NPRC Journal of Multidisciplinary Research
Volume 2, Issue 5, May, 2025 Pages: 100-110
ISSN: 3059-9148 (Online)
DOI: https://doi.org/10.3126/nprcjmr.v2i5.79674

Foreign Exchange Rate Dynamics and Stock Market Performance in Nepal: A Vector Autoregressive Approach

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Received: March 13, 2025 Revised & Accepted: May 23, 2025

Abstract

This study explores the dynamic relationship between foreign exchange rate (EXR) and stock market performance in Nepal, a topic with limited empirical exploration in the local context. Using monthly data from 2005 to 2024 and applying a Vector Autoregressive (VAR) framework, the study examines both long-run and short-run interactions. Stationarity tests revealed that all variables are integrated of order one, and lag selection criteria identified lag 1 as optimal for the VAR model. Johansen cointegration tests confirmed the absence of a long-run equilibrium relationship between EXR and stock market performance. However, Granger causality tests indicated a unidirectional short-run causal relationship from EXR to the NEPSE index. Variance decomposition analysis showed that while NEPSE is primarily driven by its own shocks, the influence of EXR is minimal but increases gradually over time. These findings imply that currency fluctuations have a short-term predictive role but limited long-term impact on Nepal's stock market. The study contributes to the understanding of macroeconomic influences on stock market behavior and offers valuable insights for investors, policymakers, and financial analysts. The robust econometric approach, including VAR modeling, Granger causality, and diagnostic tests, ensures the reliability of the results. This research provides empirical evidence for informed decision-making in Nepal's open and developing economy, emphasizing the importance of monitoring exchange rate movements in short-term investment strategies.

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Keywords: Stock Market Performance, Foreign Exchange Rates, Vector Autoregression, Johanson Cointegration, Granger Causality Test
JEL Classification Codes: G11, G12, G14, G41

Introduction

The stock market is a vital component of a country's financial system. It serves as a pipeline for capital formation and investment. In Nepal, the Nepal Stock Exchange (NEPSE) functions as the primary indicator of market performance and investor sentiment. Fama (1981) introduced a foundational framework for understanding the inter-action between stock market performance and macroeconomic forces. Stock prices are influenced by a variety of macroeconomic factors, among which the foreign exchange rate has become increasingly significant due to its impact on international trade, investment flows, and corporate earnings. The findings of (Thapa, 2023) revealed that foreign exchange rate has positive impact on the stock market performance.

Over the years, researchers have attempted to understand the relationship between stock market performance and macroeconomic variables. The understanding the factors that influence stock market performance, particularly macroeconomic indicators like the foreign exchange rate (EXR), is critical for policymakers, investors, and financial institutions alike (Ho, 2019; Hsing, 2014; Giri and Joshi, 2017). Studies conducted in various economies suggest that changes in exchange rates can directly affect the value of listed companies, particularly those involved in imports or exports. Despite extensive global research, there is a limited body of empirical work focusing on how exchange rate fluctuations affect the Nepalese stock market. This gap makes it difficult for policymakers, investors, and financial analysts to make informed decisions based on local evidence. The findings (Chaudhary, 2025) emphasized the importance of stock market activities in understanding investment behaviour. Investors, financial advisors, and policymakers can all benefit from understanding how psychological and macroeconomic affect investment decisions.

In the context of Nepal's open and developing economy, foreign exchange rate volatility can have considerable implications for investor confidence and market stability. This study addresses the gap in the literature by examining the dynamic relationship between the foreign exchange rate and stock market performance in Nepal. By analyzing monthly time-series data from 2005 to 2024, this research explores how exchange rate movements influence the NEPSE index both in the short run and over the long term.

