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Impact of Money Supply and Interest Rate on Stock Market Performance: Evidence from the Nepalese Capital Market

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Abstract

This study examines the influence of money supply and interest rate including other macroeconomic variables on stock market performance in Nepal, using the data spanning from 1994 to 2023. The study employs the ARDL model of co-integration analysis to examine the long-run and short-run relationships between the NEPSE index and some selected macroeconomic variables, including broad money supply, interest rates, real GDP, and remittance inflow. The findings reveal unidirectional causality from broad money supply to NEPSE index, by-directional causality between real GDP and NEPSE index, and unidirectional causality between remittance flow and NEPSE index, but absence of causality between interest rate and NEPSE index. Moreover, the findings reveal that the money supply significantly and positively affects the NEPSE index, both in the long run and the short run, highlighting the importance of liquidity in stock market performance. But, interest rates show a marginally significant negative impact, indicating the dampening effect of higher borrowing costs on equity investments. The real GDP demonstrates a strong positive correlation with the NEPSE index, underscoring the critical role of economic growth in boosting corporate earnings and investor confidence. Conversely, remittance inflows exhibit no significant relationship with stock market performance, perhaps reflecting their predominant use in consumption and real estate. The negative and highly substantial error correction term confirms that deviations from the long-run equilibrium are corrected rapidly in the subsequent period. These findings provide valuable insights for policy-makers and stakeholders, emphasizing the role of macroeconomic stability in fostering sustainable growth in Nepal's stock market.

Keywords
Money supply
NEPSE index
Macroeconomic variables
ARDL model

MONEY IS REGARDED as the center of macroeconomics and understanding the effect of the money supply is critical for macro-economc theory (John & Ezeabasili, 2020; Palley, 2015). The impact

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of money supply on stock prices and stock indices is a significant area of research, revealing complex relationships influenced by various macroeconomic factors (Erdugan, 2012). In other words, the stock price is the outcome of the overall macroeconomic performance of a national economy including money supply (Bhattacharjee & Das, 2021; Muchir, 2012). In this context, the relationship between money supply and stock market performance is essentially a reflection of capital market and money market (Wang, 2016). The relationship between money supply and stock prices has long been a focal point of economic and financial research, as it encapsulates the intricate interplay between monetary policy and capital markets (Sirucek, 2013). Money supply, typically represented by broad money, serves as a key indicator of liquidity in an economy, influencing interest rates, inflation, and investment behavior (Lacey, 2021; Bhattacharjee & Das, 2021; Devkota & Dhungana, 2019). Stock prices, on the other hand, reflect investor sentiment, corporate performance, and broader economic dynamics.

Theories suggest that changes in money supply can significantly impact stock market performance, both directly and indirectly, through various transmission channels (Gunardi & Disman, 2023). In this context, understanding this nexus is critical for policymakers, investors, and economists, as it provides insights into how monetary interventions affect asset markets and economic stability. This paper examines the dynamic relationship between money supply and stock market performance, with a focus on short-run and long-run interactions in varying economic contexts. Globally, there are extensive studies on the impact of money supply on stock indices, but limited research exists exploring these dynamics in emerging economies, especially in the context of Nepal. To have better understanding of the effect of money supply and stock market performance in the Nepalese context, it is essential to investigate empirically. Moreover, this study examines the mechanisms through which money supply affects stock prices and indices, supported by empirical evidence from various contexts. Therefore, the pertinent research questions are proposed as follows: How does money supply influence stock market performance in Nepal? What is the role of other macroeconomic variables, such as interest rates, constant GDP, and remittance inflow, in shaping stock market dynamics? Is there evidence of speculative stock bubbles resulting from changes in the money supply in Nepal? In this regard, the objectives of the paper are to examine the impact of money supply on stock market performance in Nepal, including the role of other macroeconomic variables such as interest rates, constant GDP, and remittance inflow, and provide suggestions to policymakers and stakeholders for policy implications.

