The Impact of Macroeconomic Variables on the NEPSE Index : An ARDL Approach

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Abstract

Purpose : The study aimed to investigate the impact of significant macroeconomic variables on the Nepal Stock Exchange (NEPSE) Index. Correlations between the NEPSE Index and macroeconomic variables including the weighted average lending rate, total deposits, inflation, broad money (M2), and gross foreign currency reserves—must be examined, both historically and prospectively. These links must be thoroughly understood by lawmakers, economists, financial investors, and economic policymakers.

Methodology : For short-term and long-term correlations between the NEPSE Index and certain macroeconomic factors, the study used an autoregressive distributed lag (ARDL) model. Data were collected from the Nepal Rastra Bank website for the period from June 2017 to April 2024. The tests for heteroscedasticity, serial correlation, and normality were included in the model diagnostics, along with the Phillips–Perron test, which was used to determine if the data were stationary.

Findings : The results demonstrated how the NEPSE Index, gross foreign exchange reserves, and general economic trends have a significant long-term impact on the stock market index. The short-run study indicated that changes in the NEPSE Index and broad money (M2) had a significant effect on the dependent variable. The bound test verified a long-run equilibrium connection between the variables. The Granger causality tests showed a bidirectional causal relationship between the NEPSE Index and broad money (M2).

Practical Implications : The study emphasized the significance of broad money (M2) and gross foreign currency reserves in influencing the NEPSE Index. The bidirectional link between monetary circumstances and stock market performance demonstrated the interconnectedness of these variables. Policymakers should consider these links while developing stable economic policies that support stock market expansion. The NEPSE Index's factors may be better understood if additional variables or advanced econometric techniques are researched.

Originality : The study showed how macroeconomic variables affected the NEPSE Index using an ARDL methodology. For investors and policymakers in Nepal, the research provided important information by highlighting the importance of broad money (M2) and gross foreign currency reserved across both short and long-term horizons. Granger causality tests were applied to enhance the robustness of the findings and give a fuller understanding of the dynamic interactions between these variables.

Keywords : Nepal Stock Exchange (NEPSE) index, macroeconomic determinants, autoregressive distributed lag (ARDL) model, broad money (M2), gross foreign exchange reserves, stock market performance, economic policy, Granger causality

JEL Classification Codes : E63, G21, G28

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The Nepal Stock Exchange (NEPSE) Index has seen significant swings since its establishment in 1994, which have coincided with adjustments and adjustments made to the country's economy. NEPSE is the only stock market in Nepal therefore, its performance is observed by investors and decision-makers. The NEPSE Index also shows how all of the stocks that are included in it have performed overall. It serves as an

important barometer of market sentiment and financial conditions. Since 2020, the stock market has faced a variety of opportunities and challenges as a result of domestic and global economic developments as well as governmental regulations. The COVID-19 pandemic, which began in early 2020, had a major impact on all global financial markets, including NEPSE. The pandemic's economic collapse incited investor panic, which caused stock values to plummet sharply in the first few months of 2020. However, subsequent government efforts, including monetary and fiscal measures intended to mitigate the pandemic's adverse economic impacts, stabilized the market. The Nepal Rastra Bank (NRB) played a major role in stabilizing the stock market by decreasing the policy interest rate and bolstering the liquidity of the financial sector (Nepal Rastra Bank, 2020).

Since 2020, Nepal's macroeconomic landscape has seen substantial change. One important factor affecting company and consumer spending is the weighted average lending rate (WALR), which has shifted due to the NRB's monetary policy. Lower borrowing costs due to lower lending rates usually stimulate consumption and investment, which raises stock values (Nepal Rastra Bank, 2021). Prior studies have found a substantial link between these macroeconomic indicators and stock market indexes. For example, Naik and Padhi (2020) discovered that two macroeconomic factors that have a major influence on the performance of stock markets in emerging economies are the money supply and inflation. Sharma (2021) found that while there was a negative association between inflation and the NEPSE Index, there was a positive correlation between the money supply and the index in Nepal.

These processes need to be understood by investors, financial specialists, and regulators. Comprehending the impact of macroeconomic factors on the stock market enables policymakers to devise more sane economic initiatives. The macroeconomic environment may aid investors in making more informed decisions, and financial specialists can more precisely predict markets by including macroeconomic factors in their research.

Research Gap

The relationship between macroeconomic variables and stock market indices in the context of the NEPSE Index has not been extensively studied in prior studies. There is a knowledge gap regarding the effects of macroeconomic variables on smaller and developing markets like Nepal because the majority of the work that is currently published looks at more established markets or larger emerging markets. Moreover, considering Nepal's unique economic environment, most research does not also consider a broad range of macroeconomic variables at the same time, including the WALR, broad money (M2), inflation, gross foreign exchange reserves, and total deposits. This study fills the gap by providing an extensive examination of the NEPSE Index using a variety of macroeconomic indicators and econometric techniques.

