IMPACT OF MACROECONOMIC VARIABES ON THE PERFORMANCE OF THE NEPAL STOCK MARKET: EMPERICAL ANALYSIS USING THE VEC MODEL

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ABSTRACT

The Stock Exchange plays a vital role for generating, investing, and growing the wealth and diversify portfolios. This study investigates the influence of macroeconomic variables on the Nepal Stock Exchange (NEPSE) performance, focusing on the lending interest rate (LIR), money supply (MS), and liquidity (LIQ). The objective of this research is to assess the long-run cointegration, evaluate the short-run dynamics and error correction, and conduct Granger causality tests to identify causal linkage. This study employs the vector error correction (VEC) model to analyze the determinants of the Nepal Stock Exchange (NEPSE) index from January 2005 to December 2024, utilizing 203 observations with the required lags. The study finds that there is a significant long-term relationship between NEPSE and MS, and a negative impact from liquidity. The results suggest that MS and LIQ exhibit significant effects on NEPSE, whereas LIR does not show a substantial long-term relationship. In the short-term, the study identifies weak short-term adjustments for LIR and LIQ but significant autoregressive effects for MS and NEPSE. Additionally, the Granger Causality Test reveals that money supply and liquidity have predictive power for NEPSE, with one-way causal relationships from MS and LIQ to NEPSE.

Keywords: Stock Market Performance, Vector Error Correction (VEC), Landing Interest Rate, Liquidity (LIQ)

INTRODUCTION

The stock market acts as a channel for capital formation, enabling businesses to raise funds by issuing shares to the public. By offering investment opportunities, the stock market allows individuals and institutions to grow their wealth and diversify portfolios. The performance of the

stock market provides valuable insights into the overall economic stability and growth prospects of a country. A booming stock market can attract foreign investment, boosting a nation's financial resources and contributing to economic development. Investors closely monitor stock market trends, as they reflect investor sentiment, market liquidity, and the health of various sectors in the economy. The activities within the stock market reflect the overall economic health of the nation (Naik & Padhi, 2012). Understanding the economic factors that influence stock market performance is crucial for investors, policymakers, and researchers (AL- Shubiri, 2010). The performance of the stock market, as represented by the NEPSE index, is affected by various macroeconomic variables that impact both short-term and long-term performance. This study explores the relationship between stock market performance and macroeconomic indicators such as the lending interest rate (LIR), money supply (MS), and the liquidity (LIQ).

This research is motivated by a strong interest in exploring the dynamics of the Nepalese stock market, an area that remains underexplored in financial research. By examining the relationship between stock market performance and macroeconomic determinants with lagged values, this study aims to analyze long-term relationships, which are crucial in this field. The research seeks to fill significant gaps in existing knowledge and provides an opportunity to make a meaningful contribution to financial economics, particularly in the context of emerging markets like Nepal. The study will support policy decisions, enhance investment strategies, and deepen understanding of how economic indicators interact with stock market behavior.

Analyzing stock market performance is essential for financial market stability and economic growth. Co-integration tests (Verma & Bansal, 2021) examine long-term relationships. ARDL models assess relationships with lagged variables. VAR/VEC models study dynamic interactions and Granger causality tests (Anjum & Habib, 2025) probe causality direction. Rjoub (2017) found that asset quality, management quality, earnings, size, money supply, and interest rates significantly affect stock price performance. Bhatta & Mishra (2021)revealed a weak but significant impact of stock market returns on GDP growth. Stock market performance is often influenced by historical values, which strongly affect current levels (Eita, 2019). Although macroeconomic factors show varied effects, some are statistically significant while others are not. This study raises important questions about the relative impact of these variables, their short-term and long-term effects, and their influence on stock market performance in Nepal. Thapa (2023) demonstrated that exchange rates significantly influence stock market dynamics, while factors like

consumer prices, money supply, and remittances have a lesser impact. However, the precise influence of macroeconomic variables, such as lending interest rates (LIR), treasury bill rates (TB91), and consumer price index (CPI), on stock market performance remains unclear. Addressing these gaps is essential for investors, policymakers, and researchers. The study aims to explore how macroeconomic determinants shape stock market behavior.

The primary goal of this research is to assess the relationship between macroeconomic factors and stock market performance. It investigates the degree of market momentum, analyzing both the short-term and long-term effects of lending interest rates (LIR) on the NEPSE index. Furthermore, the study examines how money, as measured by the money supply (MS), influences the NEPSE index, with a focus on how inflationary pressures impact stock market performance. Additionally, the study explores the role of liquidity (LIQ) in influencing the stock market, considering both immediate and future effects.