Review of Literature

Theoretical Perspectives

Stock market performance is crucial for economic prosperity, capital formation, and sustainable economic growth as it facilitates resource flow, investment opportunities, pooling funds, sharing risk, and wealth transfer between savers and users (Subedi, 2023). The relationship between money supply and the stock market composite index is a well-researched area in economics and finance around the globe, where several theories provide frameworks to understand this relationship.

The Quantity theory of money as the equation MV=PQ, suggests that an increase in the money supply leads to inflation if the output (Q) remains constant. It means as the money supply increases, the liquidity improves, which in turn leads to encouraging more investments in the stock market and raises stock values. Conversely, if inflation increases as a result of excessive money in circulation, stock values may suffer as actual returns on investments decline (Fisher, 2006). Efficient Market Hypothesis (EMH) asserts that stock prices reflect all available information, including monetary policy signals (Fama, 1970). Therefore, the changes in money supply are incorporated into stock prices as investors adjust their expectations about future earnings and inflation. Therefore, money supply changes can have immediate effects on composite stock indices, depending on the degree of market efficiency.

Lucas (1972) developed the Rational Expectations Hypothesis and postulated that investors incorporate changes in money supply into their expectations about future economic conditions thereby influencing stock prices. It asserts that anticipated increases in money supply may already be reflected in stock prices, where unexpected changes can create volatility. Therefore, stock markets respond to the unanticipated component of money supply changes. Modigliani and Cohn (1979) argue that money supply increases can raise inflation expectations. Essentially, if inflation rises, it reduces the present value of future cash flows from stocks, adversely affecting stock prices. Therefore, the effect of money supply on stocks prices depends on whether inflation expectations are stable or rising. Behavioral Finance theories argue that the sentiment of investors and psychological factors expand the effects of money supply changes on stock prices (Shiller, 1981). It is observed that during periods of increased money supply, euphoria prevails and may lead to the overvaluation of stocks. Therefore, the theory states that the increase in money supply cognitive biases and herd behavior influence stock indices.

Empirical Review

The nexus between money supply and the market stock performance is a widely studied and discussed matter in macroeconomics and financial economics to have a better understanding of this relationship. The summary is presented subsequently.

Table 1

Literature Review Matrix

Auther (s) Years	Methodology	Major Findings
Brahmasrene & Jiranyakul (2007)	Time Series Analysis	The study found a long-run positive relation between money supply and stock market index. Likewise, the Granger causality test indicated causality from money supply to stock market returns.
Sahu et al. (2011)	Time Series Analysis	The study found that money supply significantly influences share prices positively.
Albaity (2011)	Generalized Autoregressive Conditional Heteroscedasticity (GARCH)	The study found monetary policy variables significantly influencing the stock market indices. Similarly, interest rate and real GDP growth also significantly influence on stock index.
		The study provides an evidence of the potential connection between excess money supply and

Martin (2012)	Time Series Analysis	speculative stock behavior as increase in price.
Sirucek (2013)	Time Series Analysis	The study found the money supply as significant factor causing stock bubbles, meaning that impact of money supply on stock index increases over time.
Shrestha & Subedi, (2014)	Time Series Analysis	The study found positive correlation of NEPSE with broad money supply and inflation but negatively correlated with treasury bills rate. The study concludes that Nepalese investors seem to take equities as a hedge against inflation and consider stock as an alternative financial instrument.
Ahmad et al. (2015)	ARDL short-run and long-run test,	The study found a contrasting result as money supply has a significant negative influence on the stock market performance.
Olulu-Briggs & Ogbulu (2015)	Vector Error Correction Model (VECM)	The Granger Causality test demonstrate a Uni-directional causality from broad money supply to stock market performance. Overall, all the results obtained are in line with a priori expectation.
Taamouti (2015)	Nonparametric Granger causality in mean test	The Granger causality in mean test result showed that money supply has no impact on stock prices. By contrast, general Granger causality test and quantile regression-based test were used, the effect of money becomes apparent and statistically very significant.
Shawtari et al. (2016)	VECM	The study found the macroeconomic variables such as money supply, inflation, and exchange rate are co-integrated on the long run with stock market prices.
Wang (2016)	Time Series Analysis	The study found that stock prices and the money supply in China is stable cointegration relationship with ECT -0.036 and the stock prices from a non-equilibrium state will be back to equilibrium very slightly.
Ndlovu et al. (2018)	VECM	The study found positive effect money supply and negative effect of exchange rate on stock price.
Khan & Khan (2018)	ARDL	The findings suggested that the money supply, and interest rate have significant positive and exchange rate have significant but negative impact on prices of Karachi Stock Exchange in long term.
Devkota & Dhungana (2019)	ARDL model	The bound test result confirmed that there is a long-run relationship among the variables and macroeconomic variables have a notable impact on stock market. NEPSE is highly interested sensitive while the gold price has insignificant impact on the

