjustments implemented during and after the COVID-19 pandemic. Consequently, the recent behaviour of inflation under India's evolving monetary policy framework remains insufficiently examined.

The present study addresses these limitations in several ways. First, it jointly examines the effects of monetary policy, fiscal policy, and economic activity on inflation within a unified empirical framework. Second, it employs the Autoregressive Distributed Lag (ARDL) approach, which is particularly suitable for estimating both long-run equilibrium relationships and short-run dynamics in the presence of variables integrated of mixed orders. Finally, by using quarterly data covering the period from 2012Q1 to 2024Q4, the study captures recent structural changes in India's monetary policy framework and provides updated evidence on the determinants of inflation. The findings are expected to contribute to the growing literature on inflation dynamics in India and provide useful policy implications for achieving price stability through coordinated monetary and fiscal policy.

III. RESEARCH GAP

Although the theoretical and empirical literature strongly establishes that interest rate adjustments are a primary tool for controlling inflation, several

important gaps remain unresolved. Theoretical models such as the New Keynesian framework emphasize systematic monetary policy rules and expectation anchoring mechanisms, yet these models often assume well-functioning financial markets, rational expectations, and stable structural relationships. In reality, developing and emerging economies experience structural rigidities, fiscal dominance, supply-side shocks, and external vulnerabilities that may weaken the conventional interest rate transmission mechanism.

Empirical studies using VAR, SVAR, panel regressions, and cross-country datasets largely confirm that contractionary monetary policy reduces inflation over time. However, much of this evidence is concentrated in advanced economies, particularly the United States and the Euro Area. Cross-country panel studies, while broader in scope, often mask country-specific dynamics by averaging heterogeneous responses. Consequently, the magnitude, speed, and stability of interest rate pass-through to inflation remain insufficiently examined in country-specific contexts, especially in developing economies where financial markets are less deep and informal sectors are large.

Furthermore, recent post-pandemic inflation episodes highlight structural changes in inflation dynamics, including supply-chain disruptions, commodity price volatility, and geopolitical shocks. Existing empirical models may not fully capture these nonlinearities, structural breaks, or asymmetric effects of monetary policy during crisis and recovery periods. There is also limited evidence on the long-run versus short-run dynamics of interest rate adjustments under changing monetary policy regimes, particularly in economies that have transitioned toward inflation targeting frameworks.

Another important gap relates to methodological limitations. While many studies employ VAR and panel techniques, fewer studies use cointegration-based approaches such as ARDL

bounds testing to distinguish between long-run equilibrium relationships and short-run adjustments. The speed of adjustment toward equilibrium and the stability of the inflation–interest rate nexus over time remain areas requiring deeper investigation.

Therefore, this study seeks to fill these gaps by providing a country-specific, time-series analysis of the relationship between interest rates and inflation, distinguishing between short-run and long-run effects, and examining the stability of the monetary transmission mechanism. By employing ARDL and ECM approach, this research contributes to the literature by offering updated empirical evidence in the post-pandemic context and by addressing structural characteristics unique to the selected economy.

IV. OBJECTIVES OF THE STUDY

The primary objective of this study is to examine the dynamic relationship between inflation and macroeconomic policy variables using the ARDL bounds testing framework. Specifically, the study aims:

1. To investigate the existence of a long-run cointegrating relationship between inflation (LNAICPI), fiscal deficit (GFD), gross value added (LNGVA), repo rate (LNREPO), and reverse repo rate (LNRREPO).
2. To analyse the short-run dynamics and transmission effects of fiscal deficit and monetary policy instruments on inflation.
3. To estimate the speed of adjustment toward long-run equilibrium using the Error Correction Model (ECM).
4. To examine the relative effectiveness of fiscal policy and monetary policy instruments in controlling inflation.
5. To provide policy recommendations for coordinated fiscal and monetary stabilization strategies aimed at achieving

sustainable price stability.

V. RESEARCH METHODOLOGY

This study investigates the long-run and short-run effects of monetary and fiscal policy variables on inflation in India using the Autoregressive Distributed Lag (ARDL) modelling framework. The ARDL bounds testing approach, proposed by Pesaran et al. (2001), is employed because it is appropriate for estimating both short-run and long-run relationships when the variables are integrated of mixed orders, $I(0)$ and $I(1)$, provided that none is integrated of order two, $I(2)$. Furthermore, the ARDL approach performs well in small samples and simultaneously estimates the dynamic adjustment process and long-run equilibrium relationship.

The empirical analysis is based on quarterly time-series data covering the period from 2012Q1 to 2024Q4, yielding 52 observations. The study employs the natural logarithm of the Consumer Price Index (LNAICPI) as the dependent variable, while the explanatory variables comprise the natural logarithm of the Repo Rate (LNREPO), the natural logarithm of the Reverse Repo Rate (LNRREPO), the natural logarithm of Gross Value Added (LNGVA), and Gross Fiscal Deficit (GFD). Logarithmic transformation is applied to all variables except Gross Fiscal Deficit to stabilise the variance, mitigate potential heteroscedasticity, and facilitate elasticity-based interpretation of the estimated coefficients.