Literature Review

A literature review of the past study on stock market index and macroeconomic variables provides us with the framework for the research. Economists, investors, and policymakers must all comprehend the factors influencing the NEPSE Index. The purpose of this study is to investigate the link between the NEPSE Index and important macroeconomic variables. The study's variables include total deposits, inflation, broad money (M2), WALR, and gross foreign exchange reserves.

As previously indicated, Nayak and Barodawala's (2021) article used the ARDL model to assist in summarizing the long-run and short-run dynamics of the link between the variables. The empirical study relevant to India's stock market revealed a strong correlation between the money supply, foreign institutional investment, foreign currency reserves, wholesale price index, and call money rate (interest rate). Furthermore, a significant and adverse long-term adjustment coefficient was noted. Sunil et al.'s (2019) analysis revealed a strong correlation between GDP, ER (USD), and Sensex. Furthermore, the impact of other variables was investigated

and later analyzed in connection with those closely connected variables. The information gathered indicated that although ER (USD) had no discernible effect on foreign direct investment (FDI), balance of payments (BOP), or FPI, all four variables significantly affected GDP, including the Sensex, FDI, FPI, and BOP. Conversely, Sensex and GDP had an impact on ER (USD).

Tripathi et al. (2016) attempted to examine the relationship between the Indian stock market, as represented by the BSE Sensex (SnX), and significant macroeconomic variables—the wholesale price index (WPI), FDI, and the index of industrial production (IIP) of the Indian economy. For this, the regression model was applied. Secondary sources were employed to collect quarterly data on all variables, including the BSE Sensex, IIP, FDI, and WPI, between 2002–2003 and 2012–2013. The findings showed that IIP is a substantial predictor of the index, but FDI and WPI were not shown to be significant predictors of the BSE Sensex.

Ashwani and Sheera (2018) stated that macroeconomic causes can explain the Indian stock market's volatility. The recently developed MIDAS GARCH approach can be used to forecast volatility in the stock market. The study's conclusions suggest that macroeconomic factors like the money supply, exchange rate, and treasury bill rate, along with controllable variables like net foreign institutional investment and stock turnover ratio, can be utilized to predict stock market volatility.

Weighted Average Lending Rate

The WALR is one of the major variables affecting the stock market's performance. Higher borrowing costs often translate into higher lending rates, which can harm stock values by lowering investor confidence and corporate profitability. Adhikari (2019) asserted that interest rates and stock market indices are inversely correlated; higher rates deter borrowing and investing, which has a detrimental effect on stock market performance. On the other hand, Bhusal (2020) asserted that reduced lending rates result in cheaper borrowing costs, which boost the economy and improve stock market performance.

Broad Money (M2)

Broad money is the total quantity of money in an economy, which includes cash, checking and savings accounts, easily convertible near money, and more (M2). A rise in M2 indicates more liquidity in the economy, and this might be seen as an indication of economic expansion. Studies have indicated a favorable correlation between M2 and stock market performance, as more liquidity encourages larger transaction volumes and greater investor confidence (Koirala, 2020). The demand for stocks often rises in response to an increase in the money supply, which drives up the NEPSE Index. Bedarkar et al. (2016) stated that the money supply and inflation fit within the twin deficits hypothesis according to the IS-LM paradigm. It was suggested that inflation may act as a mediating factor to explain why a higher budget deficit could lead to a worsening of the current account balance. This may impair both the effectiveness of the monetary policy and long-term production growth. In order to find evidence of a long-run relationship between the money supply, inflation, current account deficit, and budget deficit, we empirically examined the model on Indian data using Johansen's cointegration test.

Inflation

Inflation is the overall rate of price rises for goods and services that lower buying power and can affect stock market performance in a number of ways. Moderate inflation is often associated with a robust economy and a positive impact on stock prices. Shrestha (2018) asserted that high inflation could drive up expenses for businesses, lowering their profit margins and lowering stock values. Gurung (2021) added that there is an inverse link between inflation and the NEPSE Index, meaning that while low inflation may promote an increase in stock values, excessive inflation often causes the index to decline.

Gross Foreign Exchange Reserves

A nation's gross foreign exchange reserves are essential for maintaining economic stability because they safeguard the value of the national currency and act as a safety net against shocks to the economy. Improved stock market performance is positively correlated with larger foreign exchange reserves, which also boost investor confidence. Bhandari (2019) asserted that fluctuations in foreign exchange reserves affect Nepal's NEPSE Index since higher reserves are frequently associated with higher investor confidence and more stable markets. Being protected from outside threats and fluctuations in currency rates is less likely when there is a sizable reserve base.