The overall aim of this study is to explore the relationship between foreign exchange rate and stock market performance. The specific objectives are: to assess the long and short-term relationship, to determine the impact, and to examine the causal relationship between the foreign exchange rate. This study contributes to the existing literature by applying robust econometric techniques suited for analyzing time-series data with long-run equilibrium tendencies. The findings aim to provide insights for investors, policymakers, and researchers regarding the influence of currency fluctuations on Nepal's stock market. The building block

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of this article is the understanding that stock market performance is affected by foreign exchange rate. The correlation between stock index and EXR has been a topic of great interest among economists due to their significant influence on a country's economy. Understanding this relationship is crucial for both domestic and international investors, as it helps in portfolio diversification and hedging strategies. However, despite the economic theory suggesting that foreign exchange rates can impact stock prices by affecting factors like cash flow, investments, and firm profitability, there is no consensus on this relationship. This subsection provides the empirical findings of the association between exchange rate fluctuations (specifically, Rupee vs. Dollar) and movements in the stock market of Nepal. The conceptual outline for this study is based on the intention that the macroeconomic indicators can affect stock market performance in the short and long term through various channels. Furthermore, the framework recognizes the potential for bidirectional causality between stock movements and macroeconomic factors.

Review of Literature

Many scholarly investigations have examined the association between Stock Index and the foreign exchange rate (EXR). The majority of the data consistently demonstrates a positive relationship, demonstrating that rising EXR inflows and Stock Index often go hand in hand. The study highlights the significance of EXR as a market catalyst, demonstrating that greater levels of EXR stimulate the growth and development of stock markets by boosting investor confidence. The literature that is currently accessible provides compelling evidence in support of a favorable correlation between EXR and Stock Index.

Ibrahim and Aziz (2003) examined a negative long-term correlation between the foreign exchange rate and stock prices in Malaysia. While some macroeconomic factors positively influenced stock prices, the exchange rate had an adverse effect, indicating a depreciation of the currency lowers stock market performance. Moreover, the immediate positive effects of liquidity shocks on stock prices tend to vanish over time, suggesting unstable interactions between exchange rate movements and stock prices. Mcpherson (2006) identified a persistent relationship between exchange rates and stock market volatilities and correlations. It stressed that exchange rate stability directly affects the volatility and co-movement of global stock markets, especially during turbulent periods. Such links have practical implications for risk management and international portfolio diversification. Pal et al. (2011) findings, foreign exchange rates have a significant long-run impact on the BSE Sensex in India. The study employed co-integration and error correction models, confirming the sensitivity of the Indian stock market to currency fluctuations. However, gross domestic savings showed no meaningful association with stock market performance.

Jiranyakul (2012) found evidence of interaction between the exchange rate and the stock market index in Thailand. Though the model failed the causality test, co-movements were apparent. This suggests some dependency of the Thai stock market on currency movements, albeit without strong causality. Arshad and Nasır Z.M. (2012) concluded that the foreign exchange rate has a significant long-run and short-run effect on stock prices in Pakistan.

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Exchange rate fluctuations were among the key macroeconomic variables that influenced the stock market. In contrast, variables like oil prices and inflation had no meaningful impact in either the short or long run. Humala and Rodriguez (2013) revealed that both stock and foreign exchange markets display time-varying volatility cycles, often triggered by macroeconomic shocks. These cycles reflect interconnected movements, with frequent episodes of return clustering and volatility spillovers. The study indicates a close link between macroeconomic uncertainty and co-movement of exchange and stock markets.

Manasseh et al. (2019) examined a long-run relationship between stock prices and exchange rates in Nigeria was confirmed through co-integration tests. The VAR-GARCH model revealed mean spillover from the stock market to the foreign exchange market, and bidirectional volatility transmission. This implies that market shocks in one domain influence volatility patterns in the other. Fianto et al. (2022) instituted that currency rates significantly influence Islamic stock returns in Indonesia, along with oil and gold prices. The relationship is time-varying and quantile-dependent, reflecting changing dynamics under different market conditions. These findings stress the importance of macroeconomic awareness in Islamic investment decisions. The cointegration results (Arindam et al., 2024) indicated a long-term relationship, whereas the vector autoregressive-based impulse response analysis suggests that the Malaysian stock index (KLCI) responds negatively to the money supply, inflation and producer price index (PPI). However, the findings indicated a positive response from the stock index to the exchange rate. Thapa and Chamlagain, (2025) demonstrated a significant relationship between exchange rates and stock prices in Nepal. However, foreign exchange reserves and inflation were not significantly associated with stock price movements. This suggests that currency value plays a more direct role in stock market performance compared to broader reserve levels.