The empirical investigation proceeds through several stages. Initially, descriptive statistics are computed to summarise the distributional characteristics of the variables, including measures of central tendency and dispersion. Subsequently, Pearson's correlation analysis is performed to examine the degree of linear association among the study variables. To assess the presence of multicollinearity, the Variance

Inflation Factor (VIF) is estimated, with acceptable VIF values indicating the absence of severe multicollinearity.

The stationarity properties of the variables are then examined using the Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) unit root tests. These tests determine the order of integration of each variable and verify the suitability of applying the ARDL methodology. Since the variables exhibit a mixed order of integration, the ARDL bounds testing procedure is considered appropriate.

The optimal lag structure is selected using the Akaike Information Criterion (AIC), after which the ARDL bounds test is employed to determine the existence of a long-run equilibrium relationship among the variables. Upon confirmation of cointegration, the long-run coefficients are estimated within the ARDL framework. The associated Error Correction Model (ECM) is subsequently estimated to analyse the short-run dynamics and the speed at which deviations from the long-run equilibrium are corrected following short-term shocks. The statistical significance and negative sign of the error correction term provide evidence of convergence towards long-run equilibrium.

To ensure the robustness and reliability of the estimated model, several post-estimation diagnostic tests are conducted. These include the Breusch–Godfrey Serial Correlation LM test for autocorrelation, the Breusch–Pagan–Godfrey test for heteroscedasticity, the Jarque–Bera test for normality of residuals, and the Ramsey RESET test for model specification. In addition, the stability of the estimated coefficients is examined using the CUSUM and CUSUM of Squares (CUSUMSQ) tests. All empirical analyses are performed using Eviews software package.

Model Specification

The empirical model examining the determinants of inflation is specified as follows:

$$LNAICPI_t = \beta_0 + \beta_1 LNREPO_t + \beta_2 LNRREPO_t + \beta_3 LNGVA_t + \beta_4 GFD_t + \epsilon_t$$

where
 $LNAICPI$ = Natural logarithm of Consumer Price Index (Inflation)
 $LNREPO$ = Natural logarithm of Repo Rate
 $LNRREPO$ = Natural logarithm of Reverse Repo Rate
 $LNGVA$ = Natural logarithm of Gross Value Added
 GFD = Gross Fiscal Deficit
 ϵ_t = Error term

Table 1: Variables used for study

Variable	Proxy	Nature
Inflation	LNAICPI	Dependent Variable
Repo rate	LNREPO	Independent variable
Reverse repo rate	NRREPO	Independent variable
Fiscal Deficit	GFD	Independent variable
Gross value added	LNGVA	Control Variable

To reduce heteroscedasticity and facilitate elasticity interpretation, all variables except Gross Fiscal Deficit were transformed into natural logarithms.

The study uses quarterly data covering the period 2012Q1 to 2024Q4, comprising 52 observations. Data were obtained from the Reserve Bank of India's Database on the Indian Economy (DBIE). Owing to the lag structure selected in the ARDL model, the effective estimation sample was reduced to 48 observations, which is the sample used for the ARDL estimation and subsequent diagnostic tests.

VI. DATA ANALYSIS AND RESULTS

Descriptive Statistics

The descriptive statistics of the study variables based on 52 quarterly observations. The mean values indicate that LNAICPI, LNREPO, LNRREPO, LNGVA, and GFD are 1.703, 1.815, 1.598, 14.929,

and 84,135.81, respectively. Among the variables, GFD exhibits the highest variability (standard deviation = 70,541.90), whereas LNGVA shows the lowest variability (standard deviation = 0.214), indicating relatively stable economic output over the sample period.

The skewness values suggest that most variables are slightly negatively skewed, except GFD, which is positively skewed. The kurtosis values are generally close to the benchmark value of three, indicating no serious departure from normality. The Jarque–Bera test reveals that LNAICPI, LNREPO, and LNGVA are normally distributed, while LNRREPO and GFD deviate from normality at the 5% significance level. However, this does not affect the validity of the ARDL model, as the ARDL approach does not require normally distributed variables.

Table 2: Descriptive Statistics

STATS	LNAICPI	LNREPO	LNRREPO	LNGVA	GFD
Mean	1.703	1.815	1.598	14.929	84135.81
Median	1.678	1.872	1.749	14.954	79498.50
Maximum	2.370	2.140	2.015	15.336	275051.70
Minimum	0.792	1.386	1.209	14.532	-17346.33
Std. Dev.	0.379	0.225	0.309	0.214	70541.90
Skewness	-0.232	-0.769	-0.339	-0.073	0.931
Kurtosis	2.782	2.584	1.354	2.048	3.292
Jarque-Bera	0.569	5.503	6.865	2.008	7.690
Probability	0.752	0.064	0.032	0.366	0.021
Sum	88.540	94.387	83.099	776.314	4375062
Sum Sq.	158.086	173.919	137.666	11592.030	6.22.E+13
Sum Sq. Dev.	7.329	2.592	4.869	2.339	2.54.E+11
Observations	52	52	52	52	52

Source: Researchers' computations.

Correlation Analysis

The Pearson correlation matrix for the variables used in the study. The dependent variable, LNAICPI, exhibits a weak positive correlation with LNREPO ($r = 0.184$) and LNRREPO ($r = 0.050$), indicating that changes in the repo rate and reverse repo rate have only a weak linear association with inflation. In contrast, LNAICPI has a moderate negative correlation with LNGVA ($r = -0.420$), suggesting that higher gross value added is associated with lower inflation. The correlation between LNAICPI and GFD is negligible ($r = 0.021$).