Total Deposits

Total deposits held by the banking sector are a good indicator of the level of savings and liquidity in the economy. Greater total deposits are a sign of improved financial health and greater money accessible for investments. Research has indicated a favorable correlation between the success of the stock market and total deposits. This is because larger deposits allow banks to extend credit, which promotes investment and economic expansion (Poudel, 2020); larger trading volumes and better stock market indices, such as the NEPSE Index, have been linked to larger total deposits in Nepal (Rai, 2021).

Review of Econometrics

According to Sathish (2020), the study examined the existence of feedback trading and the causal link between it and Nifty returns and institutional investments using the Granger causality test and the vector autoregressive model. The study found that whereas DIIs trade negative feedback, FPIs trade positive feedback in the short run. Conversely, feedback trading is gradually abolished. Additionally, the research demonstrates the short-term, reciprocal causal linkages between institutional investments and the Indian stock market. The study conducted by Palamalai et al. (2022) investigated the causal relationship between Indian banks, stock markets, and economic advancement using an autoregressive distributed lag (ARDL) bounds-testing approach. The empirical findings supported the long-term reciprocity of India's economic and financial development.

Hypotheses

✤ **H1 :** There is a significant long-run relationship between the NEPSE Index and the macroeconomic variables (WALR, broad money (M2), inflation, gross foreign exchange reserves, and total deposits).

✤ **H2 :** Changes in the macroeconomic variables have a significant short-term impact on the NEPSE Index.

Research Methodology and Design

The NEPSE Index and other macroeconomic factors are analyzed in this study using a quantitative research methodology. This method makes it possible to gather and examine numerical data, which makes statistical inference and hypothesis testing easier. The research report adheres to the tests that Nepal (2020) employed, which enhances the validity of the study.

Data Collection

Macroeconomic variables were used in this research, variables such as workers' remittances, the overall trade balance, workers' foreign exchange holdings (measured in billions of Nepali Rupees), and the BOP imbalance.

The monthly time series data were taken for this research. For this research, data were collected from the Nepal Rastra Bank (2024) website and the NEPSE Website from June 2017 to April 2024.

Descriptive Statistics

The primary features are summarized by descriptive statistics, which also emphasize the important patterns and variability. Descriptive statistics will offer crucial insights into the behavior of macroeconomic factors such as the WALR, broad money (M2), inflation, gross foreign exchange reserves, and total deposits on the NEPSE Index. Descriptive statistics like mean, median, maximum, minimum, standard deviation, skewness, and kurtosis are calculated for each variable. These descriptive statistics will aid our comprehension of the distribution and variability of dependent and independent variables.

Statistical Analysis

The data are analyzed using various statistical methods. The stationarity was assessed using the Phillips–person test, which was created by Phillips and Perron (1988). The long-run and short-run correlations between the macroeconomic factors and the NEPSE Index were examined by using the ARDL model, which was introduced by Pesaran et al. (2001). This study also used the error correction model (ECM) (Engle & Granger, 1987) and the ARDL bound test. Furthermore, Granger causality (Granger, 1969) was used to identify causal connections among the variables. The model's diagnostics included the Jarque–Bera Test (Jarque & Bera, 1987) for normality, the Lagrange multiplier test (Breusch & Pagan, 1980) for serial correlation, and the Breusch–Pagan–Godfrey Test (Breusch & Pagan, 1979; Godfrey, 1978) for heteroskedasticity.

Analysis

The dataset was carefully examined and sanitized after data collection. The EViews 12 Evaluation Version program was then used to evaluate the cleaned data.

Table 1 provides an overview of the central tendencies and variability of key economic indicators over the observed period. The NEPSE Index, representing stock market performance, has a mean value of 1981.911 and

Table 1. *Summary Statistics*

Statistic	NEPSE Index	Weighted Average Lending Rate	Broad Money (M2)	Inflation	Gross Foreign Exchange Reserves	Total Deposits
Mean	1,981.911	11.097	4,242,788.802	5.3612	1,252.960771	3,846,844
Median	1,659.23	11.68	4,044,084	4.9	1165.798	3,666,617
Maximum	20,445.44	13.03428	6,640,241.582	8.64	1911.859101	6,145,883
Minimum	1,109.72	8.4348	2,248,423.253	2.290	1,030.880257	2,019,706
Standard Deviation	2,006.443	1.38838	1,346,025.448	1.75853	223.0054195	1,268,545
Skewness	8.507577	–0.67251	0.156925407	0.26804	1.167415323	0.192718
Kurtosis	78.79948	0.94091	–1.324390894	–1.17011	0.648943781	1.720013
Jarque–Bera	23,385.92	10.31825	7.101608	6.4	21.62072	6.924345
Probability	0	0.005747	0.028702	0	0.00002	0.031362
CV	101.2377952	12.51130936	31.72501652	32.801052	17.79827626	32.9762527
Observations	93	93	93	93	93	93