The relationship between stock market performance and macroeconomic factors has been widely discussed, yet there is no unified theoretical framework. However, it is generally accepted that economic indicators play a significant role in influencing stock market performance. Various studies have examined the effects of macroeconomic on stock market performance. The theoretical foundation of this research dates back to the 1950s, with subsequent studies providing deeper insights.

Research on stock market performance and macroeconomic factors lacks a consolidated theoretical framework, but it is well-recognized that economic indicators affect stock market behavior. Thapa (2023) found that exchange rates significantly impact stock market performance in Nepal, while other factors like consumer prices, money supply, and remittances had little impact. Bhatta & Mishra (2021) identified significant relationships with real income, savings rates, and financial intermediary development. Abu Hussin et al. (2012) demonstrated a co-integrating relationship between the Malaysian stock market index and macroeconomic variables, highlighting the significant roles of reserves and industrial production. Bhatta & Mishra (2021) found a weak yet significant relationship between stock market returns and GDP in Nepal, suggesting institutional limitations in forecasting GDP with stock prices. Rjoub (2017) emphasized that earnings, asset quality, management quality, and company size significantly affect stock price performance, with bidirectional causality in some variables. (Naik & Padhi, 2012) observed a long-term equilibrium between the stock market index and macroeconomic factors, revealing that money supply, interest rates, and industrial production influence stock prices. AL- Shubiri (2010) analyzed microeconomic factors in the Amman Stock Exchange and found significant relationships between stock prices and net

asset value per share, GDP, and other economic variables. Shrestha & Bhatta (2018) addressed the challenges of time series analysis, focusing on trends and structural breaks in economic data, with a case study on Nepal's money-price relationship. Rjoub (2017) found that asset quality, management quality, and earnings significantly impact stock prices, and that markets respond negatively to economic crises. Eita (2019) showed that in Namibia, economic activity and money supply positively influence stock prices, while inflation and interest rates have a negative effect. Thapa (2019) showed that dividends and earnings per share positively affect stock market performance, whereas interest rates and price-to-earnings ratios have a negative impact. Abu Hussin et al. (2012) demonstrated that Malaysia's Islamic stock market is co-integrated with macroeconomic variables, influenced by industrial production and consumer price indices. Rahman et al. (2009) found long-term relationships between Malaysia's stock market and macroeconomic factors such as money supply, interest rates, and industrial production. Hiransha et al. (2018) revealed that CNN outperforms other deep learning models in predicting stock prices, with NSE data effectively predicting NYSE stock prices. Kelotra & Pandey (2020) developed a stock market prediction model using Deep-ConvLSTM optimized by Rider-MBO, achieving high accuracy with minimal prediction errors. Jermsittiparsert et al. (2019) identified that the financial performance of institutions, including current ratio, quick ratio, and return on assets, significantly determines stock prices in the ASEAN region. Thapa (2023a) observed that although GDP does not have a long-term effect on the Nepalese stock market, it influences stock market movements in the short term. Shrestha & Bhatta (2018) provided a robust framework for time series analysis, addressing difficulties in selecting methods due to the unique properties of such data. Naik & Padhi (2012) examined the relationship between BSE Sensex and macroeconomic factors, revealing a long-term equilibrium with positive correlations to money supply and industrial production, but negative correlations with inflation.

The existing literatures provide the relevant theories that supports to develops hypotheses, which will inform the research design and statistical techniques. The research analyzes data using various tests and models, interpreting the empirical findings to better understand stock market dynamics influenced by macroeconomic factors in Nepal. Based on the research questions and objectives, the following research hypotheses will be developed for empirical investigation of stock market performance and macroeconomic factors.

HO: Lagged NEPSE index values do not have significant influence the current NEPSE index values.

HO: Lending interest rates (LIR) do not have significant effect, either immediate or lagged, on the

NEPSE index.

HO: Money supply (MS) does not have significant impact the NEPSE index.

HO: Liquidity (LIQ) do not have significant immediate or lagged effect on the NEPSE index.

RESEARCH MATERIALS AND METHODS

This study adopted quantitative research approach with the time series data. It employed the Vector error Correction (VEC) model to analyze the association between the Nepal Stock Exchange (NEPSE) index. The sources of data from NRB, NEPSE, SEBON, World Bank, and listed company financial statements. The study used monthly data spanning from Jan 2005 to Dec 2024, total 203 observations after adjustments. The data gathered by applying a judgmental sampling method. It ensures relevance and significance of selected macro variables. This study employed quantitative analysis to understand the issues that affect the performance of the stock market. Data analysis applied on the Excel, and Eviews- 12 for time series regression analyses. The study employed inferential statistics to explore long-term and impact between macroeconomic variables and the stock market performance. Through an econometric model, it observes how selected macroeconomic indicators influence stock prices, aiming to gauge their impact and their relationship. The VEC model was chosen due to its flexibility in handling variables of different integration orders.