		stock market.
Al-Kandari & Abul (2019)	VECM	The study found a long-run unidirectional relationship from Kuwaiti Stock Exchange Index to the broad money supply, interest rate and exchange rate.
John & Ezea-basili (2020).	Time Series Analysis	The study revealed the existence of a long-run relationship between money supply and stock market performance in Nigeria, South Africa and Ghana. The study concluded that it is stock market performance that influences money supply more, rather than money supply affecting stock market performance in Nigeria, South Africa and Ghana.
Bhattacharjee & Das (2021)	VECM	The study found that money supply has an immediate positive effect on both Indian stock market index and stock market capitalization.
Lacey (2021)	An information Entropy Statistical Methodology	The study found positive relation between broad money supply and growth rate in stock index.
Gunardi & Disman (2023)	Associative descriptive approach	The study showed that both the money supply and interest rates have an influence on stock prices in Indonesia. But, the research in Malaysia shows that only interest rates have an influence on stock prices.
Synek & Veselá (2024)	Time Series Analysis	The study found the long-term dependence of stock indices on the broad money supply.

In summary, these studies have provided valuable insights into the short-term and long-term interactions between money supply, along other macroeconomic variables on stock market indicexisting studies mentioned above predominantly focused on the developed economy context, with limited attention to a unique economic structure of Nepal. Similarly, most studies report a positive correlation between the money supply and stock prices or stock indices, contrasting evidence on causality and the role of macroeconomic variables indicates the need for a localized investigation. In conclusion, this review identifies gaps in understanding the money supply dynamics in emerging economies like Nepal, highlighting the need for further investigation into the impact of changes in money supply on stock market performance and stability, thereby setting the stage for further research in Nepal.

Methodology

Research Design

This study has adopted a quantitative research design to analyze the relationship between money supply, interest rates, and stock market performance in the Nepalese contest. The research uses time-series analysis using econometric techniques to capture the dynamic interactions among the variables included in the model over time. Similarly, the study is explanatory in nature and employs statistical models to fulfill the objectives of the research.

Variables, Data, and Their Sources

This study used secondary annual data on some selected macroeconomic variables of Nepal viz., broad money supply(M2), interest rate, GDP at a constant price, remittance inflow in Nepal and Nepal Stock Exchange (NEPSE) index from 1994 to 2023. They are presented below:

Table 1

Variables, Data and Their Sources

Variables	Nature	Definition	Sources
NEPSE	Dependent Variable	Stock Market Performance	Nepal Rastra Bank
M2	Independent Variable	Broad Money Supply	Nepal Rastra Bank
IR	Independent Variable	Interest Rate	Nepal Rastra Bank
RGDP	Control Variable	GDP at Constant Price	Nepal Rastra Bank
RMT	Control Variable	Annual Remittance Inflow of Nepal	Nepal Rastra Bank

Analysis Tools and Techniques

The data analysis process involves descriptive statistics, stationarity tests, granger causality tests, ARDL methods of co-integration. Similarly, diagnostic tests like RESET test, Breusch-Godfrey Serial Correlation LM Test, Normality test, Heteroscedasticity test, stability test are done and they are subsequently discussed hereunder. The computer software EVIEWs 10 was used for data analysis.