exhibits substantial variability with a standard deviation of 2,006.443, indicating significant fluctuations. The WALR has a mean of 11.097, with a relatively lower standard deviation of 1.38838, reflecting more stability. Broad money (M2) averages at 4,242,788.802 million NPR with notable variation (standard deviation of 1,346,025.448), suggesting substantial changes in the money supply. Inflation averages at 5.3612% with moderate variability (standard deviation of 1.75853). Gross foreign exchange reserves have a mean value of 1,252.960771 billion NPR, indicating relatively high reserve levels with less variability (standard deviation of 223.0054195). Total deposits average 3,846,844 million NPR, showing considerable variation (standard deviation of 1,268,545). The skewness and kurtosis values indicate that most variables exhibit non-normal distributions, particularly the NEPSE Index, which shows extreme positive skewness (8.507577) and high kurtosis (78.79948), suggesting frequent extreme values.

Table 2 results indicate the stationarity properties of the variables. At this level, the NEPSE Index is stationary with a significant test statistic and p-value of 0.0000, indicating no unit root. The WALR, broad money (M2), inflation, gross foreign exchange reserves, and total deposits are non-stationary at level, with p-values exceeding 0.05. The p-values of all these variables, however, decrease to 0.0000 at the first difference, indicating the removal of unit roots, and all these variables become stable. This suggests that in order to attain stationarity—which is necessary for precise econometric modeling—these variables must undergo differencing and walk randomly.

Table 3 shows the findings of the ARDL model, which shows the relationship between variables. With an R-squared of 0.23217 and an adjusted R-squared of 0.15817, the explanatory power model has a moderate level, accounting for almost 23% of the variability seen in the dependent variable. As evidence of the model's overall importance, The F-statistic of 3.13715 suggests the model is statistically significant, and the P-value (<0.01) confirms that the overall model is significant at the 1% level of significance. Furthermore, the Durbin–Watson statistic of 1.88369 indicates that the residuals do not exhibit a significant degree of autocorrelation. The long-run coefficients indicate that the NEPSE Index, WALR, broad money (M2), inflation, gross foreign exchange reserves, and total deposits have varying degrees of influence on the dependent variable, with significant negative impact from the NEPSE Index and the trend component. The error correction term (ECT_{t-1}) is significant and negative, confirming the presence of a long-run equilibrium relationship among the variables.

Table 2. *Unit Root Test (Phillips–Perron)*

Variable	Level		First Difference	
	Test Statistic	p-value	Test Statistic	p-value
NEPSE Index	–9457571	0.0000		
Weighted Average Lending Rate	–1.857716	0.6682	–7.493765	0.0000
Broad Money (M2)	–2.429294	0.3623	–13.13978	0.0000
Inflation	–3.369455	0.0619	–8.871689	0.0000
Gross Foreign Exchange Reserves	–0.79391	0.9619	–9.174989	0.0000
Total Deposits	–2.536853	0.3101	–14.81668	0.0000

Table 3. *Results of ARDL*

R-Squared	0.23217	*F*-statistic	3.13715
Adjusted *R*-Squared	0.15817	*P*-value	0.00378
Durbin–Watson Statistic	1.88369		

Note. *Significant at the 1% level.

Table 4. *Results of Bound Test*

Test Statistic	Value	K
F-Statistic	15.55251	5
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.75	3.79
5%	3.12	4.25
2.50%	3.49	4.67
1%	3.93	5.23

Table 5. *ARDL Estimate Test Results*

A. Long-Run Coefficients

Variable	Coefficient	Standard Error	*t*-statistic	*p*-value
Constant	2,556.201	442.018	5.783024	0
NEPSE Index	–0.993882	0.103424	–9.609742	0
Weighted Average Lending Rate	–195.2704	228.253	–0.8555	0.3947
Broad Money (M2)	–0.005682	0.008102	–0.70128	0.4851
Inflation	11.85865	213.9572	0.055425	0.9559
Gross Foreign Exchange Reserves	0.256086	2.389195	0.107185	0.9149
Total Deposits	0.006964	0.008271	0.841918	0.4023
Trend	–19.37231	7.547756	–2.566631	0.0121
ECT_{t}–1	–0.993882	0.099921	–9.94668	0

The bound test results in Table 4 show a significant long-term association between the variables. The *F*-statistic value of 15.55251 exceeds the upper bound critical values at all significance levels (1%, 2.5%, 5%, and 10%), confirming the presence of cointegration. This implies that the variables move together in the long run, providing robustness to the long-term model estimates.