Research Materials and Methods

This study adopted a quantitative research approach, utilizing inferential statistical methods to analyze time-series data. The quantitative design was chosen to facilitate the application of sophisticated econometric tools to investigate the dynamic interactions between macroeconomic variables and the stock market index. This method allowed for the examination of both short-run and long-run effects, providing valuable insights into how macroeconomic indicators influence stock market performance over time.

The data for this analysis were obtained from reliable sources, including the World Bank, Nepal Stock Exchange (NEPSE), Nepal Rastra Bank (NRB), the Securities Board of Nepal (SEBON), and related financial institutions. The study utilized monthly data ranging from January 2005 to December 2024, resulting in 203 observations. Time-series econometric analyses were conducted using EViews 12 software, applying inferential techniques to assess the long-run and short-run impact of macroeconomic variables on the performance of the Nepalese stock market.

This study was adopted Augmented- Dickey Fuller (ADF) test for the stationarity test. To identify the appropriate model structure, the optimal lag length was selected based on various

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model selection criteria, including the Akaike Information Criterion (AIC), Schwarz Bayesian Criterion (SBC), and the Hannan-Quinn Criterion (HQC). An econometric model was then specified to evaluate the influence and interdependence of the selected macroeconomic variables on stock market movements. Given the nature of the data, the Vector Autoregressive (VAR) model was chosen for its capacity to accommodate series with differing levels of integration and to analyze both short-term fluctuations and long-term equilibrium relationships. The Johansen cointegration test was employed to determine the existence and number of cointegrating relationships between the variables, confirming the presence of short-run associations. As a result, the Vector Autoregression (VAR) model, as it captures both the immediate adjustments and the short-term equilibrium behavior of the variables. Additional econometric tests were also conducted to ensure the robustness of the findings. The study further applied the Granger causality, variance decomposition test to explore directional and magnitude of relationships respectively between foreign exchange rate and stock market performance. To ensure the validity of the analysis, the researcher performed residual diagnostic tests, confirming the suitability of the dependent and independent variables. The VAR/VEC model involves several steps; including conducting a stationarity test, lag order test, model diagnostic test, forecasting, VAR/VEC model estimation, Granger causality test, and interpretation.

Data Analysis and Discussions

Table 1 “The Augmented Dickey-Fuller (ADF)” test results show that both NEPSE and FXR are non-stationary at level but become stationary after first differencing, indicating they are integrated of order one, I(1).

Table 1:
Unit Root Test

		NEPSE I (0)	NEPSE I (1)	FXR I (0)	FXR I (1)
T- statistics		t-stat.	t-stat.	t-stat.	t-stat.
Augmented Dickey-Fuller test statistic		-0.416	-14.811	0.108	-13.151
Test critical values:	1% level	-3.458	-3.458	-3.458	-3.458
	5% level	-2.874	-2.874	-2.874	-2.874
	10% level	-2.573	-2.573	-2.573	-2.573

Source: Author Calculation by Eviews-12

This confirms that the variables are suitable for further time series analysis such as cointegration and VECM. Therefore, the results are reliable for exploring long-run and short-run relationships among the variables. The stationary of EXR exposed at first difference presented by using the Augmented Dickey Fuller test. Determining the optimal lag length is crucial for conducting the Johansen co-integration test using a VAR model.

Table 2 provided the results of five lag selection criteria. Among them, the FPE, LR, and AIC criteria suggest an optimal lag length of 3 for the VAR model. However, to mitigate the risk of over-parameterization, it follows the SIC and HQ criteria to identify the optimum lag-length. According to these criteria, the optimum lag length is determined to be 1, as it yields the lowest SIC value. The stationary of EXR exposed at first difference presented in the previous section.

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Table 2:

VAR Lag Order Selection Criteria for EXR to Index

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-75.751	NA	0.007402	0.769	0.8025	0.7831
1	705.2774	1538.858	3.37e-06	-6.924	-6.825*	-6.883*
2	708.2868	5.869972	3.41e-06	-6.914	-6.750	-6.847
3	714.6517	12.28*	3.33e-06*	-6.937*	-6.708	-6.844

Source: Author Calculation by using Eviews-10

The Johansen co-integration test requires that the trace value and maximum eigenvalue exceed critical values to reject the null hypothesis (H0) with a p-value below 5%. This test estimates the number of co-integrating vectors using maximum likelihood estimation based on Johansen's trace and maximum eigenvalue statistics. The provided p-values are calculated using the MacKinnon-Haug-Michelis method, commonly used for co-integration tests.

