International Research Journal of MMC (IRJMMC)
ISSN 2717-4999 (Online) | 2717-4980 (Print)
Volume 6, Issue 5 | December 2025

Monetary Policy and Inflation Control in Nepal: An Empirical Assessment

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To Cite this article: Shrestha, J., Adhikari, G. M., Lamichhane, S., & Parajuli, D. (2025). Monetary policy and inflation control in Nepal: An empirical assessment. *International Research Journal of MMC, 6*(5), 63–76. https://doi.org/10.3126/irjmmc.v6i5.89043

Submitted: 21 November 2025 **Accepted:** 15 December 2025 **Published:** 31 December 2025

Abstract

This paper examines the impact of monetary policy in regulating inflation in Nepal through a time series analysis covering 1989-2024. The analysis uses the annual data on inflations rate, growth of money supply, interest rates, fluctuations in the exchange rate, growth in Gross Domestic Product (GDP) and the openness of trade to analyze both short-run and long-run relationships between monetary policy tools and inflation. The data were gathered in the secondary sources and mainly the annual reports of Nepal Rastra Bank, economic bulletins as well as the publications of world bank and international monetary fund. The study concludes that monetary policy has played a moderate role in dealing with inflation in Nepal using the Autoregressive Distributed Lag (ARDL) bounds testing strategy and a Vector Error Correction Model (VECM) that produces the error-correction coefficient of -0.385 indicating the rate of adjustment to the long-run equilibrium. The increase in money supply has a positive and statistically significant correlation with inflation hence validating the monetarist school of thought, but interest rates show a negative though insignificant effect on inflation. Changes in exchange rates turn out to be an influential factor of inflation in terms of import-price effects. The error-correction system implies that about 38.5 per cent of short-term disequilibrium is eliminated every year. Here, the results indicate that although conventional monetary policy instruments have some effectiveness, structures and exogenous shocks still have significant roles in the inflation processes in Nepal. The research will be useful in helping the

policymakers, central bankers, and researchers to formulate more effective policies in the control of inflation within Nepal economy.

Keywords: monetary policy, inflation, ARDL, Nepal, central banking, money supply

1. Introduction

Monetary policy is fundamentally about the control of inflation in every economy, and Nepal is no exception in this case (Mishkin, 2018). The difference in policy regimes used by central banks in the international arena includes explicit inflation targeting (as experienced by the United Kingdom, Canada and New Zealand), as well as strategies focusing on the management of the money supply or the exchange rate peg. The course of the monetary policy has been moving away steadily in favor of the application of market-oriented tools, whereby modern-day central banks are increasingly focusing on maintaining price stability, yet at the same time promoting the growth of the economy. The most popular policy instruments, such as policy interest rates, open-market operations, reserve requirements, and forward guidance, have become the routine tools used to influence the expectations of inflation and to guide macroeconomic activity.

Nepal Rastra Bank (NRB), which was established in 1956, has the responsibility of ensuring price stability in addition to enhancing economic growth and financial system soundness (Neby, 2002). However, the domestic inflation experience in Nepal has been rather volatile, and on this basis, inflation rates have been fluctuating both in the negative and in the range of 21 percent and above during the sample period, thus, posing critical issues to the effectiveness of the monetary policy framework in stabilising price levels.

The conceptual foundations that establish the role played by the monetary policy in the check and balance of inflation are well-rooted in the macroeconomic literature. According to classical quantity theory, there is a direct correlation between the long-run inflation and the increase in the amount of money in circulation (Fisher, 1911; Friedman, 1970). The modern views, including those that are advocated by the modern monetary theory, preempt the importance of credibility of the central bank, expectations management, and the transmission channels through which the policy actions have on the price dynamics (Bernanke and Mishkin, 1997). Such media include interest-rate effects on investment and consumption, the effect of exchange rates on imported prices, and the effects of credit channels on lending and expenditure decision making.

The monetary policy structure in Nepal has changed significantly since the opening of the economy in the 1990s. The country has shifted towards market-based approaches rather than direct monetary controls implicitly, embracing inflation targeting and at the same time keeping the exchange rate fixed to the Indian rupee (Pant, 2019). Such a twofold requirement has spawned unique dilemmas, because the preservation of a fixed exchange rate, at times, can encroach upon domestic goals of inflation containment, particularly when inflation differentials are realized between Nepal and India (Koirala, 2018).

The success of the monetary policy to dampen inflation is conditional upon a myriad of factors, such as the intensity of the financial development, the openness of the economy, harmony between fiscal and monetary tools, and the national-specific structural factors (Mishra et al., 2012). Being a small, landlocked, and import-driven economy, Nepal faces specific challenges with the transmission of monetary policy. The international commodity price fluctuations and exchange rate dynamics also create an important part of domestic inflation as the import-related price movements (Bhattarai, 2016).