Specification of the Empirical Model

To fulfill the objectives of the study, the researcher has developed an empirical model for testing the hypothesis in functional form as follows:

$$NEPSEt = f(M2t , IRt ,RGDPt , RMTt) \quad ...(1)$$

In equation (1) above, NEPSEt, M2t, IRt, RGDPt, RMTt denote the Nepal Stock Exchange, broad money supply, GDP at constant price and annual remittance inflow in Nepal for the time ‘t’ respectively. The model given in equation (1) can be transformed into a logarithmic econometric model as follows.

$$lnNEPSEt = \alpha + ln\beta 1T(M2t) + ln\beta 2(IRt) + ln\beta 3(RGDP)t + ln\beta 4(RMT)t + et \quad \ldots(2)$$

In equation (2) above symbols α denotes intercept, and β i implies slopes parameters to be estimated, ln stands for natural logarithm, remaining acronyms are as defined above in equation (1). Likewise, α and β are parameters to be estimated.

ARDL Model

The general form of an ARDL (p, q) model is:

$$Y = \alpha + \sigma_i \; _1\beta \, Y_{-i} + \sigma_j \; _0\gamma \, X_{-j} + \varepsilon \quad ...(3)$$

In the above equation (3), Y_t is the outcome variable, X_(t-j) denotes explanatory, α_i and β _j are coefficients, p and q are the lag orders, and ε_t is the error term.
The ARDL model is estimated based on the number of lags suggested by the information

criteria suggested in the lag length selection criteria. Generally, Akaike Information Criterion (AIC), Hannan-Quinn Criterion (HQC) or the Schwartz Bayesian Criteria (SBC) can be used in order to choose the optimal lag.

F- bound test is essential for examining long-run relationship of the variables included in the model. Hence, to test if the variables have a long-run relationship, the F-test was performed based on the following Pesaran, Shin and Smith (2001) generalized form of applied ARDL model. Therefore, model for F- bound test is given below:

$$\ln(NEPSE)t=\beta_0+ \beta_1 \ln(NEPSE)_{t-1} + \beta_2 \ln(M_2)_{t-1}+ \beta_3 \ln(IR)_{t-1}+ \beta_4\ln(RGDP)_{t-1} + \beta_5\ln(RMT)_{t-1} + \sigma\ \gamma\ \Delta ln\ NEPSE)_{t-i}+\sigma\ \delta\ \Delta ln\ M\ )_{t-j}+\sigma\ \lambda_k\ \quad IR)_{t-k}+\sigma\ \theta\ \Delta ln\ RGDP)_{t-l}+\sigma\ \mu\ \ \Delta ln\ RMT)_{t-m} + \varepsilon_t \quad \ldots(4)$$

In equation (4), $\beta0$, $\beta1$, $\beta2$ … $\beta5$ are coefficients to be estimated and subscript t-1 implies lagged value, Δ represents the first difference of the variables. Similarly, γi, δj, λk, θl, μm are the short-run dynamics (coefficients of the first differenced variables). Others are described as follows:

lnNEPSEt = The natural log of the Nepal Stock Exchange index.
lnM2t-1 = The natural log of money supply at time t-1.
lnIRt-1 = The natural log of interest rates at time t-1.
lnRGDPt-1 = The natural log of real GDP at time t-1.
lnRMTt-1 = The natural log of remittance inflow at time t-1.
εt = Error term.

The ARDL model for estimating long-run coefficient can be specified as follows:

$$\ln(NEPSE)t=\beta0+ \beta1 \ln(M2)t+ \beta2 \ln(IR) + \beta3\ln(RGDP)t + \beta4\ln(RMT)t + \varepsilon t \quad \ldots(5)$$

Moreover, the ECM in the ARDL approach to co-integration, the lagged error correction term is generated out of the long-run coefficients to replace a linear combination of the lagged variables, and the model is re-estimated at the optimum lags selected by using model selection criterion (Bahamani & Ardalani, 2006). The ECM for estimating short-run coefficient and error correction term is presented as follows:

$$\Delta\ln(NEPSE)t=\propto + \delta\_j\ \Delta\ln(M2)t\text{-}j+ \lambda\_k\ \Delta\ln(IR)t\text{-}k+ \theta\_l\Delta\ln(RGDP)t\text{-}l + \mu\_m\Delta\ln(RMT)t\text{-}m + \gamma ECTt-1+ \varepsilon t \quad \ldots(6)$$

In equation (6), $\propto$, δ_j, λ_k, θ_l, μ_m, and γ are coefficients to be estimated. Others are described hereunder.