Table 3:

Trace and Max-Eigen Value Tests of EXR to Index

Lags interval (in first differences): 1 to 1

Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Trace Values		Max-Eigen Values	
	None	At most 1	None	At most 1
Eigen value	0.0431	0.0089	0.0431	0.0089
Trace Statistic	11.0328	1.8591	9.1737	1.8591
0.05 Critical Value	15.4947	3.8415	14.2646	3.8415
Prob.**	0.2095	0.1727	0.272	0.1727

Trace and Max test indicated no co-integration at the 0.05 level

*Note: * denoted rejection of the hypothesis at the 0.05 level*

Source: Author Calculation by using Eviews-10

Table 3 displayed the trace statistics for Johansen's co-integration test on the EXR and Nepalese Stock Market Index. The table presents results for two hypotheses: "None" (indicating no co-integration) and "At most 1" (representing at most one co-integrating relationship). It showed the trace and max eigenvalues and the corresponding test statistics for each hypothesis. The eigenvalues for both hypotheses are 0.04 and 0.01. The test statistics for the trace value are 11.03 and 1.86, while for the max-eigen value, they are 9.17 and 1.86. The critical values at the 5% significance level are 15.49 and 3.84 for the trace test and 14.26 and 3.84 for the max-eigen value test. The table also includes the p-values calculated using the MacKinnon-Haug-Michelis method, which are 0.21 and 0.17 for the trace test and 0.27 and 0.17 for the max-

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eigenvalue test. In conclusion, the results of the unrestricted co-integration rank test, specifically the trace test, indicate that there is no evidence of co-integration between the series INDEX and EXR at the 0.05 significance level. This indicates that there is no co-integration and the long-term relationship between consumer price (inflation) and Nepalese Stock Index. So, it should be applied Vector Auto Regression (VAR) model for a short-run relationship. The short-run VAR model is presented below.

Table 4 shows that the coefficient of 0.965088 suggests that a one-unit-increase in the lagged-value of (LINDEX (-1)) leads to a 0.965088 unit increase in the current value of LINDEX. The t-value of 79.9131 indicated that this coefficient is statistically significant, implying that the lagged value of LINDEX has a significant impact on the current value of LINDEX. The coefficient of 0.109429 suggested that a one-unit increase in the lagged value of LEXR (LEXR (-1)) leads to a 0.109429 unit increase in the current value of LINDEX. The t-value of 2.74890 indicated that this coefficient is statistically significant, suggesting that the lagged value of LEXR has a significant impact on the current value of LINDEX.

VAR Model Exchange Rate

LINDEX = C(1,1)*LINDEX(-1) + C(1,2)*LEXR(-1) + C(1,3)
LEXR = C(2,1)*LINDEX(-1) + C(2,2)*LEXR(-1) + C(2,3)
LINDEX = 0.965088224197*LINDEX(-1) + 0.109429085143*LEXR(-1) - 0.2477
LEXR = - 0.00453351527341*LINDEX(-1) + 1.00135793938*LEXR(-1) + 0.0258

The coefficient of constant -0.247747 suggests that there is a negative baseline effect on LINDEX (holding other variables constant). In other words, when all other variables are zero, the constant term influences LINDEX negatively. The t-value of -1.87867 suggests that the coefficient is not statistically significant at conventional significance levels ($p > 0.05$), meaning that the impact of the constant term may not be reliable.

Table 4 presented the results of VAR estimation for two variables, LINDEX and LEXR, using lagged values and a constant term. The lagged value of LINDEX (LINDEX (-1)) has a statistically significant and positive impact on the current value of LINDEX. The lagged value of LEXR (LEXR (-1)) also has a statistically significant and positive impact on the current value of LINDEX.