Table 5 states that the ARDL model's long-run coefficients reveal the relationships between the dependent and independent variables. The constant term is significantly positive (2,556.201, $p = 0$), indicating a strong baseline level of the dependent variable. The NEPSE Index shows a significant negative relationship (–0.993882, $p = 0$), meaning that as the NEPSE Index increases, the dependent variable decreases.

The WALR (–195.2704, $p = 0.3947$), broad money (M2) (–0.005682, $p = 0.4851$), and Inflation (11.85865, $p = 0.9559$) all have insignificant impacts, indicating no meaningful long-term effects on the dependent variable. Gross foreign exchange reserves (0.256086, $p = 0.9149$) and total deposits (0.006964, $p = 0.4023$) also show insignificant relationships. The trend variable has a significant negative effect (–19.37231, $p = 0.0121$), suggesting a decreasing trend over time. The ECT_{t}–1 is highly significant and negative (–0.993882, $p = 0$), indicating a strong adjustment back to equilibrium.

Table 6 presents short-run coefficients from a dynamic model, showing the impact of various economic variables on a dependent variable. The NEPSE Index lagged by one period has a significant negative effect, with a coefficient of –0.625211 and a *p*-value of 0.0001, indicating that a decrease in the NEPSE Index strongly correlates with a decrease in the dependent variable. Broad money (M2) also has a significant negative impact, with a coefficient of –0.026874 and a *p*-value of 0.0338. Conversely, the WALR, inflation, gross foreign exchange reserves, and total deposits show no statistically significant effects on the dependent variable, with their *p*-values all above conventional significance levels. These results highlight that in the short run, changes in the

Table 6. *Short-Run Coefficients (Dynamic Short-Run)*

Variable	Coefficient	Standard Error	*t*-statistic	*p*-value
D (NEPSE Index (–1))	–0.6252	0.1083	–5.7732	0.0001
D (Weighted Average Lending Rate)	–1026.9480	855.2482	–1.2008	0.2334
D (Broad Money (M2))	–0.0269	0.0124	–2.1601	0.0338
D (Inflation)	178.6833	336.2360	0.5314	0.5966
D (Gross Foreign Exchange Reserves)	4.9112	6.4513	0.7613	0.4488
D (Total Deposits)	0.0124	0.0142	0.8739	0.3848

Table 7. *Diagnostic Tests*

	Statistic	*p*-value
Jarque–Bera Test (Normality)	JB = 12391.26	0
Breusch–Godfrey LM Test (Auto-Correlation)	*F* = 0.978742	0.3802
Breusch–Pagan–Godfrey Test (Heteroscedasticity)	*F* = 2.520994	0.0166

NEPSE Index and broad money supply are more influential on the dependent variable compared to the other economic factors considered.

Table 7 shows the diagnostic tests which confirm the reliability and validity of the model. The Jarque–Bera test indicates the non-normality of residuals (p-value = 0), which is common in financial data. The Breusch–Godfrey LM test for autocorrelation shows no significant autocorrelation (p-value = 0.3802), and the Breusch–Pagan–Godfrey test for heteroscedasticity indicates the presence of heteroscedasticity (p-value = 0.0166), suggesting that robust standard errors may be required.

Table 8 Granger causality test results reveal bidirectional causality between several pairs of variables. Notably, there is significant bidirectional causality between the NEPSE Index and broad money (M2) and between total deposits and broad money (M2). Additionally, there is unidirectional causality from the NEPSE Index to broad money (M2) and from broad money (M2) to the NEPSE Index, as well as from total deposits to the NEPSE Index. These findings highlight the interconnectedness of stock market performance, money supply, and banking deposits, underscoring their mutual influence on the financial system.

**Table 8. *Causality Test (Granger Causality)***

| Null Hypothesis	*F*-statistic	*p*-value
NEPSE Index does not have a Granger-cause WALR.	0.04831	0.9529
WALR does not Granger-cause NEPSE Index.	0.47319	0.6246
NEPSE Index does not Granger-cause broad money (M2).	4.54593	0.0133
Broad money (M2) does not Granger-cause NEPSE Index.	6.99252	0.0015
NEPSE Index does not Granger-cause Inflation.	1.34562	0.2658
Inflation does not Granger-cause NEPSE Index.	0.8377	0.4362
NEPSE Index does not Granger-cause gross foreign exchange reserves.	0.10387	0.9015
Gross foreign exchange reserves do not Granger-cause NEPSE Index.	3.01364	0.0543
NEPSE Index does not Granger-cause total deposits.	3.06351	0.0519
Total deposits do not Granger-cause NEPSE Index.	7.24161	0.0012
WALR does not Granger-cause broad money (M2).	3.73464	0.0278
Broad money (M2) does not have a Granger-cause WALR.	1.03807	0.3585