ΔlnNEPSEt = Lagged change in the natural log of the Nepal Stock Exchange index.
ΔlnM2 t-j = Lagged change in the natural log of money supply at time t-j.
ΔlnIRt-k = Lagged change in the natural log of interest rates at time t-k.
ΔlnRGDPt-l = Lagged change in the natural log of real GDP at time t-l.
ΔlnRMTt-m = Lagged change in the natural log of remittance inflow at time t-m.
ECTt−1 =Error correction term lagged by one period.
εt = Error term.

Finally, the ARDL model tries to find the best linear unbiased estimator (BLUE) and thereby diagnostic tests need to be conducted. In this, regard, the researcher has also gone through such tests. Therefore, diagnostic test, such as Ramsey Regression Equation Specification Error Test (RESET) test, is a general specification test for the linear regression model, LM Test for Serial Correlation, Test for Heteroscedasticity, J-B test for the normality of the residuals and CUSUM and CUSUMSQ test for the stability are conducted and reported.

Results and Discussion

The estimated results presented in Tables 2 to Table 9 present results of data analysis. The analysis results are given and discussed subsequently.

Descriptive Statistics

Table 2 shows descriptive statistics for included variables for the analysis from 1994 to 2023. The acronym lnNEPSE denotes NEPSE index in log form. Its mean and median are 6.4959, and 6.5278 respectively, indicating slight symmetry. Likewise, the skewness is 0.094 (near 0, suggesting symmetry), kurtosis is1.745 (below 3, implying a flat distribution), and Jarque-Bera (JB) Probability is 0.4326, indicating the data follows a normal distribution. Another, acronyms lnM2 denotes Money Supply in log form. Its mean and median are 11.44612 and 11.43098, suggesting symmetry. The skewness is 0.0768 (near 0, indicating symmetry). The kurtosis is 1.62399 (less than 3, flat distribution) and JB Probability is 0.3684, supporting normality. Another acronym lnIR denotes interest Rate in log form. Its mean and median are 0.7067 and 1.0919 in which mean is less than median, indicating potential left skewness. Another parameter, skewness is -0.6987 (negative, suggesting left-skewed distribution). Likewise, kurtosis is 2.5390 (below 3, moderately flat). Finally, JB Probability: 0.3237, indicating approximate normality. The acronym lnRGDP denotes Real GDP in log form. Its mean and median are 11.5852, and 12.0028, here mean is less than median, suggesting slight left skewness. The skewness for this is −0.1851 (near 0, weakly left-skewed). The kurtosis is 1.1759 (far below 3, flat distribution). JB Probability is 0.1646, borderline normality. Finally, the acronym lnRMT denotes remittance in log form. Its mean and median are 10.1604 and 10.490, here mean is less than median, indicating potential left skewness. The skewness, kurtosis and JB Probability are -0.5734(moderate left skewness), 2.2507(below 3, flat distribution), and 0.3763 (moderate left skewness) respectively.

Table 2

Descriptive Statistics

Parameters	lnNEPSE	lnM2	lnIR	lnRGDP	lnRMT
Mean	6.4959	11.4461	0.7067	11.5852	10.1604
Median	6.5278	11.4310	1.0919	12.0028	10.4900
Maximum	7.9667	13.3262	2.1066	12.4604	11.7122
Minimum	5.3223	9.6343	-1.8326	10.6109	7.1438
Std. Dev.	0.8044	1.2036	1.0415	0.7671	1.2866
Skewness	0.0944	0.0770	-0.6987	-0.1851	-0.5734
Kurtosis	1.7457	1.6240	2.5390	1.1759	2.2507
Jarque-Bera	1.6758	1.9970	2.2557	3.6088	1.9549
Probability	0.4326	0.3684	0.3237	0.1646	0.3763

Note. This table demonstrates the descriptive statistic result as for the variables computed by the author based on the data of respective variables from 1994-2023.
The descriptive statistics shows that most variables exhibit approximate normality, with some left-skewed or flat distributions.

