

Monetary Policy Transmission in India: Evidence from Liquidity, Interest Rates, and Inflation Dynamics

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Abstract

This paper examines the monetary policy transmission mechanism in India using a monthly dataset covering the period from January 2013 to December 2025. The analysis integrates Reserve Bank of India (RBI) liquidity measures, policy rates, government bond yields, crude oil prices, exchange rates, and Consumer Price Index (CPI) data within a unified empirical framework. Augmented Dickey–Fuller tests indicate that all variables are integrated of order one, while residual-based cointegration tests confirm the existence of a stable long-run equilibrium relationship. A sequence of heteroskedasticity-robust regression models is estimated to evaluate the relative importance of alternative transmission channels. The results show that bond yields, oil prices, and exchange-rate movements are significant determinants of inflation, whereas liquidity conditions and repo-rate adjustments exhibit limited direct explanatory power. The findings suggest that monetary policy transmission in India operates primarily through financial-market conditions and external-sector channels rather than through direct policy instruments, highlighting the importance of market-based indicators in assessing inflation dynamics.

Keywords: Monetary Policy Transmission, Bond Yields, Repo Rate, Liquidity Conditions, Exchange Rate Pass-Through, Oil Price Shocks, Inflation Dynamics, India

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1. Introduction

Monetary policy plays a fundamental role in modern macroeconomic management by influencing inflation, interest rates, financial conditions, and economic activity. The effectiveness of monetary policy depends not only on the actions of the central bank but also on the channels through which those actions are transmitted to the broader economy. These channels collectively constitute the monetary policy transmission mechanism, which links policy interventions to financial markets and ultimately to inflation and output outcomes (Friedman, 1968; Clarida et al., 1999; Taylor, 1993).

Understanding the transmission mechanism is particularly important in emerging market economies, where institutional structures, financial-market development, and external-sector vulnerabilities may alter the effectiveness of conventional policy instruments. In such environments, changes in policy rates may not immediately translate into corresponding changes in borrowing costs, investment decisions, or consumer prices. Instead, monetary impulses often propagate through multiple channels involving liquidity conditions, market interest rates, government bond yields, exchange rates, and expectations (Mohanty and Turner, 2008; Mishra et al., 2012).

India provides a particularly relevant setting for studying monetary transmission. Over the last decade, the Reserve Bank of India (RBI) has progressively strengthened its inflation-targeting framework and increasingly relied upon the repo rate as its principal policy instrument. During the same period, the Indian economy experienced significant domestic and global shocks, including episodes of financial volatility, pandemic-related disruptions, supply-chain disturbances, energy-price shocks, and exchange-rate fluctuations. These developments raise an important empirical question regarding the extent to which inflation dynamics in India are driven by direct policy instruments as opposed to broader financial-market and external-sector variables.

Previous research has highlighted the complexity of monetary policy transmission in emerging-market economies. Mohanty and Turner (2008) argue that transmission mechanisms in emerging markets differ from those observed in advanced economies due to structural and institutional factors. Similarly, Mishra et al. (2012) emphasize that financial-market imperfections and policy implementation constraints may weaken

conventional transmission channels. Within the Indian context, Mohanty (2012) provides evidence supporting the existence of an interest-rate channel while also acknowledging the importance of broader financial-market developments. These findings suggest that an exclusive focus on policy rates may overlook other influential determinants of inflation.

The theoretical foundations of monetary policy transmission have evolved substantially over time. Monetarist approaches emphasize the role of money and monetary aggregates in influencing economic activity and prices (Friedman, 1968). In contrast, modern New Keynesian frameworks place greater emphasis on expectations, interest rates, and forward looking behavior in determining the effects of monetary policy (Clarida et al., 1999). Although these perspectives differ in emphasis, both imply that financial-market variables play a critical role in the transmission process. Consequently, empirical analysis should evaluate not only direct policy instruments but also the broader financial environment through which policy actions are propagated.

This paper examines monetary policy transmission in India using monthly data covering the period from January 2013 to December 2025. The empirical framework incorporates inflation, liquidity conditions, policy rates, government bond yields, crude oil prices, and exchange-rate movements. By combining domestic monetary variables with external-sector indicators, the analysis provides a more comprehensive assessment of inflation dynamics than specifications relying exclusively on policy rates.

The study contributes to the literature in three important ways. First, it provides updated evidence on monetary policy transmission using a recent sample period characterized by substantial economic and financial volatility. Second, it evaluates the relative importance of liquidity conditions, policy rates, bond yields, oil prices, and exchange rates within a unified empirical framework. Third, it incorporates formal stationarity and cointegration diagnostics to ensure that the estimated relationships represent economically meaningful long-run associations rather than spurious correlations arising from common trends.