This study examines the factors influencing the Nepal Stock Exchange (NEPSE) index using the VEC model. The dependent variable is the NEPSE index, while the explanatory variables include the Lending Interest Rate (LIR), Money Supply (MS), and Liquidity (LIQ). The study uses an econometric technique called the VEC model to examine the relationship between Stock market and macroeconomic variables in time series data. To estimate the unknown parameters in a linear regression model, the study employs a technique known as Ordinary Least Squares (OLS). OLS identifies the best-fitting line by minimizing the sum of squared differences between the observed values of the dependent variable (Stock market) and the predicted values from the linear model. Using these methods, the study seeks to test the hypothesis and draw conclusions about the connection between the Stock market and macroeconomic variables. In line with the research objectives, the study follows a suggested sequence of research tools, including stationary tests, lag selection criteria, and the vector error correction (VEC) model.

RESULTS AND DISCUSSIONS

The table exhibits the VAR lag order selection criteria for the endogenous variables NEPSE, MS, LIR, and LIQ, with exogenous variable C.

VAR Lag Order Selection Criteria Endogenous variables: NEPSE MS LIR LIQ Exogenous variables: C

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-7501.33	NA	1.53E+27	73.94	74.01	73.97
1	-6280.7	2381.14	1.07E+22	62.08	62.41*	62.22*
2	-6259.04	41.40	1.01e+22*	62.02*	62.61	62.26
3	-6246.01	24.39	1.04E+22	62.05	62.90	62.39
4	-6238.54	13.68	1.13E+22	62.13	63.24	62.58
5	-6221.84	29.95	1.13E+22	62.13	63.50	62.68
6	-6205.81	28.11*	1.13E+22	62.13	63.76	62.79
7	-6190.89	25.58	1.15E+22	62.14	64.03	62.90
8	-6180.82	16.87	1.22E+22	62.20	64.35	63.07

* indicates lag order selected by the criterion

The table exhibits the VAR lag order selection criteria for the endogenous variables NEPSE, MS, LIR, and LIQ, with exogenous variable C. The lowest FPE and AIC values suggest an optimal lag of 2, while the SC and HQ criterion selects lag 1. The LR test identifies lag 6 as significant. Based on these criteria, the researcher selects lag 1 to avoid lower overfitting, which is the most suitable for the model.

The below cointegration test results show the presence of long-term relationships among the variables NEPSE, LIR, MS, and LIQ. The Trace Test identifies four cointegrating equations at the 5% significance level. It suggests that there are multiple stable long-run equilibrium relationships among these variables. This means that present short-term fluctuations, the variables tend to move together over-time.

Unrestricted Cointegration Rank Test (Trace)

Hypo No. of CE(s)	Eigenvalue	Trace Stat	0.05 Crit Value	Prob.**

None *	0.130329	67.18134	47.85613	0.0003
At most 1 *	0.084478	37.15858	29.79707	0.0059
At most 2 *	0.047008	18.18258	15.49471	0.0192
At most 3 *	0.035766	7.830503	3.841465	0.0051
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
None *	0.130329	30.02277	27.58434	0.0238
At most 1	0.084478	18.97599	21.13162	0.0976
At most 2	0.047008	10.35208	14.26460	0.1898
At most 3 *	0.035766	7.830503	3.841465	0.0051
Trace and Max-eigenvalue test indicates cointegrating eqn(s) at 0.05 level				

On the other hand, the Maximum Eigenvalue Test suggests only one cointegrating equation at the 5% level. It indicates a more conservative interpretation of the number of long-run relationships. The inconsistency between the two tests is common in time series analysis, however the trace test is generally considered more reliable when determining the number of cointegrating vectors.

Given that cointegration is confirmed, the theory suggests that the Vector Autoregression (VAR) model in levels would not be appropriate, as it does not account for the long-term equilibrium among the variables. Instead, the Vector Error Correction Model (VECM) is the preferred model because it captures both the short-term deviations and the long-term adjustments required to maintain equilibrium. So, the researcher applies the VECM model the dynamics between NEPSE, MS, LIR, and LIQ. Using a VECM allows for analyzing how short-term changes in one variable influence the long-run stability of the system. It also incorporates an error correction mechanism, which ensures that deviations from the equilibrium path are corrected over time. Therefore, a VECM with four cointegrating equations is the most suitable model for further analysis, as it effectively captures both short-term dynamics and long-term equilibrium among the financial variables.