Among the explanatory variables, LNREPO and LNRREPO are strongly positively correlated ($r = 0.722$), reflecting the close relationship between the policy rates. LNRREPO and LNGVA exhibit a strong negative correlation ($r = -0.855$), while LNRREPO is moderately negatively correlated with GFD ($r = -0.591$). LNREPO has moderate negative correlations with LNGVA ($r = -0.546$) and GFD ($r = -0.389$). Finally, LNGVA and GFD show a moderate positive correlation ($r = 0.516$).

Overall, although some independent variables are moderately to strongly correlated, the correlation coefficients remain below the commonly accepted multicollinearity threshold of 0.90. Therefore, the correlation analysis does not indicate severe multicollinearity, suggesting that the variables are suitable for inclusion in the ARDL model.

Table 3: Correlation Analysis

VARIABLE	LNAICPI	LNREPO	LNRREPO	LNGVA	GFD
LNAICPI	1	0.184	0.050	-0.420	0.021
LNREPO	0.184	1	0.722	-0.546	-0.389
LNRREPO	0.050	0.722	1	-0.855	-0.591
LNGVA	-0.420	-0.546	-0.855	1	0.516
GFD	0.021	-0.389	-0.591	0.516	1

Source: Researchers' computations.

Variance Inflation Factor(Multicollinearity)

The Variance Inflation Factor (VIF) was used to examine the presence of multicollinearity among the explanatory variables. The centered VIF values were 2.182 for LNREPO, 6.285 for LNRREPO, 1.645 for GFD, and 3.869 for LNGVA. Since all centered VIF values are below the commonly accepted threshold of 10, there is no evidence of serious multicollinearity in the model. Although LNRREPO exhibits the highest VIF (6.285), it remains within the acceptable range, indicating that multicollinearity is not severe and does not affect the reliability of the estimated coefficients.

Table 4: Variance Inflation Factor

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	21.287	21380.570	NA
LNREPO	0.044	146.421	2.182
LNRREPO	0.067	177.689	6.285
GFD	3.15E-13	3.789	1.645
LNGVA	0.086	19174.720	3.869

Stationarity Test

The stationarity properties of the variables were examined using the Augmented Dickey–Fuller (ADF) unit root test. The results indicate that none of the variables are stationary at their levels, as the p-values exceed the 5% significance level. However, after taking the first difference, all variables become stationary with statistically significant ADF test statistics ($p < 0.05$). Specifically, LNAICPI ($t = -5.994$, $p = 0.000$), LNREPO ($t = -3.416$, $p = 0.015$), LNRREPO ($t = -4.831$, $p = 0.000$), LNGVA ($t = -9.082$, $p = 0.000$), and GFD ($t = -16.147$, $p = 0.000$) are all stationary at first difference. Therefore, all variables are integrated of order one, $I(1)$. Since none of the variables are integrated of order two, $I(2)$, the ARDL bounds testing approach is appropriate for examining the long-run and short-run relationships among the variables.

Table 5: Unit Root Tests (Augmented Dickey Fuller Test)

Variables	t-Statistic (at level)	P Value (at level)	t-Statistic (1st difference)	P Value (1st difference)
LNAICPI	-2.256	0.190	-5.994	0.000
LNREPO	-1.782	0.385	-3.416	0.015
LNRREPO	-0.710	0.835	-4.831	0.000
LNGVA	-0.296	0.918	-9.082	0.000
GFD	-0.716	0.833	-16.147	0.000

Source: Researcher's computations.

Lag order selection

The optimal lag length was determined using the Vector Autoregression (VAR) lag order selection criteria. Five information criteria were

considered: the Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Criterion (SC), and Hannan–Quinn Criterion (HQ). As presented in the table, the AIC, FPE, LR, and HQ selected lag 4 as the optimal lag order, while the SC suggested lag 1. Since the Akaike Information Criterion (AIC) is generally preferred in ARDL modelling for relatively small samples because it captures richer dynamic relationships, lag 4 was selected for estimating the ARDL model.

Table 6: Lag Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	537.90	NA	4589.02	22.62	22.82	22.69
1	320.74	380.03	1.54	14.61	15.78371*	15.06
2	273.13	73.40	0.62	13.67	15.82	14.48
3	231.67	55.28	0.34	12.99	16.10	14.16
4	180.14	57.96571*	0.136409*	11.88094*	15.97	13.42779*

Auto Regressive Distributed Lag (ARDL) Model

The Autoregressive Distributed Lag (ARDL) model was estimated to examine the long-run and short-run relationship between inflation (LNAICPI) and the explanatory variables, namely the repo rate (LNREPO), reverse repo rate (LNRREPO), gross value added (LNGVA), and gross fiscal deficit (GFD).