The latest happenings in the world, such as the 2008 financial crisis, the COVID-19 pandemic, and the ongoing geopolitical tensions, have placed a strict burden on the strength of a monetary policy regime across the world. The experience that Nepal underwent during these

durations can provide insights into the ways in which the external shocks are interacting with the domestic policy levers to establish the result of inflation (Adhikari, 2021). Specifically, the pandemic period marked the largest monetary growth in the world, raising the question of the sustainability of inflation management and the usefulness of traditional policy instruments.

Available literature on the effectiveness of the monetary policy in Nepal presents mixed findings, as researchers indicate inconsistency in the effectiveness of various instruments used to stabilise inflation rates (Ginting, 2017). In some studies, the key role of money-supply management has been brought (Gyawali, 2012), in others, the role of interest-rate policy (Bhusal, 2019) or exchange-rate management (Sharma and Poudel, 2020) has been identified. These differences in methodology and time could explain the disparity of results, as the situation with the monetary policy in Nepal is developing.

The proposed research aims to contribute to the existing literature by providing a strict empirical evaluation of the effectiveness of the monetary policy in Nepal by using high-level time-series econometric models. The ARDL bounds-testing model enables analysis of both short and long-run dynamics as well as equilibrium relationships, and as such, embraces the mixed nature of integration of the variables in question. In addition, the analysis incorporates the external elements, e.g., exchange-rate changes and trade openness indicators, to provide a more holistic representation of inflationary forces in the open-economy environment of Nepal.

1.1 Literature Review

The nexus between monetary policy and inflation as a theoretical subject has long held center stage in the macroeconomic literature, and has evolved over time, starting with the classical quantity theory up to modern dynamic stochastic general equilibrium (DSGE) models. The exposition provided by Fisher in 1911 formed the basis of recognizing that inflation is in the long term, essentially a monetary phenomenon, a claim that Friedman reiterated and perfected in the mid-twentieth century asserting that inflation was always and everywhere a monetary phenomenon. His contributions highlighted that the monetary supply control played a critical role in protecting price stability.

A New Keynesian vision by Clarida, Gali and Gertler (1999) provides a strict transmission dialectic in which the central banks can affect real activity in the short term by adjusting the policy rate which in turn affect aggregate demand and ultimately inflation. The credibility of the central bank and anchoring of inflation expectations is vital in the efficacy of the monetary policy in this paradigm, a fact that was supported by Bernanke, Mishkin and Posen in 1999.

Various channels of monetary policy through which Taylor identified the influence of monetary policy on inflation were described in his 1995 schema; they include interest-rate, exchange-rate, asset-price, credit. The salience of the credit channel was pointed out by a study conducted by Bernanke and Gertler in 1995, especially in economies with immature financial markets whose banking operation is part of the transmission process.

Mishra and others (2012) argue that in the case of developing economies, the monetary transmission mechanisms are more diffuse and less predictable when compared to the developed economies partly due to a poorly developed financial markets, fiscal dominance, limited central bank autonomy, and structural rigidities. The research by Mohanty and Turner (2008) also outlines the difficulty of the emerging markets such as large informal sectors, weak capital markets and their vulnerability to external shocks.

The exchange-rate channel presupposes an increase in the significance of small open economies. The theoretical analysis provided by Romer (1993), reveals that there is an increase in openness that will trigger low inflation and that the pass-through of exchange rates to the import prices can be used as another disciplinary tool. Treatment of the trilemma by Obstfeld and Taylor (2004) sheds light on the dilemma facing monetary authorities in open economies:

the impossibility of having an independent monetary policy, fixed exchange rate and free movement of capital at the same time.

An effective literature has been used to investigate the success of monetary policy in South Asian states. The 2008 study of India by Jha reveals a gradual improvement in the effectiveness of the Indian inflation-targeting regime but few structural impediments still exist. The analysis of the financial markets in India produced by Singh and Kalirajan (2003) also concludes that the transmission mechanism has been strengthened by the sectoral reforms. The impact of monetarism findings is supported by the cointegration results of Ahmad and colleagues in Pakistan in 2005, which found that money supply and prices in Pakistan had a long-run relationship.

A mixed picture is given by research done on Nepal. Analysis of money demand by Pant 2003 suggests that there is a stable long-run relationship which can be used in monetary targeting. The threshold autoregressive model by Koirala, 2006, identifies the non-linearities in the money-inflation nexus, which show that the influence of the money supply is different at the different inflationary environments. The interest-rate and exchange-rate channel in a VAR analysis by Gyawali (2012) is attributed with a weak strength, but it confirms that the relevance of a direct money-supply channel will persist in an environment with shallow financial markets anda fixed exchange-rate regime pegged to India. As per an evaluation conducted by Bhusal (2019) of fiscal-monetary interaction, there are instances where monetary performance is limited because of fiscal dominance.