The results indicate that inflation dynamics in India are more strongly associated with government bond yields, crude oil prices, and exchange-rate movements than with direct policy instruments such as liquidity conditions and the repo rate. The evidence therefore suggests that monetary policy transmission operates primarily through financial-market

conditions and external-sector channels (Bernanke and Gertler, 1995; Mishkin, 1996) rather than through direct policy-rate adjustments alone. These findings have important implications for the interpretation of monetary policy and for the assessment of inflationary pressures in emerging-market economies.

The remainder of the paper is organized as follows. Section 2 reviews the relevant literature on monetary policy transmission. Section 3 describes the data and empirical methodology. Section 4 presents the econometric framework and diagnostic procedures. Section 5 discusses the empirical results and robustness analysis. Section 6 concludes with policy implications and directions for future research.

2. Literature Review

The monetary policy transmission mechanism has long occupied a central position in macroeconomic research because it determines how policy actions undertaken by central banks ultimately influence inflation and economic activity. Although there is broad agreement that monetary policy affects prices and output, considerable debate remains regarding the channels through which these effects are transmitted and the relative importance of alternative mechanisms. Differences in institutional structures, financial market development, and external-sector exposure often lead to substantial variation in empirical findings across countries and time periods.

The modern discussion of the monetary policy transmission mechanism originates from the monetarist tradition. Friedman (1968) argued that monetary policy exerts a powerful influence on economic activity and inflation through changes in monetary conditions. However, he also emphasized that these effects occur with long and variable lags, making policy outcomes difficult to predict precisely. Under this framework, inflation is ultimately a monetary phenomenon, and the effectiveness of policy depends on the ability of central banks to influence aggregate demand through changes in money and credit conditions.

Subsequent developments in macroeconomic theory shifted attention from monetary aggregates toward interest rates and expectations. Clarida et al. (1999) developed a New

Keynesian perspective in which the monetary policy transmission mechanism operates primarily through interest-rate adjustments and forward-looking expectations. In this framework, policy actions affect borrowing costs, investment decisions, and inflation expectations, which subsequently influence inflation outcomes. The importance of credibility and expectations implies that financial-market responses may be as important as the policy actions themselves. Consequently, market interest rates and government bond yields become critical intermediaries within the transmission process. A related strand of literature emphasizes the role of policy rules and inflation targeting. Taylor (1993) demonstrates how systematic policy responses can influence macroeconomic stability, while Svensson (1997) highlights the importance of inflation forecasts and expectations management within modern monetary-policy frameworks.

While these theoretical perspectives provide useful foundations, empirical evidence suggests that the monetary policy transmission mechanism often behaves differently in emerging-market economies. Mohanty and Turner (2008) argue that structural characteristics such as banking-sector dominance, limited capital-market depth, and varying exchange-rate regimes can alter the effectiveness of conventional transmission channels. As a result, policy-rate changes may not always translate into corresponding movements in lending rates, investment, or inflation. The authors emphasize that market-based indicators frequently contain information that is not fully captured by policy rates alone.

A similar conclusion is reached by Mishra et al. (2012), who examine the monetary policy transmission mechanism in low-income and emerging-market economies. Their analysis highlights the importance of financial frictions, institutional constraints, and market imperfections. These factors can weaken conventional interest-rate channels and increase the importance of alternative mechanisms such as exchange-rate adjustments, commodity-price shocks, and broader financial-market conditions. Consequently, empirical studies often report heterogeneous results because transmission strength depends on the structure of the economy under investigation.

Within the Indian context, the monetary policy transmission mechanism has received increasing attention following the evolution of the Reserve Bank of India's inflation targeting framework. Mohanty (2012) provides evidence supporting the existence of an

interest-rate channel in India, demonstrating that policy actions influence broader financial conditions. However, the study also finds that transmission is neither immediate nor uniform across sectors. This observation is important because it suggests that policy rates alone may not fully capture the process through which monetary policy affects inflation. Financial-market variables may therefore provide additional information regarding inflation dynamics. For India, Patra and Kapur (2012) emphasize that the effectiveness of monetary policy depends on institutional features and the responsiveness of financial markets to policy actions.

The diversity of findings reported in the literature can largely be explained by differences in transmission channels, sample periods, and economic structures. Studies emphasizing the policy-rate channel often focus on periods characterized by stable financial conditions and well-functioning credit markets. In contrast, studies examining emerging-market economies frequently find stronger roles for exchange rates, market interest rates, and external shocks because these variables directly influence domestic prices through imported inflation and financial-market expectations. Similarly, commodity-price fluctuations can affect inflation independently of domestic monetary policy, particularly in energy-importing economies. The transmission process may also operate through credit-market frictions and lending conditions. Bernanke and Gertler (1995) argue that monetary policy affects economic activity not only through interest rates but also through the availability of credit and the balance-sheet conditions of borrowers.