The below table of Vector Error Correction (VEC) Model estimates highlight both long-run equilibrium relationships and short-term adjustments among NEPSE, MS, LIR, and LIQ. The cointegrating equation suggests that NEPSE has a positive long-run relationship with LIR (coefficient = 23.13) but a negative association with MS (-0.000118) and LIQ (-0.0064)**.** Among these, LIQ is statistically significant at the 5% level (t-statistic = -2.89), indicating a strong

negative long-term impact on NEPSE, whereas MS and LIR do not show significant long-run effects.

Vector Error Correction Estimates

Included observations: 215 after adjustments Standard errors in () & t-statistics in []

Cointegrating Eq:	CointEq1			
NEPSE(-1)	1.000000			
MS(-1)	-0.000118			
	(0.00020)			
	[-0.58944]			
LIR(-1)	23.13295			
	(79.9368)			
	[0.28939]			
LIQ(-1)	-0.006420			
	(0.00222)			
	[-2.89051]			
C	537.3892			
Error Correction:	D(NEPSE)	D(MS)	D(LIR)	D(LIQ)
CointEq1	-0.031375	-28.39603	3.53E-05	3.315871
	(0.01143)	(6.12560)	(7.8E-05)	(2.79690)
	[-2.74388]	[-4.63563]	[0.45328]	[1.18555]
D(NEPSE(-1))	-0.005299	7.432425	-0.000197	-22.05610
	(0.06937)	(37.1645)	(0.00047)	(16.9690)
	[-0.07638]	[0.19999]	[-0.41793]	[-1.29979]
D(MS(-1))	0.000105	-0.109744	2.28E-07	0.143307
	(0.00013)	(0.06971)	(8.9E-07)	(0.03183)
	[0.80736]	[-1.57426]	[0.25712]	[4.50231]
D(LIR(-1))	-3.040522	-1160.007	-0.169586	-3077.597
	(10.0470)	(5382.30)	(0.06840)	(2457.52)
	[-0.30263]	[-0.21552]	[-2.47935]	[-1.25232]
D(LIQ(-1))	-0.000386	-0.331959	1.37E-06	-0.223234

	(0.00027)	(0.14390)	(1.8E-06)	(0.06570)
	[-1.43626]	[-2.30682]	[0.74784]	[-3.39752]
C	5.713201	30154.13	0.005436	-1112.672
	(7.66568)	(4106.61)	(0.05219)	(1875.05)
	[0.74530]	[7.34282]	[0.10417]	[-0.59341]

In the short run, the error correction term (CointEq1) for D(NEPSE) is -0.032**,** and its t-statistic of -2.74 indicates a significant adjustment mechanism. This means that deviations from the long-run equilibrium in NEPSE diverges at a slow rate. Similarly, the error correction term for D(MS) (-28.39) is also significant (t-statistic = -4.635), implying a strong short-term adjustment. However, the short-run corrections for LIR (3.53E-05, t-statistic = 0.45) and LIQ (3.31, t-statistic = 1.19) are not significant, indicating weak short-term feedback for these variables.

The short-run dynamics show that past values of NEPSE (D (NEPSE (-1))) do not significantly impact short-term changes in any variable. The short-term effect of D (MS (-1)) on MS (-0.109) is negative but insignificant, while it has a significant positive impact on LIQ (t-statistic = 4.51). Meanwhile, D (LIR (-1)) has a significant negative effect on LIR (-0.169, t-statistic = -2.47), suggesting that short-term fluctuations in LIR tend to continue. Similarly, D (LIQ (-1)) significantly influences LIQ (-0.22, t-statistic = -3.39), display a strong negative autoregressive effect. In this way, the findings confirm a strong long-term relationship among the variables**,** particularly for NEPSE and LIQ. NEPSE and MS adjust significantly towards equilibrium in the short-run**,** while LIR and LIQ depict weak short-run corrections but strong autoregressive effects**.** These findings present that the VECM is suitable for capturing long-run relationships and short-term adjustments**.**

The Granger Causality Test table reveals the direction of causality between NEPSE and the other variables (MS, LIR, and LIQ). The null hypothesis is tested at a 5% significance level**,** where a p-value below 0.05 indicates rejection of the null hypothesis. It means one variable Granger-causes another.