The error correction term (ECT) is negative and highly significant (Coefficient = -1.5699 , $p < 0.01$), confirming the existence of a stable long-run equilibrium relationship among the variables. The error correction coefficient is negative and statistically significant (-1.570), confirming the existence of a long-run equilibrium relationship. Since the coefficient lies between -2 and -1 , the adjustment process is characterised by oscillatory convergence, implying that short-run deviations initially overshoot the long-run equilibrium before gradually converging. The CUSUM and CUSUMSQ tests indicate that the estimated model is stable, suggesting that the observed adjustment reflects

dynamic convergence rather than model instability.

Long-run Results

The long-run coefficients reveal that the repo rate (LNREPO) has a positive and statistically significant effect on inflation ($\beta = 1.4418$, $p = 0.0005$), indicating that a 1% increase in the repo rate is associated with approximately a 1.44% increase in inflation in the long run, holding other factors constant.

The reverse repo rate (LNRREPO) has a negative coefficient ($\beta = -0.3268$); however, the relationship is statistically insignificant ($p = 0.6808$), suggesting that it does not exert a meaningful long-run influence on inflation.

Gross Value Added (LNGVA) exhibits a negative and statistically significant relationship with inflation ($\beta = -4.4110$, $p < 0.01$). This implies that higher economic output contributes to lower inflationary pressure over the long run.

Similarly, Gross Fiscal Deficit (GFD) has a positive and significant effect on inflation ($\beta = 0.000024$, $p = 0.0007$), indicating that increases in fiscal deficit contribute to higher inflation over the long term.

Short-run Results

The short-run dynamics indicate that inflation exhibits significant persistence. The lagged differences of inflation, $D(LNAICPI(-1))$, $D(LNAICPI(-2))$, and $D(LNAICPI(-3))$, are all positive and statistically significant ($p < 0.01$), suggesting that previous inflation continues to influence current inflation.

For the repo rate, the contemporaneous change and the first two lagged changes are statistically insignificant. However, the third lag, $D(LNREPO(-3))$, has a negative and significant coefficient ($\beta = -4.2514$, $p = 0.0146$), indicating a delayed contractionary effect of monetary policy on inflation.

The contemporaneous and first two lagged changes in the reverse repo rate are insignificant,

while the third lag, $D(LNRREPO(-3))$, is positive and statistically significant ($\beta = 3.4282$, $p = 0.0178$), suggesting that changes in the reverse repo rate influence inflation with a time lag.

Regarding Gross Value Added, the contemporaneous change is insignificant, whereas the first lag is positive and significant ($\beta = 2.6317$, $p = 0.0115$). The second lag is marginally significant at the 10% level ($p = 0.0882$).

For Gross Fiscal Deficit, the contemporaneous change is positive and significant ($\beta = 3.05 \times 10^{-6}$, $p = 0.0249$), while the first and second lagged changes are negative and statistically significant ($p < 0.01$). The third lag is not statistically significant.

Model Fitness

The ARDL model explains approximately 66.3% of the variation in inflation ($R^2 = 0.6629$). The Adjusted R^2 is 0.3399, reflecting the inclusion of multiple lagged variables in the model. The overall model is statistically significant (F-statistic = 2.0524, $p = 0.0433$), indicating that the explanatory variables jointly explain inflation. The Durbin–Watson statistic of 1.7773 suggests no serious evidence of autocorrelation in the residuals.

Overall Interpretation

The empirical findings confirm a long-run cointegrating relationship among inflation, monetary policy variables, economic growth, and fiscal deficit. While the repo rate, Gross Value Added, and Gross Fiscal Deficit significantly influence inflation in the long run, the reverse repo rate does not. In the short run, inflation responds mainly to its own past values, delayed monetary policy effects, and changes in fiscal deficit. The significant and negative error correction term further confirms that short-run deviations converge rapidly toward the long-run equilibrium, validating the ARDL model.

Bound Test Results

The ARDL bounds test was conducted to examine the existence of a long-run relationship among the study variables. The computed F-statistic is 5.8862, which exceeds the upper bound critical values at the 10%, 5%, and 1% significance levels. For a sample size of approximately 48 observations, the upper bound critical values are 3.345 (10%), 3.905 (5%), and 5.173 (1%), while the estimated F-statistic is 5.8862. Since the calculated F-statistic is greater than the upper bound critical value even at the 1% significance level, the null hypothesis of no cointegration is rejected.

These results provide strong evidence of a stable long-run equilibrium relationship among the dependent and explanatory variables included in the ARDL model. Therefore, the estimation of both the long-run coefficients and the Error Correction Model (ECM) is appropriate.

Table 7: Bound Test Results

Levels	Sample Size	10%	5%	1%	Sample size	F-statistic
I(0)	45	2.402	2.85	3.892	48	5.886215
I(1)	45	3.345	3.905	5.173		
I(0)	50	2.372	2.823	3.845		
I(1)	50	3.32	3.872	5.15		
I(0)	Asymptotic	2.2	2.56	3.29		
I(1)	Asymptotic	3.09	3.49	4.37		

Source: Researchers' computations.