Unit Root Test Result

Augmented Dicky Fuller (ADF) test result and Phillip-Perron (PP) test result is summarized subsequently. The ADF test evaluates the stationarity of variables by testing for unit roots at levels and at the first differences. The Table 3 results show that lnNEPSEt and ln IRt are stationary at levels I(0) and I(1) both. But, lnM2t, lnRGDPt, and lnRMTt are stationary only after the first difference I(1) and non-stationary at levels. These results clearly indicate that the variables are integrated at level, I(0) and after first difference I(1). Similarly, Phillip-Perron test result also shows a variable interest rate which is stationary at level I(0) and after first difference I(1) both. Reaming other variables are stationary only after first difference I(1)(Table 3). These results are crucial for selecting the ARDL model as an appropriate econometric approach for co-integration analysis and examining the relationships among these variables.

Table 3

Summary of Unit Root Test Result

ADF Test Results					
	At Level		At First Difference		Order of
Variables	t-Statistic	Prob.	t-Statistic	Prob.	Integration
lnNEPSE	-4.664**	0.005	-4.530**	0.002	I(0) and I(1)
lnM2	-2.076	0.536	-3.516**	0.015	I(1)
lnRGDP	-1.973	0.591	-5.224***	0.000	I(1)
lnIR	-4.013**	0.022	-8.501***	0.000	I(0) and I(1)
lnRMT	-1.023	0.925	-5.763***	0.000	I(1)
PP Test Results					
	At Level		At First Difference		Order of
Variables	t-Statistic	Prob.	t-Statistic	Prob.	Integration
lnNEPSE	-0.243	0.922	-7.320***	0.000	I(1)
lnM2	0.179	0.966	-3.496**	0.016	I(1)
lnRGDP	-0.548	0.867	-5.224***	0.000	I(1)
lnIR	-4.117**	0.004	-10.593***	0.000	I(0) and I(1)
lnRMT	-2.478	0.131	-5.737***	0.000	I(1)

Note. This table demonstrates the Augmented Dickey Fuller test result as computed by the author based on the data of respective variables from 1994-2023. The symbol ** and *** implies statistical significance at 5 percent and 1 percent respectively.

Lag length Selection

In time series analysis, the optimal lag selection is very crucial and quite sensitive in the case of time series analysis. The VAR Lag Order Selection Criteria are given in Table 4. The study uses criteria like LR, FPE, AIC, SC, and HQ to identify the optimal lag length for a model. The majority of the criteria have been recommended for Lag 1, as it captures model dynamics effectively and maintains accuracy. In other words, this lag length allows for a comprehensive model improving forecast with accuracy and robustness.

Table 4

Selection of Optimum lag

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-69.6404	NA	0.0003	6.2200	6.4654	6.2851
1	37.7375	161.0670*	3.81e-07*	-0.6448*	0.8277*	-0.2541*

Note. This table demonstrates the test result as computed by the author based on the data of respective variables from 1994-2023.

F-Bound testing

The ARDL bounds test is a statistical method used to determine the long-run relationship among variables included in the model. Evidently, the F-statistic value is 5.063 and it is above the upper bound at all levels of significance (1 %, 5 %, and 10 %). Since 5.063 > 4.37 (the highest critical value for I(1) bond at 1 percent, we can reject the null hypothesis at the 1 percent level and conclude that there exists a statistically significant long-run relationship between the outcome variable and the predictors included in the ARDL model(Table 5).

Table 5

F-Bound Test Result

Null Hypothesis: There is no long-run relationship		
Test Statistics	Values	K(Explanatory Variables
F-Statistics	5.063	4
Critical Value Bonds		
Level of significance	I(0) Bonds	I(1) Bonds
10 percent	2.2	3.09
5 percent	2.56	3.49
1 percent	3.29	4.37

Note. This Table shows the F-bound test for co-integration results as computed by the author based on the data used for the variables spanning from 1994-2023.