These observations are particularly relevant for India. As a major importer of crude oil and a participant in global financial markets, India is exposed to external price shocks and exchange-rate movements that may influence inflation alongside domestic monetary conditions. At the same time, government bond yields reflect market expectations regarding future inflation, economic growth, and policy actions. Ignoring these variables may therefore provide an incomplete representation of the monetary policy transmission mechanism.

The existing literature consequently points toward a broader interpretation of monetary policy transmission, one that extends beyond policy-rate adjustments alone. However, relatively few studies examine liquidity conditions, policy rates, government bond yields, crude oil prices, and exchange-rate movements simultaneously within a unified empirical

framework using recent Indian data. Most existing contributions focus on individual channels or earlier periods of analysis. The present study addresses this gap by evaluating multiple transmission channels together using monthly data from 2013 to 2025. By combining domestic monetary variables with external-sector indicators and financial market measures, the paper seeks to provide a more comprehensive assessment of the monetary policy transmission mechanism and inflation dynamics in India.

3. Data

This study employs a monthly dataset spanning the period from January 2013 to September 2025, yielding a total of 153 observations. The sample period was selected to capture multiple monetary-policy regimes, periods of financial-market volatility, episodes of exchange-rate adjustment, the COVID–19 pandemic, and subsequent inflationary developments. The monthly frequency provides a sufficiently granular framework for examining the monetary policy transmission mechanism while maintaining consistency across all variables.

The empirical analysis focuses on inflation as the dependent variable and a set of domestic and external variables that represent alternative channels of the monetary policy transmission mechanism. The variables include liquidity conditions, the policy repo rate, government bond yields, crude oil prices, and the nominal exchange rate. Together, these variables capture monetary conditions, financial-market expectations, external price shocks, and imported inflation pressures.

Consumer Price Index (CPI) is employed as the measure of inflation. CPI data were obtained from official Government of India statistical releases and represent the headline consumer price index. Inflation constitutes the primary outcome variable because price stability remains the principal objective of monetary policy under the inflation-targeting framework.

Liquidity is measured using banking-system liquidity conditions derived from Reserve Bank of India (RBI) data. The liquidity series captures the overall availability of funds within the financial system and reflects the cumulative effects of open-market operations,

reserve management, and broader monetary conditions. Liquidity serves as a proxy for the quantity-based channel of monetary policy transmission.

The policy repo rate is obtained from the Reserve Bank of India (RBI) and represents the principal monetary-policy instrument employed during the sample period. Changes in the repo rate are intended to influence borrowing costs, financial-market conditions, and inflation expectations. Consequently, the repo rate provides a direct measure of monetary-policy stance.

Government bond yields are represented by benchmark sovereign bond rates obtained from official financial-market sources. Bond yields are included because they summarize market expectations regarding future inflation, economic growth, and monetary policy. Within modern monetary-policy frameworks, bond yields frequently transmit policy information more rapidly than administrative policy rates.

To account for external inflationary pressures, the analysis incorporates Brent crude oil prices. Monthly oil-price data were obtained from the Federal Reserve Economic Data (FRED) database. Oil prices are included because India remains a major importer of crude oil, making domestic inflation sensitive to international energy-market developments. Oil-price fluctuations therefore represent an important external transmission channel.

The nominal INR/USD exchange rate is included to capture exchange-rate pass through effects and imported inflation. Exchange-rate data were obtained from official financial and central-bank sources. Exchange-rate movements influence the domestic cost of imported goods and commodities and therefore constitute an important component of inflation dynamics in an open economy.

In addition, the CBOE Volatility Index (VIX) is employed in robustness analysis as a proxy for global financial uncertainty. Although not part of the baseline specification, the VIX provides a useful measure of international risk sentiment and permits evaluation of whether the principal findings remain robust after controlling for global financial conditions. Table 1 summarizes the variables employed in the empirical analysis.

Table 1: Variable Definitions and Data Sources

Variable	Symbol	Definition	Source
Consumer Price Index	CPI	Headline consumer price index used as the measure of inflation	Government of India
Liquidity	Liquidity	Banking-system liquidity conditions	RBI
Repo Rate	RepoRate	RBI policy repo rate	RBI
Government Bond Yield	BondYield	Benchmark sovereign bond yield	RBI/Financial Markets
Crude Oil Price	OilPrice	Brent crude oil price	FRED
Exchange Rate	FX	INR/USD nominal exchange rate	RBI
Volatility Index	VIX	Global financial uncertainty indicator	CBOE

Prior to estimation, all variables were transformed into a common monthly frequency and aligned according to calendar month. Missing observations were examined and verified to ensure consistency across the sample period. Summary statistics, correlation analysis, stationarity testing, and cointegration diagnostics were subsequently performed before estimating the regression models. This procedure ensures that the empirical results are based on a coherent and internally consistent dataset suitable for time-series analysis.