Table 8: ARDL Error Correction, Long and Short run Regressors

Cointegrating Equation				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
COINTEQ	-1.570	0.240	-6.533	0.000
Lon-run Regressors				
LNAICPI(-1)	-1.570	0.297	-5.282	0.000
LNREPO(-1)	1.442	0.360	4.008	0.001
LNRREPO(-1)	-0.327	0.785	-0.416	0.681
LNGVA(-1)	-4.411	0.968	-4.557	0.000
GFD(-1)	0.000	0.000	3.916	0.001
C	64.548	14.947	4.318	0.000
Short-run Regressors				
D(LNAICPI(-1))	0.927	0.244	3.797	0.001
D(LNAICPI(-2))	0.801	0.216	3.703	0.001
D(LNAICPI(-3))	0.538	0.190	2.827	0.009
D(LNREPO)	-1.333	1.449	-0.920	0.367
D(LNREPO(-1))	-2.396	1.429	-1.677	0.107
D(LNREPO(-2))	0.763	1.493	0.511	0.614
D(LNREPO(-3))	-4.251	1.616	-2.632	0.015
D(LNRREPO)	1.927	1.590	1.212	0.237
D(LNRREPO(-1))	0.907	1.509	0.601	0.554
D(LNRREPO(-2))	1.793	1.445	1.241	0.227
D(LNRREPO(-3))	3.428	1.347	2.544	0.018
D(LNGVA)	-0.418	0.701	-0.596	0.557
D(LNGVA(-1))	2.632	0.962	2.737	0.012
D(LNGVA(-2))	1.622	0.913	1.777	0.088
D(GFD)	0.000	0.000	2.392	0.025
D(GFD(-1))	0.000	0.000	-3.699	0.001
D(GFD(-2))	0.000	0.000	-3.372	0.003
D(GFD(-3))	0.000	0.000	-1.708	0.101

Model Summary

R-squared	0.663
Adjusted R-squared	0.340
S.E. of regression	0.179
Sum squared resid	0.773
Log likelihood	30.983
F-statistic	2.052
Prob(F-statistic)	0.043
Mean dependent var	-0.012
S.D. dependent var	0.221
Akaike info criterion	-0.291
Schwarz criterion	0.645
Hannan-Quinn criter.	0.063
Durbin-Watson stat	1.777

Source: Researchers' computations.

Residual Diagnostics

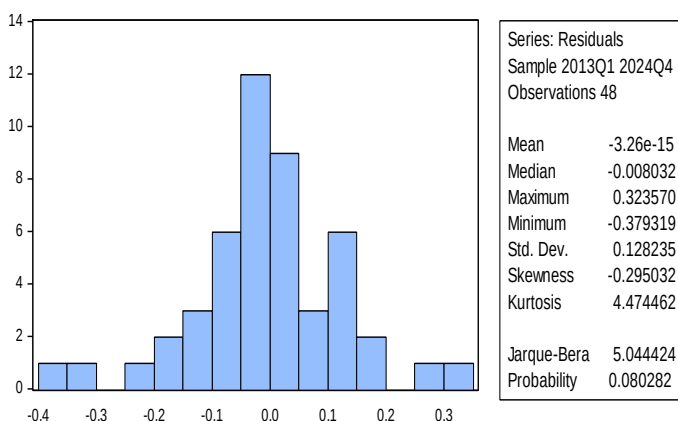
The residual diagnostic results assess whether the residuals from the ARDL model are normally distributed, which is an important assumption for valid statistical inference.

Normality Test

The normality of the residuals was examined using the Jarque–Bera (JB) test. The results indicate a Jarque–Bera statistic of 5.0444 with a corresponding probability value of 0.0803. Since the p-value is greater than the 5% significance level ($p > 0.05$), the null hypothesis of normally distributed residuals cannot be rejected. Therefore, the residuals are considered to be approximately normally distributed, satisfying the normality assumption of the ARDL model.

Further, the residuals exhibit a mean close to zero (-3.26×10^{-15}), indicating that the model errors are unbiased. The skewness value of -0.295 suggests a slight negative asymmetry, while the kurtosis value of 4.474 indicates a distribution that is moderately leptokurtic (more peaked than a normal distribution). However, these deviations are not statistically significant, as confirmed by the Jarque–Bera test. Overall, the normality test demonstrates that the residuals are adequately normally distributed, supporting the reliability of the estimated ARDL model and the validity of subsequent statistical inference.

Figure 1: Jarque-Bera Normality Test



Source: Researcher's Contribution

Heteroskedasticity Test

The Breusch–Pagan–Godfrey heteroskedasticity test was conducted to examine whether the variance of the residuals is constant. The null hypothesis of the test states that the residuals are homoskedastic (i.e., there is no heteroskedasticity). The results indicate that the F-statistic is 0.4246 with a probability value of 0.9797. Similarly, the Obs*R-squared statistic has a probability value of 0.9256, and the Scaled Explained SS statistic shows a probability value of 1.0000. Since all p-values are substantially higher than the 5% significance level, we fail to reject the null hypothesis of homoskedasticity.

This implies that there is no evidence of heteroskedasticity in the model residuals over the sample period (2013Q1–2024Q4, 48 observations). Therefore, the variance of the error term is constant, satisfying one of the key classical linear regression assumptions. Consequently, the estimated coefficients are efficient, and the standard errors, t-statistics, and F-statistics are

reliable for statistical inference. This confirms that the model does not suffer from heteroskedasticity-related specification problems.