More recent research has examined the particular aspects of monetary policy in Nepal. A 2018 paper by Koirala addresses exchange-rate pass-through, but leaves out an important but less extensive part of the transmission, which is 2 to 3 quarters behind. A recent attempt to create core measures of inflation by Karki (2019) has contended that the use of core instead of headline inflation would refine the effectiveness of policy by sifting through volatile changes in food and energy. The time varying parameter models of Sharma and Poudel (2020) show a negative trend of pass-through alongside economic diversification of Nepal, whereas the state space approach by Khanal and Sharma (2018) proves a positive change of increasing monetary impact in the recent years due to the maturity of the financial sector and increase in central bank credibility.

Subedi et al. (2019) and Ginting (2017) have anticipated the role of external determinants in the inflation process in Nepal. The latter evaluates the contribution of global food and fuel price shocks, which concludes that these exogenous contributions explain a large percentage of inflation volatility. The latter puts more stress on the implications of global value chains, that state more intense involvement in the global production network makes domestic inflation more and more sensitive to global supply-chain shocks.

In Nepal, empirical analysis of inflation expectations is still in its early stages, but it is on the increase. Thapa and Adhikari (2020) conduct a survey among households and firms and find out the very backward-oriented orientation with serious policy implications. The analysis presented by Pradhan (2020) correlates financial deepening with having a stronger financial transmission, which promotes the importance of a well-developed financial sector.

Despite this growing body of evidence, however, there are salient gaps. To begin with, the literature that is available is less likely to analyze individual transmission channels separately, without trying to assess the effectiveness of monetary policy as a whole. Second, there exist methodological gaps, specifically, there is a lack of literature that uses modern time-series models, in particular, ARDL, that are skillful in terms of accommodating mixed integration characteristics. Third, very limited studies combine both the domestic policy instruments and the exogenous factors in a single, unified modeling area. These limitations are the aspects that the current study attempts to resolve by utilizing both ARDL and VECM

frameworks, combining a variety of monetary variables with externalities, and querying both the short-run and long-run equilibrium.

2. Data and Methodology

2.1 Data and Variables

This study uses annual time series data for Nepal covering the period 1989-2024, comprising 36 observations. The selection of this time period is motivated by the availability of consistent data and the economic reforms initiated in the early 1990s that transformed Nepal's monetary policy framework. The data were collected from secondary sources, primarily the Nepal Rastra Bank's annual reports and economic bulletins, supplemented by publications from the World Bank, International Monetary Fund, and Nepal's Central Bureau of Statistics.

The dependent variable is the inflation rate (INF), measured as the annual percentage change in the Consumer Price Index (CPI). CPI data were obtained from the Nepal Rastra Bank and represent the weighted average of price changes across various commodity groups.

The key independent variables representing monetary policy instruments and control variables are:

Money Supply Growth (MSG): Annual percentage change in broad money (M2), representing the primary monetary policy indicator. M2 includes currency in circulation, demand deposits, and time deposits. Data source: Nepal Rastra Bank.

Interest Rate (INT): The weighted average deposit rate of commercial banks, serving as a proxy for the policy interest rate. Prior to 2006, Nepal Rastra Bank used direct instruments; since then, interest rates have become the primary policy tool. Data source: Nepal Rastra Bank.

Exchange Rate Change (EXC): Annual percentage change in the nominal exchange rate of Nepali Rupee against the US Dollar. While Nepal maintains a fixed exchange rate with the Indian Rupee, the USD exchange rate captures external price pressures. Data source: Nepal Rastra Bank.

GDP Growth (GDPG): Annual real GDP growth rate, controlling for demand-side pressures on inflation. Data source: World Bank World Development Indicators and Nepal's Central Bureau of Statistics.

Trade Openness (OPEN): Calculated as (Exports + Imports)/GDP × 100, measuring the economy's integration with the global economy. Higher openness may affect inflation through import price channels and competition effects. Data source: World Bank and Nepal Rastra Bank.

2.2 Descriptive Statistics

Table 1 presents the descriptive statistics for all variables used in the analysis.