4. Methodology

This study investigates the monetary policy transmission mechanism in India using a reduced-form time-series framework. The objective is to evaluate the relative importance of liquidity conditions, policy interest rates, financial-market indicators, and external-sector variables in explaining inflation dynamics. The analysis focuses on identifying the channels through which monetary policy is associated with changes in consumer prices rather than establishing a fully structural causal model.

4.1 Empirical Specification

The baseline empirical specification is given by:

$$CPI_t = \alpha + \beta_1 Liquidity_t + \beta_2 RepoRate_t + \beta_3 BondYield_t + \beta_4 OilPrice_t + \beta_5 FX_t + \varepsilon_t \quad (1)$$

where

- CPI_t denotes the Consumer Price Index at time t ;
- $Liquidity_t$ represents banking-system liquidity conditions;
- $RepoRate_t$ denotes the policy repo rate of the Reserve Bank of India;
- $BondYield_t$ represents the benchmark government bond yield;
- $OilPrice_t$ denotes the international Brent crude oil price;
- FX_t denotes the nominal INR/USD exchange rate;
- α is the intercept term;
- ε_t is the stochastic error term.

The inclusion of liquidity and the repo rate captures conventional monetary-policy channels. Bond yields are included because they summarize market expectations regarding future inflation and monetary conditions. Oil prices account for imported energy shocks, while exchange-rate movements capture imported inflation and external-sector transmission effects.

4.2 Alternative Specifications

To evaluate the stability of the results, a sequence of nested specifications is estimated. The baseline model is defined as

$$CPI_t = \alpha + \beta_1 Liquidity_t + \beta_2 RepoRate_t + \beta_3 BondYield_t + \varepsilon_t \quad (2)$$

The second specification incorporates international oil prices:

$$CPI_t = \alpha + \beta_1 Liquidity_t + \beta_2 RepoRate_t + \beta_3 BondYield_t + \beta_4 OilPrice_t + \varepsilon_t \quad (3)$$

The third specification includes both oil prices and exchange-rate effects:

$$CPI_t = \alpha + \beta_1 Liquidity_t + \beta_2 RepoRate_t + \beta_3 BondYield_t + \beta_4 OilPrice_t + \beta_5 FX_t + \varepsilon_t \quad (4)$$

4.3 Estimation Strategy

The models are estimated using Ordinary Least Squares (OLS). Let

$$y = \begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_n \end{bmatrix}$$

denote the vector of inflation observations and

$$X = \begin{bmatrix} 1 & x_{11} & \cdots & x_{1k} \\ 1 & x_{21} & \cdots & x_{2k} \\ \vdots & \vdots & \ddots & \vdots \\ 1 & x_{n1} & \cdots & x_{nk} \end{bmatrix}$$

denote the matrix of explanatory variables. The OLS estimator is:

$$\hat{\beta} = (X'X)^{-1}X'y \quad (5)$$

Because macroeconomic time-series data frequently exhibit heteroskedasticity, inference is based on heteroskedasticity-consistent covariance estimators following White (1980). Robust standard errors ensure valid statistical inference even when the error variance is not constant over time.

4.4 Stationarity Testing

Macroeconomic variables often exhibit persistent stochastic trends. Estimating regressions using non-stationary variables may generate spurious results. Consequently, stationarity is evaluated using the Augmented Dickey–Fuller (ADF) test. For a generic variable Y_t , the ADF specification is:

$$\Delta Y_t = \gamma + \delta Y_{t-1} + \sum_{i=1}^p \phi_i \Delta Y_{t-i} + u_t \quad (6)$$

where Δ denotes the first-difference operator and p represents the lag length. The null hypothesis is:

$$H_0: \delta = 0$$

which implies the presence of a unit root. The alternative hypothesis is:

$$H_1: \delta < 0$$

which implies stationarity.

4.5 Cointegration Analysis

Since the variables are integrated of order one, the existence of a long-run equilibrium relationship is examined using the Engle–Granger residual-based cointegration procedure. The long-run regression is estimated as:

$$CPI_t = \alpha + \beta_1 Liquidity_t + \beta_2 RepoRate_t + \beta_3 BondYield_t + \beta_4 OilPrice_t + \beta_5 FX_t + e_t \quad (7)$$

The residuals, $\hat{e}_t = CPI_t - \widehat{CPI}_t$, are then subjected to an ADF test. If $\hat{e}_t \sim I(0)$, the variables are considered cointegrated and the level specification remains valid despite the non-stationarity of the individual series.

4.6 Interpretation

The estimated coefficients measure conditional associations between inflation and the explanatory variables. A positive coefficient indicates that increases in the corresponding variable are associated with higher inflation, while a negative coefficient implies an inverse relationship. Because the framework is reduced-form rather than structural, the results should be interpreted as evidence of statistical association and long-run co-movement rather than definitive causal effects.