Table 9: Breusch–Pagan–Godfrey heteroskedasticity test

Source: Researcher's computations

Serial correlation Test

The Breusch–Godfrey Serial Correlation LM test was conducted to examine the presence of autocorrelation in the residuals of the estimated ARDL model. The null hypothesis of the test states that there is no serial correlation up to four lags. The results indicate that the F-statistic is 0.096322 with a corresponding probability value of 0.9823. Similarly, the Obs*R-squared statistic is 1.005907 with a probability value of 0.9089. Since both probability values are substantially higher than

the conventional significance levels (1%, 5%, and 10%), the null hypothesis cannot be rejected.

These findings confirm the absence of serial correlation in the residuals of the model. This implies that the error terms are independently distributed and that the estimated ARDL model does not suffer from autocorrelation problems. Consequently, the estimated coefficients are efficient and unbiased, and the model satisfies one of the key classical linear regression assumptions. Therefore, the results strengthen the reliability and robustness of the estimated long-run and short-run relationships.

Table 10: Breusch-Godfrey Serial Correlation LM Test

Test Statistic	Value	Probability
F-statistic	0.332041	0.721
Obs*R-squared	1.406452	0.495
Sample (adjusted)	2013Q1 to 2024Q4	
Included observations	48	
Method	ARDL	
Null Hypothesis	No serial correlation up to 2 lags	

Source: Researcher's computations

Stability Diagnosis Tests

The stability of the estimated ARDL model was evaluated using the Cumulative Sum (CUSUM) and Cumulative Sum of Squares (CUSUMSQ) tests based on recursive residuals. As illustrated in Figures 2 and 3, both the CUSUM and CUSUMSQ statistics remain within the 5% critical bounds throughout the sample period. Since neither plot crosses the upper or lower critical boundaries, the null hypothesis of parameter stability cannot be rejected. These results indicate the absence of structural breaks and confirm that the estimated coefficients are stable over time. The findings suggest that the ARDL model satisfies the stability condition, implying that both the long-run and short-run parameter estimates are robust, reliable, and suitable for statistical inference and

policy analysis.

Figure 2: CUSUM Stability Diagnosis Test

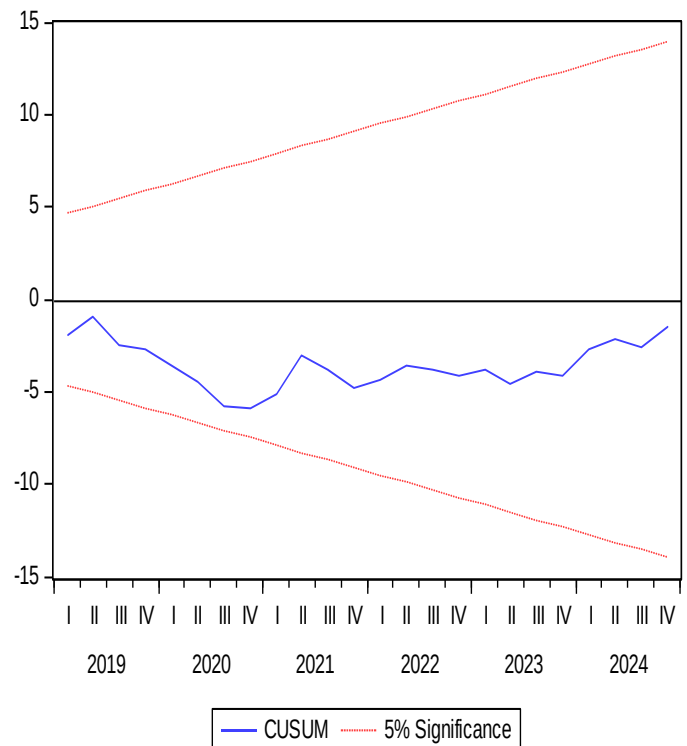
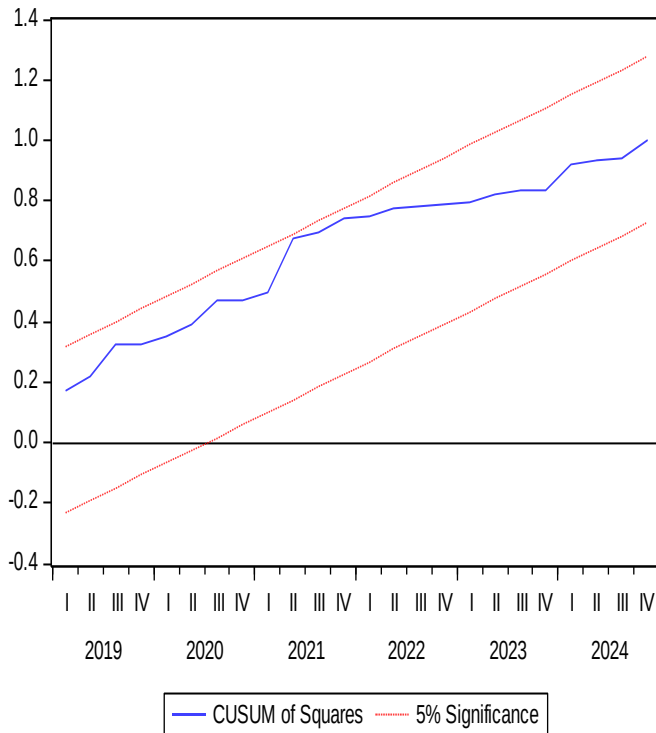