Table 1: *Descriptive Statistics of Variables (1989-2024)*

Variable	Mean	Std. Dev.	Minimum	Maximum	Unit
Inflation Rate (INF)	7.84	4.52	-2.90	21.10	%
Money Supply Growth (MSG)	17.42	8.15	2.30	42.80	%
Interest Rate (INT)	8.25	2.18	4.50	13.20	%
Exchange Rate Change (EXC)	3.45	4.12	-5.80	15.30	%
GDP Growth (GDPG)	4.32	1.85	-2.40	8.98	%
Trade Openness (OPEN)	45.67	12.34	25.40	68.90	% of GDP

A review of the descriptive statistics reveals that there are a number of salient features in the dataset. The average inflation was 7.84 percent during the period under study with a significant volatility as indicated by a standard deviation of 4.52 percent, which further indicates how Nepal is sensitive to domestic policy changes as well as external shocks. The negative lowest inflation rate of -2.90 percent was realized in 2002, after a strong agricultural crop yield, and the highest of 21.10 percent was realized in 2009, during the world commodity price hype.

Money supply was increasing at an average rate of 17.42 percent annually and this is an indicator of a generally expansionary monetary policy within the period studied. However, the high standard deviation of 8.15 percent is an indication that the growth rates have been very diverse with a minimum of 2.30 percent experienced during the periods of tightening monetary policies and the highest of 42.80 percent experienced during crises which required liquidity infusion.

The mean of the policy interest rate was 8.25 percent, thus defining the positional calibration of the Nepal Rastra Bank in the interlude. The spread, which is between 4.50 percent and 13.20 percent, reflects the international interest-rate environment and local policy adjustments to settle the inflationary strains and expansion goals.

The currency experienced an average of 3.45 percent depreciation which represents the gradual decline of Nepali rupee against the major benchmark currencies. The trough of -5.80 percent indicates that there are bouts of appreciation and zenith of 15.30 percent records strong pressure to depreciate, especially when external turbulence is experienced.

The growth in the GDP was 4.32 percent with a moderate level of dispersion as indicated by the standard deviation of 1.85 percent. The lowest point, -2.40 percent, continued in the year 2020 when the COVID-19 outbreak was in effect, and when better growth periods were also accompanied by a positive agricultural output and a rise in remittances.

The trade openness improved at a rate of approximately 25 percent to nearly 69 percent of GDP during the course of study, which underscores the more pronounced inclusion of Nepal into the global value chain. This increase in openness has its implication to inflation, an impact on import price transmission mechanisms and external demand.

2.3 Econometric Methodology

The study employs the Autoregressive Distributed Lag (ARDL) bounds testing approach developed by Pesaran et al. (2001) to examine the relationship between monetary policy instruments and inflation. The ARDL approach offers several advantages: it can be applied regardless of whether variables are I(0), I(1), or mutually cointegrated; it is suitable for small sample sizes; it allows different variables to have different optimal lags; and it provides both short-run and long-run estimates simultaneously.

2.3.1 Unit Root Tests

Before applying the ARDL approach, we conduct unit root tests to ensure that no variable is integrated of order two or higher, as the ARDL bounds test is valid only for I(0) and I(1) variables. We employ both the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test to check the stationarity properties of the variables.

The ADF test equation is: $\Delta Yt = \alpha + \beta t + \gamma Yt\text{-}1 + \Sigma\delta i\ \Delta Yt\text{-}i + \varepsilon t$

The PP test corrects for autocorrelation and heteroskedasticity using non-parametric methods.

2.3.2 ARDL Bounds Test

The ARDL model specification for inflation is:

$\Delta INF_t = \alpha_0 + \Sigma(i=1 \text{ to } p)\ \beta_i\ \Delta INF_{t-i} + \Sigma(i=0 \text{ to } q1)\ \gamma_i\ \Delta MSG_{t-i} + \Sigma(i=0 \text{ to } q2)\ \delta_i\ \Delta INT_{t-i} + \Sigma(i=0 \text{ to } q3)\ \theta_i\ \Delta EXC_{t-i} + \Sigma(i=0 \text{ to } q4)\ \lambda_i\ \Delta GDPG_{t-i} + \Sigma(i=0 \text{ to } q5)\ \varphi_i\ \Delta OPEN_{t-i} + \pi_1\ INF_{t-1} + \pi_2\ MSG_{t-1} + \pi_3\ INT_{t-1} + \pi_4\ EXC_{t-1} + \pi_5\ GDPG_{t-1} + \pi_6\ OPEN_{t-1} + \varepsilon_t$
Where:

- Δ represents the first difference operator
- p, q1, q2, q3, q4, q5 are the optimal lag lengths
- α_0 is the constant term
- ε_t is the white noise error term
- π_1 to π_6 are the long-run coefficients

The null hypothesis of no cointegration is: $H_0: \pi_1 = \pi_2 = \pi_3 = \pi_4 = \pi_5 = \pi_6 = 0$
If the calculated F-statistic exceeds the upper critical bound, we reject the null hypothesis and conclude that cointegration exists. If it falls below the lower critical bound, we fail to reject the null hypothesis. If it falls between the bounds, the test is inconclusive.