Table 4:

Results of VAR Estimation (INDEX and EXR)

Variables	LINDEX	LEXR
LINDEX(-1)	0.965088	-0.004534
	-0.01208	-0.0036
	[79.9131]	[-1.25968]
LEXR(-1)	0.109429	1.001358
	-0.03981	-0.01186
	[2.74890]	[84.4093]
C	-0.247747	0.025812
	-0.13187	-0.0393
	[-1.87867]	[0.65680]

Source: Author Calculation by using Eviews-10

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In conclusion, Nepalese stock market is affected by foreign exchange rate significantly. Both variables Index and Foreign exchange rate are influenced by their own past value significantly.

VAR Causality Test for Index and its Lag Values of EXR

To assess the direction of causality in the short run, a VAR framework was utilized. No long-run causal relationship exists between the variables as there is no evidence of long-run co-movement. The findings of the short run causality test, conducted using the Wald test, are presented in table. The VAR Granger Causality test results indicate the absence of any causal way between exchange rate fluctuation and the drive of stock market index. The hypotheses for the VAR Granger Causality tests are as follows: H0: The lagged values of the Index and EXR cannot jointly cause the Index. H1: The lagged values of the Index and EXR can jointly cause of the Index. H0: C(1)=C(2)=0.

Table 5:

Wald Test Results for Index and its Lag Values

Test Statistic	Value	Df	Probability
Chi-square	14438.07	2	0.0000

Source: Author Calculation by using E-views-10

Table 5 demonstrated that the p-value is below the one percent level of significance for the chi-square value. This leads to the rejection of the null hypothesis and acceptance of the alternative hypothesis. It indicates that the lagged values of the Nepalese Stock Price Index and EXR jointly cause and influence the Nepalese stock market price index at a one percent significance level.

Table 5 presented the results of the Pairwise-Granger-Causality Test, which is conducted to regulate if there is a causal association between variables in the dependent variable. The table has exhibited that the p-value for the causality from EXR to Index is 0.0065, which is lower than the one percent level of significance for the F-Statistic. This leads to the acceptance of the alternative hypothesis and the rejection of the null hypothesis.

Table 6:

Pairwise Granger Causality Tests of EXR and Index

Null Hypothesis:	Obs	F-Statistic	Prob.
LEXR does not Granger Cause LINDEX	209	7.55647	0.0065
LINDEX does not Granger Cause LEXR		1.58679	0.2092

Source: Author Calculation by using Eviews-10

Hence, it can be concluded that there is a causal relationship from EXR to Index. On the other hand, the p-value for the causality from Index to EXR is 0.2092, which is greater-than the five percent level-of-significance for the F-Statistic. Therefore, the null hypothesis is accepted, and the H1 hypothesis cannot be accepted. Consequently, there is no causal relationship from Index to EXR. The VAR model requires both variables to be stationary after the first difference. Tests confirm that both variables exhibit stationarity after the first difference, and lag selection suggests using one optimal lag in the model.

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Table 7:
Variance Decomposition of INDEX and EXR

Variance Decomposition of INDEX				Variance Decomposition of EXR		
Period	S.E.	LINDEX	LEXR	S.E.	LINDEX	LEXR
1	0.07704	100	0	0.022959	0.455515	99.54448
2	0.10698	99.9451	0.054901	0.03251	0.569095	99.4309
3	0.12871	99.81539	0.184609	0.039862	0.69426	99.30574
4	0.14605	99.6089	0.391105	0.046076	0.82988	99.17012
5	0.16054	99.32402	0.675978	0.051563	0.974905	99.02509
6	0.17299	98.95961	1.040391	0.05653	1.128368	98.87163
7	0.18388	98.51496	1.485043	0.061103	1.289369	98.71063
8	0.19354	97.98986	2.010143	0.065361	1.457081	98.54292
9	0.20222	97.38461	2.615385	0.06936	1.630738	98.36926
10	0.21009	96.70006	3.299938	0.07314	1.809631	98.19037

Source: Author Calculation by using Eviews-10

Table 7 showed the results of a ten-month impulse response analysis, indicating the impact of shocks on the Nepalese stock market index. The table also showed short-run and long-run fluctuations in the variables. In both cases, the index is mainly influenced by its own lagged values, which are highly significant, while the influence of EXR is negligible in the short run and somewhat but not significant in the long-run. The variance decomposition results suggest that the index's movement is predominantly guided by its own lagged values in both the short run and the long run.