Granger Causality Test Result

The Granger causality test is a statistical hypothesis test used to determine whether one-time series data can predict other data belonging to certain variables included in the time series model. It was developed by Granger (1969) and evaluates the causal relationship between two variables in the sense of temporal precedence. Therefore, the result of Granger causality is summarized as follows:

Table 6

Granger Causality Test Result

Null Hypothesis	F-Statistic	P-Value	Decision	Interpretation
Broad money supply does not Granger-cause NEPSE Index	5.81348	0.0090	Reject (at 1% level)	Broad money supply Granger-causes NEPSE Index.
NEPSE Index does not Granger-cause broad money supply	0.06150	0.9405	Fail to reject	NEPSE Index does not Granger-cause broad money supply.
Interest rate does not Granger-cause NEPSE Index	1.16312	0.3349	Fail to reject	Interest rate does not Granger-cause NEPSE Index.
NEPSE Index does not Granger-cause interest rate	0.22746	0.7988	Fail to reject	NEPSE Index does not Granger-cause Interest rate.
Real GDP does not Granger-cause NEPSE Index	4.02875	0.0316	Reject (at 5% level)	Real GDP Granger-causes NEPSE index.
NEPSE Index does not Granger-cause real GDP	2.96630	0.0714	Reject (at 10% level)	Weak evidence of NEPSE Index Granger-causing real GDP.
Remittance flow does not Granger-cause NEPSE Index	3.84697	0.0362	Reject (at 5% level)	Remittance flow Granger-cause NEPSE index.
NEPSE Index does not Granger-cause remittance flow	1.2367	0.3089	Fail to reject	NEPSE Index does not Granger-cause remittance flow.

Note. This Table shows the Granger causality test result as computed by the author based on the data used for the variables spanning from 1994-2023.

In summary, broad Money Supply Granger-causes the NEPSE index, indicating that liquidity significantly impacts stock market performance. Likewise, real GDP Granger-causes the NEPSE index. But, there is weak evidence that the NEPSE index may also Granger-cause GDP. Interest Rate and Remittance Inflows show no Granger causality with the NEPSE index in either direction.

Estimated Long Run Coefficients

Table 7 below shows the estimated long-run coefficients of the ARDL model and provides valuable insights into the relationships between the outcome variable NEPSE index and the independent and control variables included in the model.

Table 7

Estimated Long Run Coefficients using the ARDL Approach

Dependent Variables: NEPSE			
Selected Model: ARDL (1,1,1,0,1)			
Variables	Coefficient(Standard error)	t-Statistic	P. Value
lnM2	1.287***(0.364)	3.539	0.003
ln IR	-0.242*(0.135)	-1.797	0.093
lnRGDP	1.387***(0.419)	3.307	0.005
lnRMT	0.170(0.381)	0.446	0.662
C	5.783**(2.232)	2.591	0.021

Note. This table demonstrates estimated long-run coefficients using the ARDL approach as computed by the author based on the data used for the variables and the symbols *** ' ** and *indicate the significance of coefficients at 1 percent 5 percent and 10 percent level.

Table 7 result reveals that the coefficient of broad money supply (M2) is 1.287 (P<0.01). It implies a 1 percent increase in broad money supply is associated with a 1.287 percent increase in the NEPSE index in the long run. It indicates that increased money supply may enhance liquidity in the economy, encouraging investment in the stock market and driving up NEPSE index. Similarly, the coefficient of interest rate(IR) is -0.242 (P<0.10) indicating a 1 percent increase in interest rates leads to a 0.242 percent decrease in the NEPSE index in the long run. This can be inferred as higher interest rates increase the cost of borrowing and reduce corporate profits, making equities less attractive relative to other fixed-income securities. The coefficient of real GDP is 1.387 (P<0.01). This implies a 1 percent increase in real GDP causes an increase in NEPSE index by 1.387 percent in the long run. Its economic interpretation can be higher GDP growth reflects improved economic activity, boosting corporate earnings and investor confidence, which positively impacts stock prices. Moreover, the coefficient of remittance Inflows 0.170 (not significant, P=0.662). The coefficient is positive but statistically insignificant, indicating no clear long-run relationship between remittance inflows in Nepal and the NEPSE index. It can be inferred that remittance is predominant used in consumption or real estate investment but not invested stocks. The estimated coefficient for constant is 5.783 (P <0.05). This reflects the inherent factors influencing the NEPSE index that are yet to include as the explanatory variables.