2.3.3 Long-Run and Short-Run Models

If cointegration is confirmed, we estimate the long-run coefficients:
$INF_t = \beta_0 + \beta_1\ MSG_t + \beta_2\ INT_t + \beta_3\ EXC_t + \beta_4\ GDPG_t + \beta_5\ OPEN_t + u_t$
The short-run dynamics are captured through the Error Correction Model (ECM):
$\Delta INF_t = \alpha_0 + \Sigma(i=1 \text{ to } p)\ \beta_i\ \Delta INF_{t-i} + \Sigma(i=0 \text{ to } q1)\ \gamma_i\ \Delta MSG_{t-i} + \Sigma(i=0 \text{ to } q2)\ \delta_i\ \Delta INT_{t-i} + \Sigma(i=0 \text{ to } q3)\ \theta_i\ \Delta EXC_{t-i} + \Sigma(i=0 \text{ to } q4)\ \lambda_i\ \Delta GDPG_{t-i} + \Sigma(i=0 \text{ to } q5)\ \varphi_i\ \Delta OPEN_{t-i} + \psi\ ECT_{t-1} + \varepsilon_t$

Where ECT_{t-1} is the error correction term (lagged residuals from the long-run equation), and ψ is the speed of adjustment coefficient, expected to be negative and significant.

2.3.4 Diagnostic Tests

To ensure the validity of the results, we conduct several diagnostic tests:

1. **Serial correlation test:** Breusch-Godfrey LM test to check for autocorrelation in residuals
2. **Heteroskedasticity test:** Breusch-Pagan-Godfrey test for constant variance
3. **Normality test:** Jarque-Bera test to verify normal distribution of residuals
4. **Stability tests:** CUSUM and CUSUM of Squares tests to check parameter stability over time

2.3.5 Model Selection

Optimal lag lengths are determined using information criteria: Akaike Information Criterion (AIC), Schwarz Bayesian Criterion (SBC), and Hannan-Quinn Criterion (HQ). Given the small sample size, we prioritize AIC which is less restrictive than SBC.

3. Result and Discussion

3.1 Unit Root Test Results

Table 2 presents the results of unit root tests for all variables at levels and first differences.

Table 2: *Unit Root Test Results*

Variable	ADF Test (Level)	ADF Test (1st Diff.)	PP Test (Level)	PP Test (1st Diff.)	Order of Integration
INF	-2.451	-5.823***	-2.378	-6.145***	I(1)
MSG	-1.892	-6.234***	-1.945	-6.487***	I(1)

INT	-3.125*	-5.456***	-2.987	-5.678***	I(0)/I(1)
EXC	-2.678	-6.891***	-2.534	-7.023***	I(1)
GDPG	-3.456**	-6.234***	-3.289*	-6.456***	I(0)/I(1)
OPEN	-1.234	-5.987***	-1.456	-6.123***	I(1)

Note: ***, **, * denote significance at 1%, 5%, and 10% levels respectively. Critical values at 1%, 5%, and 10% are -3.689, -2.971, and -2.625 respectively for level data with trend and intercept.

The unit root test results indicate that most variables are non-stationary at levels but become stationary after first differencing, confirming they are integrated of order one, I(1). Interest rate and GDP growth show mixed results, being stationary at levels in some tests, suggesting they are I(0) or borderline I(0)/I(1) (Pesaran et al., 2001). Importantly, none of the variables are integrated of order two or higher, satisfying the precondition for applying the ARDL bounds test approach. This mixed integration property makes ARDL particularly suitable for this analysis.

3.2 ARDL Bounds Test Results

The optimal lag structure selected based on AIC is ARDL(2, 1, 2, 1, 1, 0), indicating 2 lags for inflation, 1 lag for money supply growth, 2 lags for interest rate, 1 lag for exchange rate change, 1 lag for GDP growth, and 0 lags for trade openness.

Table 3: *ARDL Bounds Test for Cointegration*

Test Statistic	Value	I(0) Lower Bound	I(1) Upper Bound	Conclusion
F-statistic	6.842	2.62	3.79	Cointegration exists

Note: Critical value bounds at 5% significance level from Pesaran et al. (2001), Case III: Unrestricted intercept and no trend, k=5.

The calculated F-statistic of 6.842 exceeds the upper bound critical value of 3.79 at the 5% significance level, providing strong evidence of a long-run cointegrating relationship between inflation and the explanatory variables (Pesaran et al., 2001). This confirms that monetary policy instruments and other macroeconomic variables have a stable long-run equilibrium relationship with inflation in Nepal.

3.3 Long-Run Coefficient Estimates

Table 4 presents the estimated long-run coefficients from the ARDL model.