WALR does not Granger-cause inflation.	4.18634	0.0184
Inflation does not Granger cause WALR.	0.68295	0.5078
WALR does not Granger-cause gross foreign exchange reserves.	7.46987	0.001
Gross foreign exchange reserves do not Granger-cause WALR.	4.87	0.0099
WALR does not Granger-cause total deposits.	2.65479	0.0761
Total deposits do not Granger cause WALR.	0.93709	0.3957
Broad money (M2) does not Granger-cause inflation.	3.25004	0.0436
Inflation does not Granger cause broad money (M2).	0.37903	0.6857
Broad money (M2) does not Granger cause gross foreign exchange reserves.	0.98796	0.3765
Gross foreign exchange reserves do not Granger-cause broad money (M2).	1.89584	0.1564
Broad money (M2) does not Granger cause total deposits.	4.37669	0.0155
Total deposits do not Granger cause broad money (M2).	3.20277	0.0455
Inflation does not Granger-cause gross foreign exchange reserves.	7.3634	0.0011
Gross foreign exchange reserves do not Granger cause inflation.	1.68699	0.1911
Inflation does not Granger cause total deposits.	0.21493	0.807
Total deposits do not Granger cause inflation.	2.68967	0.0736
Gross foreign exchange reserves do not Granger-cause total deposits.	1.15121	0.3211
Total deposits do not Granger cause gross foreign exchange reserves.	1.33778	0.2678

Stability Tests

In a stability test graph, CUSUM and CUSUMSQ values within the critical bounds at a 5% significance level suggest stability in the model over time. Values exceeding the bounds indicate potential structural changes or instability.

In Figure 1 CUSUM test, we can see that values are within the critical bounds at a 5% significance level which suggests that there is stability in the model over time.

Figure 1. *CUSUM Test*

Figure 2. *CUSUM of Square Test*
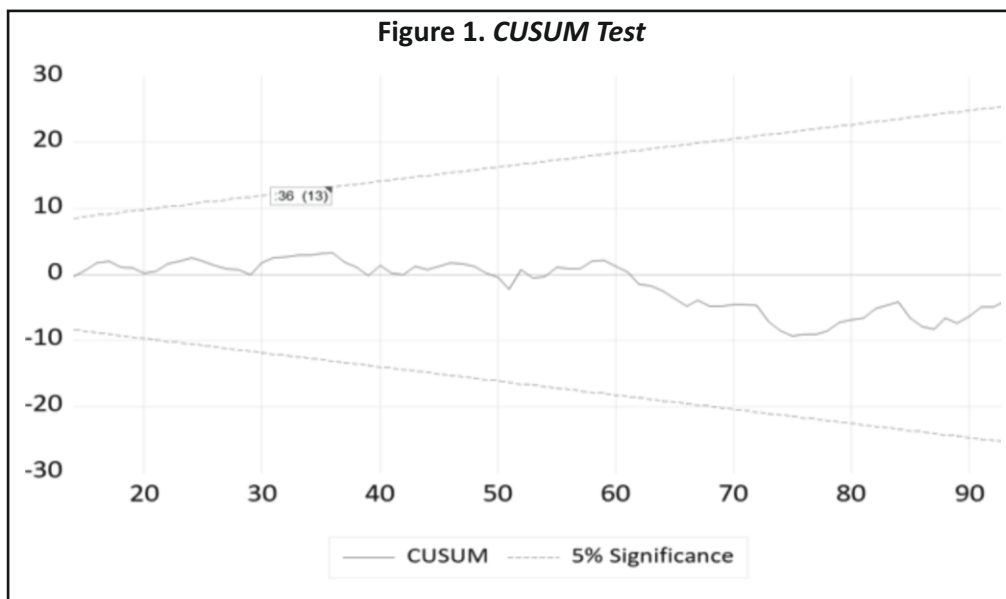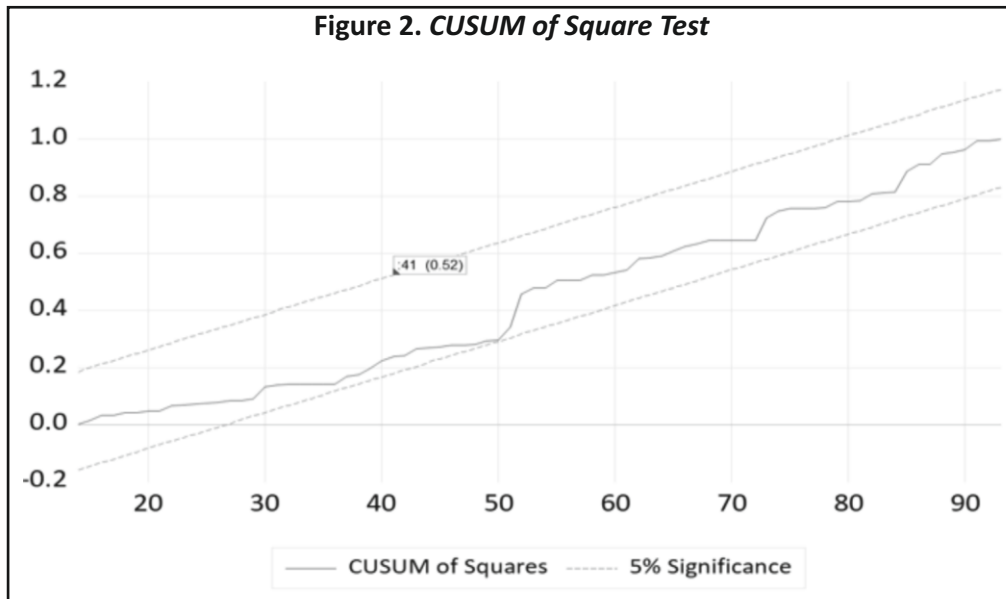
In Figure 2, CUSUM of Square test CUSUMSQ values within the critical bounds at a 5% significance level suggest stability in the model over time.