Pairwise Granger Causality Test Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
MS does not Granger Cause NEPSE	215	3.58130	0.0296

NEPSE does not Granger Cause MS		1.97461	0.1414
LIR does not Granger Cause NEPSE	229	0.78231	0.4586
NEPSE does not Granger Cause LIR		0.58855	0.5560
LIQ does not Granger Cause NEPSE	231	9.08915	0.0002
NEPSE does not Granger Cause LIQ		0.46629	0.6279

The test finds that MS Granger-causes NEPSE (F-statistic = 3.58, p-value = 0.029). It means past values of MS can help predict NEPSE. However, the opposite is not true, as the null hypothesis that NEPSE does not Granger-cause MS cannot be rejected (p-value = 0.14). This suggests a one-way causal relationship from MS to NEPSE**.** For LIR and NEPSE**,** the results exhibit no Granger causality in either direction. For LIQ and NEPSE, there is strong evidence that LIQ Granger-causes NEPSE (F-statistic = 9.08915, p-value = 0.0002). It means past values of LIQ can significantly predict NEPSE. However, the NEPSE to LIQ is not true, as the null hypothesis cannot be rejected (p-value = 0.63). The result confirms a one-way causal relationship from LIQ to NEPSE. These findings emphasize the importance of monetary supply (MS) and liquidity (LIQ) in forecasting stock market movements (NEPSE).

The connection between macroeconomic variables and stock market performance has been a topic of great interest and varying conclusions in the literature. Previous studies have emphasized both significant and insignificant effects of factors like asset quality, money supply (MS), liquidity (LIQ), and interest rates (LIR) on stock market performance. The research by Rjoub (2017) emphasized the critical role of earnings, and company size in stock price behavior, while Bhatta & Mishra (2021) found a weak yet significant influence of stock market returns on GDP growth in Nepal. In contrast, Thapa (2023) observed that exchange rates have a significant impact on stock market performance in Nepal, whereas other factors like money supply, remittances, and consumer prices had less effect.

One significant aspect of this research is the inconsistency observed between different cointegration tests, with the Maximum Eigenvalue Test suggesting to determine long-run relationships among variables. This aligns with the previous literature, where the trace test is often seen as a more reliable method for determining the number of cointegrating vectors, especially in the context of stock market analysis (Verma & Bansal, 2021). Cointegration, confirmed by the current study, suggests that the variables involved with a long-run equilibrium relationship. The

current study finds that NEPSE, the stock market index in Nepal, has a positive long-term relationship with LIR but a negative relationship with MS and LIQ. This aligns with the research showed by Naik & Padhi (2012) and Rahman et al. (2009), who also observed significant long-term relationships between macroeconomic factors such as money supply, interest rates, and stock market indices. Specifically, LIQ is statistically significant, reinforcing the findings by Thapa (2023) that liquidity plays a crucial role in Nepal's stock market performance. However, in contrast to earlier findings by Bhatta & Mishra (2021), the current study does not find a significant long-term effect of money supply on stock market performance.

In the short run, the VECM estimates focus the adjustment mechanisms, with MS and LIQ showing significant short-term corrections, while LIR does not. This is consistent with previous studies such as Eita (2019), where macroeconomic variables had mixed short-term effects on stock market performance. The error correction terms also indicate that NEPSE and MS adjust significantly towards equilibrium in the short run, whereas the adjustments for LIR and LIQ are weak. The findings suggest that short-term market movements are more strongly driven by money supply and liquidity rather than interest rates.

Furthermore, the Granger Causality Test results deliver new insights into the directionality of relationships. The findings suggest a one-way causal relationship from MS and LIQ to NEPSE. The findings indicates that past values of money supply and liquidity can help predict stock market movements. This is in line with the conclusions of Thapa (2023a), who observed that GDP had a short-term effect on Nepal's stock market, but the influence was not long-lasting. The lack of Granger causality between NEPSE and LIR, as well as between NEPSE and LIQ, suggests that these variables may not drive market performance in the same way as money supply or liquidity do.

CONCLUSIONS AND RECOMMENDATIONS

In conclusion, this study provides valuable insights into the relationship between the Nepal Stock Exchange (NEPSE) performance and macroeconomic variables, particularly lending interest rate (LIR), money supply (MS), and liquidity (LIQ). The results indicate a significant long-term relationship between NEPSE and MS, with a notable negative impact from LIQ. The study also reveals that while LIR does not demonstrate a substantial long-term relationship with NEPSE, MS and LIQ have significant effects. Short-term adjustments for LIR and LIQ are weak, but MS shows

a significant autoregressive effect. The findings from the Granger Causality Test confirm that MS and LIQ have predictive power for NEPSE, with one-way causal relationships from these variables to NEPSE. These findings highlight the crucial role of monetary factors like money supply and liquidity in shaping the stock market performance in Nepal, providing valuable insights for investors and policymakers. The study emphasizes the need for further exploration of these macroeconomic indicators to optimize market forecasting and enhance financial decision-making.

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