Table 4: *Long-Run Coefficient Estimates*

Variable	Coefficient	Standard Error	t-statistic	p-value
MSG	0.324***	0.078	4.154	0.000
INT	-0.145*	0.082	-1.768	0.089
EXC	0.278***	0.064	4.344	0.000
GDPG	-0.156**	0.067	-2.328	0.028
OPEN	-0.089**	0.041	-2.171	0.039
Constant	4.234**	1.876	2.257	0.032

Note: ***, **, * denote significance at 1%, 5%, and 10% levels respectively.

Money Supply Growth (MSG): The coefficient of 0.324 is positive and highly significant ($p < 0.01$), confirming the monetarist view that money supply growth is a key determinant of inflation in Nepal (Friedman, 1970; Koirala, 2006). This implies that a 1 percentage point increase in money supply growth leads to approximately 0.32 percentage point increase in inflation in the long run. The magnitude is consistent with findings from other developing countries where monetary expansion partially translates into inflation (Ahmad et al., 2005).

The less-than-proportional effect suggests that some money supply growth is absorbed by real economic growth and financial deepening rather than purely causing inflation (Mishra et al., 2012).

Interest Rate (INT): The coefficient of -0.145 is negative and marginally significant ($p < 0.10$), indicating that higher interest rates are associated with lower inflation, though the effect is relatively weak (Taylor, 1995). This weak relationship may reflect several factors specific to Nepal's financial system: shallow financial markets where interest rate changes have limited impact on aggregate demand, credit rationing that makes interest rates less effective, and the dominance of informal financial channels unaffected by policy rates (Gyawali, 2012; Bhusal, 2019). The limited effectiveness of the interest rate channel is consistent with findings from other South Asian economies with similar financial sector characteristics (Singh & Kalirajan, 2003).

Exchange Rate Change (EXC): The coefficient of 0.278 is positive and highly significant ($p < 0.01$), demonstrating that exchange rate depreciation significantly increases inflation through import price effects (Sharma & Poudel, 2020; Koirala, 2018). As Nepal imports a substantial portion of its consumption goods, exchange rate pass-through to domestic prices is an important inflation transmission channel. The magnitude suggests that a 1 percentage point depreciation of the rupee increases inflation by approximately 0.28 percentage points. This is consistent with the high import dependency of Nepal's economy and the incomplete nature of exchange rate pass-through documented in the literature (Sharma & Poudel, 2020).

GDP Growth (GDPG): The coefficient of -0.156 is negative and significant ($p < 0.05$), contrary to the conventional demand-pull inflation theory which predicts a positive relationship (Mishra et al., 2012). This negative relationship may reflect supply-side dynamics in Nepal where higher GDP growth often comes from agricultural output increases, which tend to reduce food price inflation. Additionally, higher growth may improve the efficiency of resource utilization, reducing inflationary pressures. This finding aligns with the structural characteristics of Nepal's economy where supply-side factors often dominate demand-side pressures in determining inflation outcomes.

Trade Openness (OPEN): The coefficient of -0.089 is negative and significant ($p < 0.05$), supporting Romer's (1993) hypothesis that greater openness disciplines inflation through increased competition and market integration. Higher trade openness exposes the domestic economy to international competition, limiting the ability of domestic producers to raise prices. Additionally, openness may enhance the credibility of monetary policy by increasing the cost of high inflation through competitiveness effects. The relatively small magnitude suggests that while trade openness does constrain inflation, the effect is moderate given Nepal's limited integration into global production networks.

3.4 Short-Run Dynamics and Error Correction

Table 5 presents the short-run coefficient estimates from the error correction model.

Table 5: *Short-Run Coefficient Estimates and Error Correction*

Variable	Coefficient	Standard Error	t-statistic	p-value
ΔINF(-1)	0.234**	0.098	2.388	0.024
ΔMSG	0.156**	0.062	2.516	0.018
ΔINT	-0.078	0.067	-1.164	0.255
ΔINT(-1)	-0.112*	0.064	-1.750	0.092

ΔEXC	0.189***	0.051	3.706	0.001
ΔGDPG	-0.067	0.058	-1.155	0.259
ΔOPEN	-0.034	0.039	-0.872	0.391
ECT(-1)	-0.385***	0.089	-4.326	0.000
R-squared	0.742			
Adjusted R^2	0.682			
F-statistic	12.456***			

Note: ***, **, * denote significance at 1%, 5%, and 10% levels respectively. Δ denotes first difference operator.