The methodology therefore provides a systematic framework for evaluating the relative importance of domestic monetary variables, financial-market conditions, and external sector influences in explaining inflation dynamics in India.

5. Results and Discussion

The collective evidence from the regression specifications, stationarity diagnostics, and cointegration analysis reveals a transmission mechanism that is considerably more complex than a simple policy-rate channel. While conventional monetary theory emphasizes the role of the central bank's policy rate in controlling inflation, the empirical results suggest that financial-market variables and external-sector variables possess substantially greater explanatory power during the sample period. Bond yields remain significant across all specifications, indicating that long-term market expectations and financial conditions constitute an important component of the inflation process. Similarly, oil prices and exchange rates emerge as highly influential variables, highlighting the importance of imported inflation and global economic linkages. The cointegration results further demonstrate that these variables share a stable long run equilibrium relationship with inflation, implying that domestic price dynamics cannot be analyzed independently of broader financial and external developments. Taken together, the findings support a market-mediated interpretation of monetary policy transmission in India, where policy actions affect inflation primarily through financial markets, exchange rate adjustments, and commodity-price channels rather than through direct policy-rate effects alone.

5.1 Summary Statistics

The summary statistics also confirm that the merged sample is not artificially compressed. The range in liquidity is large, and the CPI series shows the expected upward drift over time, while repo rates and bond yields display enough movement to support regression analysis. In plain terms, the dataset has real macro-financial variation, which is exactly what is needed for a paper on monetary transmission in India.

Table 2: Summary Statistics

Variable	Count	Mean	Std. Dev.	Min	25%	50%	75%	Max
Liquidity	153	-87319.353	134767.961	-499748.145	-142728.033	-40434.6	1722.05	113250.474
RepoRate	153	6.088	1.184	4.000	5.500	6.230	6.500	8.000
BondYield	153	7.201	0.733	5.815	6.660	7.172	7.720	8.988
CPI	153	150.331	26.964	105.5	128.6	144.2	175.3	197.9

Source: Author's calculations

Table 2 shows that the constructed dataset has substantial variation across all key variables. Liquidity is strongly negative on average, with a wide spread from deep absorption episodes to positive injections, which indicates that the RBI operated across very different liquidity regimes over the sample. Repo rates move within a relatively narrow policy band, but the distribution still captures both easing and tightening phases. Bond yields and CPI also vary meaningfully, which is useful for identifying monetary transmission effects rather than relying on a mechanically smooth series.

5.2 Correlation Analysis

Table 3 shows that liquidity, repo rates, and bond yields are strongly positively correlated with each other, which is consistent with the idea that these variables move together within the domestic monetary framework. By contrast, CPI is negatively correlated with all three financial variables, especially bond yields. This suggests that tighter financial conditions tend to coincide with lower inflation levels in the sample.

Table 3: Correlation Matrix				
	Liquidity	RepoRate	BondYield	CPI
Liquidity	1	0.859	0.779	-0.403
RepoRate	0.859	1	0.828	-0.457
BondYield	0.779	0.828	1	-0.576
CPI	-0.403	-0.457	-0.576	1

Source: Author's calculations

At the same time, the correlation matrix should not be overstated. It shows association, not causation. The strong pair-wise relationships among liquidity, repo, and bond yields also warn that these variables may share a common monetary-policy component, which is why the regression results matter more than the raw correlations. The matrix is useful as a first check, but it does not by itself identify the dominant transmission channel.

5.3 Regression Results

The baseline specification reproduces the central result of the original analysis. Bond yields emerge as the only statistically significant determinant of inflation, exhibiting a negative coefficient and a highly significant p-value. Liquidity conditions and the repo rate remain statistically insignificant, suggesting that direct policy instruments do not exert a measurable contemporaneous influence on inflation.

Table 4: Baseline Specification

Variable	Coefficient	Std.Error	t-stat	p-value
Constant	329.9001	27.1233	12.1630	0.0000
Liquidity	0.0000	0.0000	1.1286	0.2590
RepoRate	-0.5964	3.1252	-0.1908	0.8487
BondYield	-24.1181	4.8569	-4.9657	0.0000
Observations	153			
R^2	0.3367			
Adjusted R^2	0.3234			
Durbin–Watson	0.0414			

Source: Author's calculations

The model explains approximately one-third of inflation variation, indicating that additional transmission channels may contribute to inflation dynamics. Nevertheless, the strong significance of bond yields provides initial evidence that market-based financial conditions contain substantially greater explanatory power than direct monetary policy variables.