Figure 3: CUSUM Stability Diagnosis Test



VII. IMPLICATIONS AND POLICY RECOMMENDATIONS

The ARDL results provide robust empirical evidence of a long-run equilibrium relationship between inflation, monetary policy variables, economic activity, and fiscal deficit in India. The statistically significant and negative error correction coefficient confirms that short-run deviations converge toward the long-run equilibrium, indicating a stable adjustment mechanism. Furthermore, the reliability of the estimated model is reinforced by the diagnostic analysis. The model satisfies the residual diagnostic tests, exhibits parameter stability based on the CUSUM and CUSUMSQ tests, and shows no evidence of problematic multicollinearity according to the adopted diagnostic measures. Collectively, these results provide confidence that the estimated relationships are statistically reliable within the study period.

The long-run coefficient of the repo rate is positive and statistically significant, whereas the third lag of the repo rate exerts a significant negative effect on inflation in the short run. These findings suggest that the transmission of monetary policy operates with identifiable time lags. Rather than focusing solely on contemporaneous inflation outcomes, monetary policy decisions may therefore benefit from a forward-looking approach that recognizes the delayed effects of policy rate adjustments. The results support the importance of maintaining credible and predictable monetary policy, allowing sufficient time for transmission mechanisms to influence inflation dynamics.

The reverse repo rate is not statistically significant in the long run but exhibits a significant lagged short-run effect. This pattern indicates that its contribution to inflation management appears to be primarily through short-term liquidity conditions rather than as an independent long-run determinant of price stability. Consequently, the empirical evidence suggests that the reverse repo rate should continue to complement, rather than substitute for, the broader monetary policy framework implemented by the Reserve Bank of India.

The negative and statistically significant long-run coefficient of Gross Value Added indicates that sustained improvements in productive capacity are associated with lower inflation over time. This finding highlights the importance of supply-side policies that enhance productivity, improve infrastructure, strengthen manufacturing competitiveness, and reduce production bottlenecks. Such measures are likely to reinforce price stability by expanding productive capacity rather than relying exclusively on demand-management policies.

The positive and statistically significant long-run relationship between the fiscal deficit and

inflation indicates that persistent fiscal imbalances are associated with higher inflationary pressures over time. The short-run coefficients, however, reveal a dynamic adjustment process, with the contemporaneous effect differing from the lagged responses. This suggests that fiscal policy influences inflation through both immediate and delayed channels. Accordingly, the results support fiscal policies that promote medium-term fiscal sustainability while preserving productive public investment and growth-enhancing expenditure. The findings therefore favour improving the quality and efficiency of public expenditure alongside prudent fiscal management rather than advocating indiscriminate fiscal consolidation.

The significant adjustment coefficient further indicates that macroeconomic disturbances are corrected relatively quickly, suggesting that coordinated monetary and fiscal policies can effectively restore long-run equilibrium following temporary shocks. The estimated lag structure also demonstrates that policy interventions do not produce instantaneous effects, underscoring the importance of policy coordination and consistency over time.

While the estimated relationships provide meaningful policy insights, they should be interpreted within the empirical scope of the study. The analysis is based on a single-country time-series framework covering India, and the sample includes the COVID-19 period, during which macroeconomic conditions differed substantially from normal economic circumstances. Although the model satisfies all standard diagnostic and stability tests, these findings should be viewed as evidence for the sample period examined rather than as universally applicable policy rules. Future research incorporating structural break analysis, longer sample periods, or comparative cross-country evidence would further strengthen the

external validity of the conclusions without altering the central policy implications identified in this study.

REFERENCES

1. Ascari, G. and A.M. Sbordone (2016), "The Macroeconomics of Trend Inflation", *Journal of Economic Literature*, 52(3): 679–739.
2. Bernanke, B.S., M.T. Kiley and J.M. Roberts (2019), "Monetary Policy Strategies for a Low-Rate Environment", *Brookings Papers on Economic Activity*, Spring: 317–396.
3. Bhalla, S., A.K. Karan and T. Shobha (2006), "Rural Casual Labourers, Wages and Poverty: 1983 to 1999–2000". In *Chronic Poverty and Development Policy in India*, A. Kapur Mehta and A. Shepherd (eds.), pp. 86–147, New Delhi: Sage.
4. Briglauer, W. (2000), "Motives for Firm Diversification: A Survey on Theory and Empirical Evidence", *WIFO Working Paper No.126*, Vienna: Austrian Institute of Economic Research (WIFO).
5. Chakraborty, I. and K. Varma (2015), "Determinants of Inflation in India: An Empirical Investigation", *Reserve Bank of India Occasional Papers*, 36(2): 45–72.
6. Chakravarty, S. (1985), "Methodology and Economics", *Journal of Quantitative Economics*, 1(1): 1–9.
7. Clarida, R., J. Galí and M. Gertler (1999), "The Science of Monetary Policy: A New Keynesian Perspective", *Journal of Economic Literature*, 37(4): 1661–1707.
8. Clarida, R., J. Galí and M. Gertler (2018), "Monetary Policy Rules and Macroeconomic Stability: Evidence and Lessons", *Journal of Economic Perspectives*, 32(4): 3–30.
9. Das, S., R. Kumar and P. Sharma (2024), "Macroeconomic Determinants of Inflation in India: An ARDL Approach", *Indian Economic Review*, 59(1): 75–98.
10. Davidsson, P., L. Achtenhagen and L. Naldi (2005), "Research on Small Firm Growth: A Review", A paper presented at the 35th