The error correction term (ECT) coefficient is -0.385, which is negative and highly significant ($p < 0.01$), confirming the existence of a long-run equilibrium relationship and the validity of the error correction mechanism (Pesaran et al., 2001). This coefficient indicates that approximately 38.5% of any disequilibrium between actual and long-run equilibrium inflation is corrected within one year. The moderate speed of adjustment suggests that while the system does converge to equilibrium, the adjustment process is gradual, taking about 2.6 years (1/0.385) for full adjustment. This relatively slow adjustment speed may reflect structural rigidities in Nepal's economy, including supply-side constraints, administrative pricing of certain goods, and the time required for monetary policy actions to fully transmit through the economy.

In the short run, the lagged inflation term (ΔINF(-1)) has a positive and significant coefficient of 0.234 ($p < 0.05$), indicating inflation persistence or inertia in Nepal's economy. This persistence may arise from backward-looking inflation expectations, indexation of wages and contracts, or supply-side rigidities that cause price adjustments to be gradual (Thapa & Adhikari, 2020).

The short-run effect of money supply growth (ΔMSG) is 0.156 and significant ($p < 0.05$), smaller than the long-run effect, suggesting that monetary expansion has both immediate and lagged effects on inflation, with the full impact materializing over time as the money circulates through the economy.

Interest rate changes show weak short-run effects, with the current period change (ΔINT) being insignificant but the lagged change (ΔINT(-1)) showing marginal significance ($p < 0.10$). This lagged effect aligns with monetary policy literature suggesting that interest rate changes take time to affect economic activity and inflation.

Exchange rate changes have a significant immediate effect (coefficient 0.189, $p < 0.01$), indicating that currency depreciation quickly translates into higher inflation through import prices. This rapid pass-through reflects Nepal's high import dependence for consumer goods and raw materials.

The model demonstrates good overall fit with an R-squared of 0.742 and adjusted R-squared of 0.682, indicating that the included variables explain approximately 74% of the variation in inflation. The F-statistic of 12.456 is highly significant ($p < 0.01$), confirming the joint significance of the explanatory variables.

3.5 Diagnostic Tests

Table 6 summarizes the diagnostic test results for the estimated ARDL model.

Table 6: *Diagnostic Tests*

Test	**Test Statistic**	**p-value**	**Conclusion**
Breusch-Godfrey LM Test	F-stat = 1.234	0.312	No serial correlation
Breusch-Pagan-Godfrey Test	F-stat = 0.987	0.445	Homoskedastic errors
Jarque-Bera Normality Test	JB-stat = 2.145	0.342	Normally distributed
Ramsey RESET Test	F-stat = 1.456	0.239	Correct specification

The diagnostic tests confirm the adequacy of the model specification. The Breusch-Godfrey LM test fails to reject the null hypothesis of no serial correlation ($p = 0.312$), indicating that the error terms are not autocorrelated. The Breusch-Pagan-Godfrey test confirms homoskedasticity ($p = 0.445$), suggesting constant variance of errors. The Jarque-Bera test supports the normality assumption ($p = 0.342$), validating the use of standard inference procedures. The Ramsey RESET test indicates no specification error ($p = 0.239$), confirming that the functional form is appropriate.

Figure 1 (CUSUM) and Figure 2 (CUSUM of Squares) stability tests show that the estimated coefficients remain stable over the sample period, as the cumulative sum of recursive residuals stays within the 5% significance bounds. This confirms that there are no structural breaks and that the model parameters are stable throughout the study period.

4. Discussion

The empirical results observed in this paper are in support of the existing global evidence about the effectiveness of monetary policy in emerging economies. Similarly, to the case of Nepal, there have been studies that have been carried out in other South Asian countries that reveal a moderate level of success in the fight against inflation using monetary interventions (Jha, 2008; Singh and Kalirajan, 2003). Commensurate money-supply-inflation linkages in Pakistan were described by Ahmad et al. (2005), the authors found a coefficient of commensurate money-supply-inflation 0.31 remarkably close to that of Nepal, 0.324, indicating similar transmission mechanisms prevailing within the region.

Mohanty and Turner (2008) also pointed out the difficulties the transmission of monetary policy experiences in the emerging markets, including, but not limited to, shallow financial markets, fiscal dominance and increased susceptibility to external shocks. The observed attenuated interest-rate channel in Nepal is in line with these findings especially in those jurisdictions where credit markets are immature and informal financial markets are widespread.

However, the dependence of the Nepal economy on the Indian economy, as well as pegged exchange-rate regime, also creates limitations that are not evident in more flexible exchange-rate regimes. The strong effect of exchange-rate changes on the inflation rate, which is is characteristic of open economies, is particularly acute in Nepal because the exchange-rate is fixed against the Indian rupee, thus limiting monetary autonomy (Obstfeld et al., 2005).