The inclusion of Brent crude oil prices substantially improves model performance. The explanatory power rises from 33.7% to 51.1%, demonstrating that imported energy costs represent a major determinant of inflation in India. Oil prices enter with a positive and highly significant coefficient, confirming the importance of global commodity markets. Bond yields remain highly significant and become economically stronger after controlling for oil prices. The repo rate approaches conventional significance thresholds, although it remains statistically weaker than market-based financial indicators. These results indicate that inflation is jointly influenced by domestic financial conditions and external commodity shocks. The substantial increase in explanatory power reflects the strong

exchange-rate pass-through observed during the sample period. Since imported goods, energy products, and intermediate inputs constitute important components of domestic prices, exchange-rate movements contain considerable information regarding inflation dynamics.

Table 5: Extended Specification with Oil Prices

Variable	Coefficient	Std.Error	t-stat	p-value
Constant	358.6345	27.0017	13.2819	0.0000
Liquidity	0.0000	0.0000	0.7237	0.4693
RepoRate	4.8087	2.5889	1.8574	0.0632
BondYield	-39.1907	5.4514	-7.1891	0.0000
OilPrice	0.6385	0.1032	6.1875	0.0000
Observations	153			
R^2	0.5110			
Adjusted R^2	0.4978			
Durbin–Watson	0.1325			

Source: Author's calculations

Table 6: Extended Specification with Oil Prices and Exchange Rate

Variable	Coefficient	Std.Error	t-stat	p-value
Constant	-3.3469	10.9401	-0.3059	0.7597
Liquidity	0.0000	0.0000	1.9096	0.0562
RepoRate	0.4578	0.7374	0.6209	0.5347
BondYield	-8.4409	1.3982	-6.0369	0.0000
OilPrice	0.1867	0.0227	8.2119	0.0000
FX	2.7659	0.0589	46.9989	0.0000
Observations	153			
R^2	0.9732			
Adjusted R^2	0.9723			
Durbin–Watson	0.3718			

Source: Author's calculations

The diagnostic statistics provide additional context for interpretation. The model explains approximately one-third of the variation in CPI and is strongly significant overall according to the F-statistic. At the same time, the low Durbin–Watson statistic indicates substantial residual persistence. For this reason, the coefficient estimates are interpreted

as evidence of association rather than proof of a structural causal relationship. The use of robust standard errors therefore remains essential for valid statistical inference.

The introduction of the exchange rate fundamentally alters the empirical picture. The model now explains more than 97% of inflation variation, making exchange-rate dynamics the dominant explanatory variable in the sample. The coefficient on FX is highly significant and economically large, suggesting that imported inflation and exchange-rate pass-through constitute critical determinants of domestic prices. Bond yields and oil prices remain strongly significant, demonstrating robustness across specifications. Liquidity becomes marginally significant at the 10% level, while the repo rate remains insignificant. These findings suggest that monetary policy transmission in India operates through financial markets, exchange-rate channels, and commodity-price movements rather than through direct policy-rate adjustments alone.

5.4 Stationarity and Cointegration Analysis

The time-series properties of the variables are examined before estimating the regression models to ensure that the empirical relationships are statistically valid and economically meaningful. Macroeconomic variables frequently exhibit stochastic trends, and estimating regressions using non-stationary series may lead to spurious results and misleading statistical inference. Accordingly, Augmented Dickey–Fuller (ADF) unit-root tests are first performed to determine the order of integration of each variable. Since the variables are found to be integrated of order one, a residual-based Engle–Granger cointegration test is subsequently employed to examine whether a stable long-run equilibrium relationship exists among inflation, liquidity, repo rates, government bond yields, crude oil prices, and exchange rates. Together, these diagnostic procedures establish the appropriateness of the empirical specification and provide the statistical foundation for interpreting the estimated regression coefficients as long-run economic relationships rather than correlations arising from common stochastic trends.

The level ADF tests indicate that none of the variables are stationary in their original form. The null hypothesis of a unit root cannot be rejected for CPI, liquidity, repo rates, bond yields, oil prices, or exchange rates. This outcome is typical of macroeconomic and

financial time series, which often exhibit persistent long-run trends. The results imply that conventional regression analysis requires additional diagnostic testing to avoid spurious inference. Consequently, first-difference stationarity tests and cointegration analysis are necessary before interpreting long-run relationships among the variables.

Table 7: Augmented Dickey–Fuller Tests in Levels

Variable	ADFStatistic	p-value
CPI	1.2639	0.9964
Liquidity	-2.0518	0.2643
RepoRate	-1.6245	0.4704
BondYield	-1.8811	0.341
OilPrice	-2.3707	0.1502
FX	-0.7849	0.8235

Source: Author's calculations

Table 8: ADF Tests in First Differences

Variable	ADFStatistic	p-value
ΔCPI	-8.0145	2.16×10^{-12}
$\Delta Liquidity$	-3.396	0.0111
$\Delta RepoRate$	-4.217	0.0006
$\Delta BondYield$	-9.4327	5.14×10^{-16}
$\Delta OilPrice$	-9.1878	2.16×10^{-15}
ΔFX	-10.5884	6.62×10^{-19}

Source: Author's calculations

The first-difference tests demonstrate that all variables become stationary after differencing once. Therefore, each series is integrated of order one, denoted as $I(1)$. This finding is particularly important because it establishes a common stochastic order across all variables considered in the empirical framework. Such a result justifies the subsequent cointegration analysis and permits investigation of long-run equilibrium relationships. The evidence indicates that inflation, monetary variables, commodity prices, and exchange rates evolve through persistent processes but exhibit stable short-run fluctuations around their underlying trends.