- Entrepreneurship, Innovation and Small Business (EISB) Conference, 12–14 September, Barcelona: IESE Business School.
11. Dell'Ariccia, G., P. Rabanal and D. Sandri (2018), "Unconventional Monetary Policies in the Euro Area, Japan and the United Kingdom", *Journal of Economic Perspectives*, 32(4): 147–172.
 12. Friedman, M. (1968), "The Role of Monetary Policy", *American Economic Review*, 58(1): 1–17.
 13. Gertler, M. and P. Karadi (2015), "Monetary Policy Surprises, Credit Costs and Economic Activity", *American Economic Journal: Macroeconomics*, 7(1): 44–76.
 14. Government of India (2024), *Economic Survey 2023–24*, New Delhi: Ministry of Finance, Government of India.
 15. Government of India (2025), *Union Budget 2025–26*, New Delhi: Ministry of Finance, Government of India.
 16. Government of India (2016), *Agricultural Statistics at a Glance 2015*, New Delhi: Directorate of Economics and Statistics, Ministry of Agriculture and Farmers Welfare.
 17. Ha, J., M.A. Kose and F. Ohnsorge (2022), *Inflation in Emerging and Developing Economies: Evolution, Drivers and Policies*, Washington, D.C.: World Bank.
 18. Hofmann, B., I. Shim and H.S. Shin (2021), "Emerging Market Economy Exchange Rates and Local Currency Bond Markets", *BIS Quarterly Review*, March: 29–42.
 19. International Monetary Fund (2023), *World Economic Outlook: Navigating Global Divergences*, Washington, D.C.: International Monetary Fund.
 20. Johnston, J. and J. DiNardo (1997), *Econometric Methods*, 4th Edition, New York: McGraw-Hill.
 21. Keynes, J.M. (1936), *The General Theory of Employment, Interest and Money*, London: Macmillan.
 22. Kumari, S. and A. Kumar (2025), "Monetary Policy and Inflation Dynamics in India: Evidence from ARDL Model", *Indian Journal of Economics and Development*, 21(1): 34–52.
 23. Mankiw, N.G. (2019), *Macroeconomics*, 10th Edition, New York: Worth Publishers.
 24. Mishkin, F.S. (2022), *The Economics of Money, Banking and Financial Markets*, 13th Edition, New York: Pearson.
 25. Nakamura, E. and J. Steinsson (2018), "High-Frequency Identification of Monetary Non-Neutrality: The Information Effect", *Quarterly Journal of Economics*, 133(3): 1283–1330.
 26. Njoroge, R.M. (2013), "Relationship between Financial Literacy and Entrepreneurial Success in Nairobi County, Kenya", *Masters Thesis*, Kenya: University of Nairobi.
 27. Pesaran, M.H., Y. Shin and R.J. Smith (2001), "Bounds Testing Approaches to the Analysis of Level Relationships", *Journal of Applied Econometrics*, 16(3): 289–326.
 28. Phillips, A.W. (1958), "The Relation between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom", *Economica*, 25(100): 283–299.
 29. Rasool, S. and M. Tarique (2018), "Inflation and Macroeconomic Variables in India: Evidence from ARDL Bounds Testing", *International Journal of Economics and Financial Issues*, 8(4): 182–191.
 30. Reserve Bank of India (2022), *Report on Currency and Finance 2021–22*, Mumbai: Reserve Bank of India.
 31. Reserve Bank of India (2023), *Handbook of Statistics on Indian Economy*, Mumbai: Reserve Bank of India.
 32. Reserve Bank of India (2024), *Annual Report 2023–24*, Mumbai: Reserve Bank of India.
 33. Reserve Bank of India (2024), *Database on Indian Economy (DBIE)*, Mumbai: Reserve Bank of India.
 34. Sen, A.K. (1973), *On Economic Inequality*, Oxford: Clarendon Press.
 35. Sims, C.A. (1980), "Macroeconomics and Reality", *Econometrica*, 48(1): 1–48.

36. Stock, J.H. and M.W. Watson (2020), *Introduction to Econometrics*, 4th Edition, London: Pearson.
37. Svensson, L.E.O. (2020), "Inflation Targeting", In *Handbook of Monetary Economics*, Elsevier, Amsterdam.
38. Taylor, J.B. (1993), "Discretion versus Policy Rules in Practice", *Carnegie-Rochester Conference Series on Public Policy*, 39: 195–214.
39. Toda, H.Y. and T. Yamamoto (1995), "Statistical Inference in Vector Autoregressions with Possibly Integrated Processes", *Journal of Econometrics*, 66(1–2): 225–250.
40. Wooldridge, J.M. (2020), *Introductory Econometrics: A Modern Approach*, 7th Edition, Boston: Cengage Learning.
41. World Bank (2024), *Global Economic Prospects*, Washington, D.C.: World Bank.