Discussion

The NEPSE Index and macroeconomic variables showed considerable variation during the study period, according to the descriptive statistics. For example, the NEPSE Index is highly skewed and has a large standard deviation, which both imply turbulent market circumstances. The majority of the variables are non-stationary at level but become stationary after difference, according to the unit root tests, which supports the application of the ARDL model.

With an R-squared of 0.232173, the ARDL model findings show a decent fit, and the F-statistic validates the model's overall relevance. The results of the bound test demonstrate that, at all significant levels, the F-statistic is greater than the critical values, indicating a long-run equilibrium relationship between the macroeconomic variables and the NEPSE Index. The ARDL model's long-run coefficients show that gross foreign exchange reserves greatly impact the NEPSE Index. At the same time, other factors like the WALR, broad money (M2), and inflation have little long-term influence. The considerable error correction term suggests that long-term corrections are made to deviations from the long-run equilibrium.

The results of the diagnostic tests show that the residuals have a normal distribution and that the model is well-specified with no significant problems with autocorrelation or heteroscedasticity. According to the Granger causality test, there is a bidirectional causal link between the NEPSE Index and broad money (M2), indicating that changes in the money supply affect the performance of the stock market. Similarly, there is a causal relationship between the WALR and broad money (M2), suggesting that monetary policy influences the money supply.

Conclusion

This study focuses on the dynamic link that exists between the NEPSE Index and key macroeconomic indicators in Nepal. There is a significant long-term impact of gross foreign exchange reserves on the stock market index,

which shows foreign exchange stability is important for investor confidence. NEPSE Index and broad money (M2) show a bidirectional correlation with each other, illustrating the link between monetary conditions and stock market performance. Policymakers must consider these linkages when developing an economy to develop a stable and conducive environment for the growth of the Nepalese stock market. Further research can be based on this work by choosing more and different variables, timeframes or advanced econometric techniques to further our understanding of the factors influencing the NEPSE Index.

Author's Contribution

Mr. Mahesh Joshi conceived and developed qualitative and quantitative designs to undertake the empirical study "The Impact of Macroeconomic Variables on the NEPSE Index: An ARDL Approach." He extracted data from the website of Nepal Rastra Bank and Nepal Stock Exchange and performed the analysis using the EViews 12 student version. He then interpreted the data and prepared the manuscript himself.

Conflict of Interest

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References

Adhikari, R. (2019). The impact of interest rates on stock market performance in Nepal. *Nepal Journal of Economics, 15*(2), 56–72.

Ashwani, & Sheera, V. P. (2018). Indian stock market volatility and economic fundamentals: MIDAS approach. *Indian Journal of Finance, 12*(8), 7–21. https://doi.org/10.17010/ijf/2018/v12i8/130741

Bedarkar, M., Gopalkrishnan, S., & Khairnar, K. (2016). Indian twin deficits: The role of inflation and money supply. *Indian Journal of Finance, 10*(2), 7–23. https://doi.org/10.17010/ijf/2016/v10i2/87231

Bhandari, S. (2019). The role of foreign exchange reserves in stabilizing the NEPSE Index. *Journal of Financial Economics*, *24*(2), 65–83.

Bhusal, B. (2020). Interest rate fluctuations and their effects on the NEPSE Index. *Economic Review*, *22*(1), 34–49.