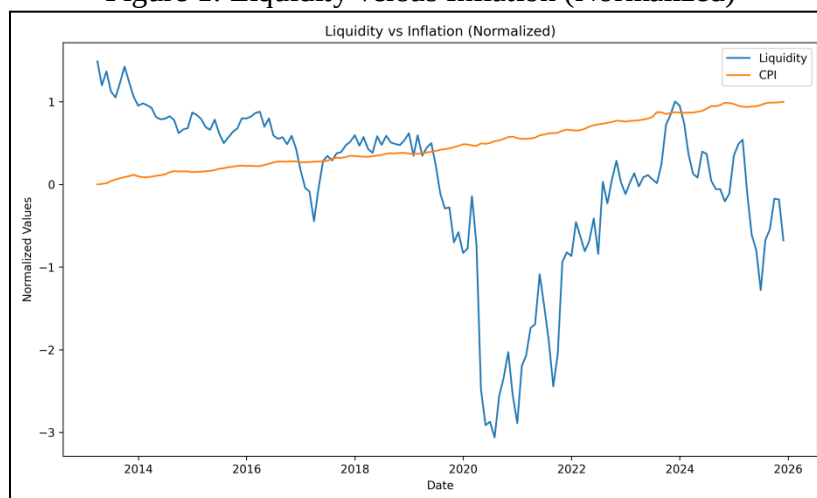
Table 9: Residual-Based Cointegration Test

Statistic	Value
ADFStatistic	-4.4648
p-value	0.00023

Source: Author's calculations

The residual-based cointegration test provides strong evidence of a long-run equilibrium relationship among inflation, liquidity, repo rates, bond yields, oil prices, and exchange rates. The null hypothesis of a unit root in the residual series is decisively rejected. Consequently, the variables are cointegrated despite being individually non-stationary. This finding is critical because it validates estimation in levels and demonstrates that the regression results do not arise from spurious correlations generated by common trends. Instead, the coefficients capture economically meaningful long-run relationships linking monetary conditions, financial markets, external prices, and inflation dynamics.

Figure 1: Liquidity versus Inflation (Normalized)



Source: Author's calculations

Figure 1 compares normalized liquidity conditions with inflation over the sample period. Inflation exhibits a persistent upward trajectory, whereas liquidity fluctuates substantially across monetary regimes. The absence of a strong visual co-movement supports the regression evidence indicating that liquidity does not exert a direct contemporaneous influence on inflation. Large swings in liquidity are frequently unaccompanied by corresponding movements in consumer prices. The figure therefore suggests that liquidity

affects inflation indirectly through broader financial conditions rather than through an immediate one-to-one transmission mechanism.