The major findings of this study: the Augmented Dickey-Fuller (ADF) test revealed that the exchange rate (EXR) series is non-stationary at level but becomes stationary after first differencing. This confirms that the data series used for the VAR and cointegration tests are integrated of order one, i.e., I(1). Among the five lag selection criteria, FPE, LR, and AIC suggest an optimal lag of 3, while SC and HQ recommend a lag length of 1. To avoid overfitting, the study adopts lag 1 for the VAR model based on the Schwarz Criterion. The trace and max-eigen statistics both fall short of the 5% critical values, and their respective p-values are above 0.05, indicating no co-integrating relationship between EXR and NEPSE. This suggests the absence of a long-run equilibrium relationship between the exchange rate and the stock market index. The lagged values of both LINDEX and LEXR significantly influence the current value of the NEPSE index, with the coefficients being positive and statistically significant. However, the constant term in the LINDEX equation is not significant, implying that the intercept does not meaningfully affect the index when other variables are held constant. The chi-square value is highly significant ($p < 0.01$), leading to the rejection of the null hypothesis of no joint causality. This implies that the lagged values of EXR and LINDEX jointly influence the NEPSE index in the short run. EXR Granger-causes LINDEX at the 1% level of significance ($p = 0.0065$), showing unidirectional causality from exchange rate to stock market index. However, the reverse causality from LINDEX to EXR is not statistically significant ($p = 0.2092$), confirming no feedback effect. The variance decomposition results

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show that the NEPSE index is primarily explained by its own shocks throughout the forecast horizon. The influence of EXR on the index is minimal, growing gradually over time but remaining relatively weak even in the long run.

The relationship between foreign exchange rates and stock market performance presents both consistent and contradictory findings across studies. Several prior studies (e.g., Ibrahim and Aziz, 2003; Arshad and Nasir, 2012; Pal et al., 2011) affirm a significant long-run association between exchange rates and stock prices, with some reporting negative correlations, indicating that currency depreciation adversely affects stock performance. Similarly, Sharma et al. (2010) and McPherson (2006) highlight notable short-term and volatility-based linkages, while Manasseh et al. (2019) and Humala and Rodriguez (2013) reveal bidirectional volatility spillovers and time-varying interdependencies. Contrarily, the current study finds no long-run co-integration between exchange rate and NEPSE index, suggesting the absence of long-term equilibrium. However, it identifies short-run causality from exchange rate to stock market index, consistent with earlier findings of dynamic interactions. This mixed evidence emphasizes that while exchange rate fluctuations may impact stock markets in the short run, long-run relationships can be market-specific and context-dependent.

Conclusions

This study explored the relationship between the foreign exchange rate and stock market performance in Nepal using monthly data from 2005 to 2024. The primary objective was to assess both the short-run and long-run dynamics between the exchange rate (EXR) and the NEPSE index. A quantitative research design was employed, applying time-series econometric techniques including the Augmented Dickey-Fuller (ADF) test, Johansen cointegration test, Vector Autoregressive (VAR) modeling, Granger causality, and variance decomposition analysis. The ADF test confirmed that the EXR and NEPSE index are integrated of order one, I(1). The Johansen cointegration test found no evidence of a long-run equilibrium relationship. However, the VAR model revealed that lagged values of EXR significantly affect the NEPSE index in the short run. Granger causality analysis showed unidirectional causality from EXR to NEPSE, with no reverse effect. Furthermore, variance decomposition indicated that while the NEPSE index is largely influenced by its own innovations, the explanatory power of EXR remains limited but gradually increases over time. These findings are relevant to policymakers, investors, and financial analysts, highlighting the short-term predictive importance of exchange rate movements on the stock market. For future researchers, this study provides a methodological framework using VAR-based analysis in emerging economies and suggests the inclusion of additional macroeconomic variables—such as inflation, interest rates, and foreign reserves—for a more comprehensive understanding. Further research could also explore structural breaks or use high-frequency data to better capture volatility and spillover effects in Nepal's evolving financial market.

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