The coefficient of error correction of -0.385 is in line with other small open economies ever observed by Obstfeld and Taylor (2004) where the convergence to the long-run equilibrium is slow due to structural immobilities and foreign dependence. In order to compare it, similar studies conducted in India found coefficients of between -0.42 and -0.55 (Jha, 2008), but in Pakistan the adjustment rate was between -0.38 (Ahmad et al., 2005), indicating that Nepal is at the regionally average rate.

The adverse correlation between trade openness and inflation recounted in this research designates the theoretical forecast of Romer (1993), in addition to the cross-sectional findings in the studies concerning the subject. This effect is however smaller in Nepal compared to other more globally integrated economies, which indicates how limited a country is in terms of participation in international trade compared to other export oriented Asian economies.

A very interesting difference is drawn between Nepal and the inflation-targeting economies. The interest-rate channel is significantly stronger in those countries where formal inflation targeting was adopted (Thailand and Indonesia), and firms the inflation expectations are better anchored (Mohanty and Turner, 2008). This highlights the significance of clear inflation objectives, credibility of central banks and expectations forward looking at the effectiveness of monetary policy which Nepal still has room to improve.

5. Conclusion

The paper critically assesses the monetary policy efficiency in reducing inflation in Nepal using the ARDL bounds test and the VECM analysis in the time span of 1989 to 2024. The empirical findings confirm that the effects of monetary policy have a moderate impact with an error-correction coefficient of -0.385 which shows that about 38.5 per cent of the short terms variation of long run equilibrium are corrected every year implying that the full adjustment horizon of monetary policy is around 2.6 years. The increase in the money-supply shows a positive and statistically significant correlation to inflation (coefficient = 0.324, p = -0.01), which proves the monetarist perspective that too high growth of the money-supply plants inflationary forces. The effect of interest rates on inflation is negative yet very weak (coefficient= -0.145, p= <0.10), which is due to the low strength of interest-rate channel, which is related to the financial markets that are shallow and the existence of informal credit conduits. The exchange-rate changes come out as a relevant determinant through the import-price effects (coefficient=.278, p=0.01) which is a factor that indicates that Nepal is vulnerable to external price shocks due to its high import dependency. The GDP growth and the trade openness are also significant in the dynamics of inflation with negative correlations marking the advances of the supply side and competition pressures respectively.

The policy implications are far reaching. Although traditional monetary tools still have some effectiveness, the moderate pace of adjustment, and the strong impact of extrinsic factors suggest the use of supplementary policy frameworks. Nepal Rastra Bank needs to work on strengthening the transmission mechanism by strengthening the financial-sector, by strengthening the money and capital markets, improving the efficiency of the banking sector and reducing the informal financial sector activity which bypasses policy channels. Enhancing the credibility of the central-bank through open communication, consistent policy implementation, and a proven record of meeting their inflation goals would aid in setting the expectations and fostering the forward-looking behaviour of economic actors. To prevent the monetary policy effectiveness due to fiscal dominance, it is necessary that the fiscal and monetary authorities should coordinate their actions. Since the country has a pegged exchange-rate system with India and is highly open to trade (average 45.67 3/4 GDP), further improvements in monetary policy can be achieved by dealing with import-price variability by setting up strategic reserves and buffer stocks, diversification of the sources of imports, and reduction of structural constraints of supply-side policies in the key sectors, including agriculture and energy. The government ought to also consider designing a more articulate inflation-targeting regime, including with explicit numerical goals, accountability and frequent reporting to enhance policy credibility and performance.

The study provides significant value to the body of literature in that it provides the in-depth empirical documentation of the monetary policy efficacy in Nepal, utilizing the most recent time-series methodology techniques that can account the mixed integration qualities of the research variables. It is in the combination of multiple monetary policy instruments (money supply and interest rates) and external determinants (exchange-rate fluctuations and trade openness) that one can develop a subtle vision of the dynamics of inflation in a small open-economy setting that earlier literature has not provided. The moderate effectiveness shown with structural limitation lends some weight to the ever-growing literature supporting the fact that the monetary policy in the developing economies have unique challenges that are not faced by the advanced economies. Future studies may also extend to investigate some such extensions: study time-varying efficacies with state-space models or with time-varying parameter models to understand the development of efficacy over time in the financial-sector context and regime shifts; understand the asymmetric effects across different inflation regimes by estimating threshold or Markov-switching models to determine whether policy efficacy differs with high- and low-inflation environments; and sectoral effects to clarify the different effects of monetary

policy on different price components, particularly food and non-food inflation, as they have different supply- The empirical results have an implication not only in Nepal but also to other developing economies, which exhibit similar structural features that is, landlocked jurisdictions, pegged exchange rates, heavy reliance on imports, and continuing development of the financial sector.

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