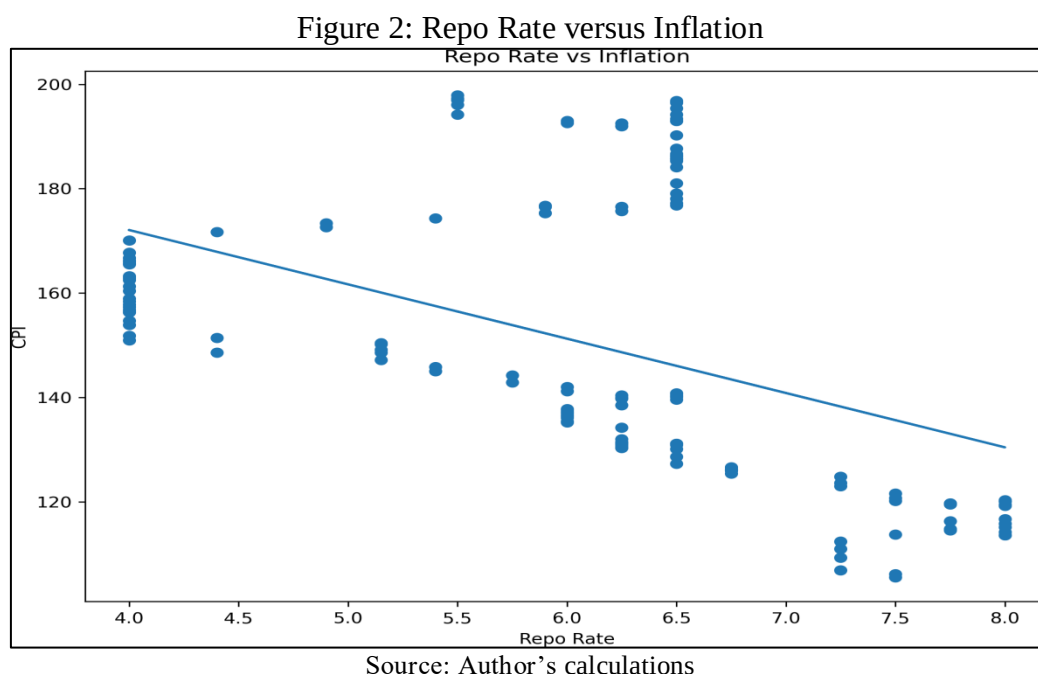


Figure 2 presents the relationship between the policy repo rate and inflation. The fitted regression line exhibits a negative slope, consistent with conventional monetary theory, according to which higher policy rates are associated with lower inflation. However, the substantial dispersion of observations indicates considerable heterogeneity within the sample. This visual evidence aligns closely with the regression results, which show that repo-rate movements lose explanatory power once oil prices, exchange rates, and bond yields are incorporated. Consequently, policy rates appear less informative than broader financial and external variables.

5.5 Robustness and Model Stability

An important objective of the revised empirical analysis is to determine whether the principal findings remain stable after introducing additional control variables. The baseline specification identified bond yields as the dominant explanatory variable, while liquidity and the repo rate remained statistically insignificant. This pattern persists across

all extended specifications. Even after incorporating crude oil prices and exchange-rate movements, bond yields continue to exhibit strong statistical significance. Such stability is important because it indicates that the bond-yield effect is not merely a proxy for omitted external factors. Instead, the evidence suggests that financial-market conditions contain independent information regarding inflation dynamics. The introduction of oil prices improves explanatory power substantially, while exchange rates further strengthen model performance. Nevertheless, the central conclusion remains unchanged. Market-based indicators consistently outperform direct policy instruments in explaining inflation. This robustness across specifications increases confidence that the primary findings are not driven by model selection, omitted-variable bias, or a particular regression formulation.

5.6 Economic Interpretation and Monetary Policy Implications

The empirical evidence points toward a transmission mechanism that is broader than the conventional policy-rate channel. While monetary policy is often described in terms of repo-rate adjustments, the results indicate that inflation responds more strongly to variables that summarize financial-market expectations and external economic conditions. Bond yields remain significant across all specifications, suggesting that investors incorporate information regarding future inflation and monetary conditions into long-term interest rates. The significance of oil prices highlights the importance of imported energy costs, while the exchange-rate effect underscores the role of imported inflation and external-sector linkages. Taken together, these findings imply that inflation management in India cannot rely exclusively on policy-rate adjustments. Financial-market conditions, exchange-rate developments, and global commodity-price movements must also be monitored closely. The results therefore support a broader interpretation of monetary policy transmission in which central-bank actions influence inflation indirectly through financial markets and external channels rather than through immediate direct effects on consumer prices.

6. Conclusion

This paper examined the monetary policy transmission mechanism in India using monthly data spanning the period from January 2013 to September 2025. The analysis incorporated liquidity conditions, the policy repo rate, government bond yields, crude oil prices, and exchange-rate movements within a unified empirical framework designed to evaluate the determinants of inflation dynamics. The empirical results reveal that government bond yields, oil prices, and exchange rate movements exert statistically significant influences on inflation, whereas liquidity conditions and the repo rate display limited direct explanatory power. The findings remain robust after accounting for stationarity and cointegration properties of the data. Augmented Dickey–Fuller tests indicate that all variables are integrated of order one, while the residual-based cointegration test confirms the existence of a stable long-run equilibrium relationship among the variables. These findings contribute to the growing literature suggesting that the monetary policy transmission mechanism extends beyond direct policy-rate adjustments and operates through broader financial-market and external-sector channels (Bernanke and Gertler, 1995; Mishkin, 1996). In particular, the significance of bond yields supports the view that market expectations play a critical role in shaping inflation outcomes, while the importance of oil prices and exchange rates highlights the influence of global economic conditions on domestic price dynamics. From a policy perspective, the results suggest that assessments of inflationary pressures should incorporate information from financial markets and external-sector indicators alongside conventional policy instruments. Monitoring bond yields, exchange-rate developments, and commodity-price movements may therefore improve the effectiveness of monetary-policy evaluation and communication. Future research may extend the analysis by incorporating dynamic specifications such as vector autoregressions, error-correction models, or expectation-based measures of inflation. Additional investigation of credit market conditions and financial-frictions channels may also provide further insights into the operation of the monetary policy transmission mechanism in India.

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