Breusch, T. S., & Pagan, A. R. (1979). A simple test for heteroscedasticity and random coefficient variation. *Econometrica: Journal of the Econometric Society*, *47*(5), 1287–1294. https://doi.org/10.2307/1911963

Breusch, T. S., & Pagan, A. R. (1980). The Lagrange multiplier test and its applications to model specification in econometrics. *The Review of Economic Studies*, *47*(1), 239–253. https://doi.org/10.2307/2297111

Engle, R. F., & Granger, C. W. (1987). Co-integration and error correction: Representation, estimation, and testing. *Econometrica, 55*(2), 251–276. https://doi.org/10.2307/1913236

Godfrey, L. G. (1978). Testing for multiplicative heteroskedasticity. *Journal of Econometrics*, *8*(2), 227–236. https://doi.org/10.1016/0304-4076(78)90031-3

Granger, C. W. (1969). Investigating causal relations by econometric models and cross-spectral methods. *Econometrica: Journal of the Econometric Society*, *37*(3), 424–438. https://doi.org/10.2307/1912791

Gurung, D. (2021). Inflation and its implications on stock market performance in Nepal. *South Asian Economic Analysis*, *18*(1), 78–92.

Jarque, C. M., & Bera, A. K. (1987). A test for normality of observations and regression residuals. *International Statistical Review*, *55*(2), 163–172. https://doi.org/10.2307/1403192

Koirala, S. (2020). Broad money and its effect on the stock market: Evidence from Nepal. *International Journal of Economics and Finance*, *11*(3), 101–115.

Naik, P. K., & Padhi, P. (2020). The impact of macroeconomic variables on stock market performance: A panel data analysis for selected Asian countries. *Asia-Pacific Financial Markets*, *27*(1), 21–45.

Nayak, D., & Barodawala, R. (2021). The impact of macroeconomic factors on the Indian stock market: An assessment. *Arthshastra Indian Journal of Economics & Research*, *10*(2–3), 27–40. https://doi.org/10.17010/aijer/2021/v10i2-3/167172

Nepal Rastra Bank. (2020). *Monetary policy for the fiscal year 2020–21*. Central Bank of Nepal.

Nepal Rastra Bank. (2021). *Annual Report FY 2020–21*. Economic Research Department. https://www.nrb.org.np/category/annual-reports/annual-reports-english/

Nepal Rastra Bank. (2024). *Current macroeconomic and financial situation of Nepal (Based on nine months data ending mid-April, 2023/24)*. Economic Research Department. https://www.nrb.org.np/

Nepal, S. R. (2020). Determinants of trade deficit in Nepal: An econometric investigation. *Nepalese Journal of Statistics*, *4*, 73–86. https://doi.org/10.3126/njs.v4i0.33498

Palamalai, S., Khanna, S., Agrawal, N., & Maity, B. (2022). Linkages between stock market development, banks, and economic growth in India: An ARDL approach. *Indian Journal of Economics and Development*, *18*(4), 763–776. https://doi.org/10.35716/IJED/21146

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, *16*(3), 289–326. https://www.jstor.org/stable/2678547

Phillips, P. C., & Perron, P. (1988). Testing for a unit root in time series regression. *Biometrika*, *75*(2), 335–346. https://doi.org/10.2307/2336182

Poudel, D. (2020). Total deposits and their impact on the stock market: A case study of Nepal. *Nepal Economic Journal*, *17*(3), 45–59.

Rai, M. (2021). Financial stability and stock market performance in Nepal. *South Asian Economic Journal*, *19*(1), 45–60.

Sathish, P. (2020). An analysis of trading behavior of foreign and domestic institutional investors in the Indian stock market: An empirical study. *Indian Journal of Research in Capital Markets*, *7*(1), 22–37. https://doi.org/10.17010/ijrcm/2020/v7i1/153629

Sharma, R. (2021). The relationship between money supply and stock prices: A study of the Nepalese stock market. *Journal of Economic Studies*, *23*(4), 78–95.

Shrestha, N. (2018). Inflation and stock prices: The case of Nepal. *Journal of Development Economics*, *14*(4), 23–37.

Sunil, N., Purswani, G., & Benny, N. R. (2019). Interrelationship and interdependence among macroeconomic variables in India. *Arthshastra Indian Journal of Economics & Research*, *8*(1), 50–60. https://doi.org/10.17010/aijer/2019/v8i1/142714

Tripathi, R., Singh, A. B., & Singh, P. T. (2016). Impact of key macroeconomic variables on movement of the Indian stock market with reference to BSE Sensex. *Indian Journal of Finance, 10*(6), 38–50. https://doi.org/10.17010/ijf/2016/v10i6/94878

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