Estimated Short-Run Coefficients

The ECM term, also known as the error correction term ECT (-1), is a key component in the Error Correction Model (ECM) estimated output. Moreover, the highly significant error correction term (ECT) indicates that the long-run equilibrium is corrected very quickly, reflecting a strong and stable long-run relationship among the variables included.

Table 8

Error Correction Model

Dependent Variables: NEPSE			
Selected Model: ARDL (1,1,1,0,1)			
Variable	Coefficient (Standard error)	t-Statistic	P-Value
ΔlnM2	0.842**(0.314)	2.683	0.018
ΔlnIR	-0.198(0.121)	-1.636	0.112
ΔlnRGDP	0.954***(0.312)	3.059	0.007
ΔlnRMT	0.051(0.158)	0.322	0.750
ECT(-1)	-0.653***(0.147)	-4.443	0.001

Note. This table demonstrates estimated short-run coefficients using the ECM approach as computed by the author based on the data for the variable spanning 1994-2023 of Nepal and the symbols *** ' ** and *indicate the significance of coefficients at 1 percent 5 percent and 10 percent level.

Table 8 shows the error correction term (ECT) coefficient value as -0.653 suggesting a rapid adjustment process in response to shocks, indicating that deviations from the long-run equilibrium are quickly corrected back. Essentially, the short-run dynamics reveal that the ECT is negative and highly significant (-0.653, $P<0.01$), indicating that approximately 65 percent of deviations from the long-run equilibrium are corrected in the subsequent period. In other words, any short-term fluctuations in economic growth caused by any changes the money supply, interest rate, real GDP growth, and remittance inflow will not persist, as the model tends to correct the disequilibrium rapidly. Moreover, in short, only the variables broad money supply(M2), and real GDP(RGDP) are statistically significant. But, interest rate (IR), and remittance inflow (RMT) are not significant. Furthermore, the values of R-squared and Adjusted R-squared are 0.697 and 0.652, implying that the model explains about 69.7 percent of the variation in NEPSE index, with an adjusted value of 65.2 percent, indicating robustness of the model. Moreover, Durbin-Watson Statistic value is 2.42 which is close to 2, reflecting no serious autocorrelation issues in the residuals of the estimated model.

Diagnostic Test of the ARDL Model

Table 9 demonstrates diagnostic test result such as the RESET (Regression Specification Error Test) is used to check for specification errors in a regression model, the Breusch-Godfrey serial correlation LM Test is used to detect the serial correlation (autocorrelation) in the residuals of a regression, the Breusch-Pagan-Godfrey test is used to detect heteroskedasticity in the residuals of a regression model and Jacque-Berra Test for normality test result.

Table 9

RESET Test Result

RESET Test Result			
	Value	df	Probability
t-statistic	1.401521	35	0.1699
F-statistic	1.964261	(1, 35)	0.1699
Breusch-Godfrey serial correlation LM Test result			
	Value	df	Probability
F-statistic	1.4406	Prob. F(2,13)	0.2722
Obs*R-squared4.3541	Prob.	Chi-Square(2)	0.1134
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
	Value	df	Probability
F-statistic	1.2071	Prob. F(8,15)	0.3581
Obs*R-squared	9.3999	Prob. Chi-Square(8)	0.3097
Normality Test Result			
Jarque-Bera statistic	0.6667	p-value	0.7165

Note. This table demonstrates diagnostic test result as computed by the author based on the data for the variable spanning 1994 -2024 of Nepal.

In the Regression Specification Error Test (RESET) result, the t-statistic value is 0.9641 with a p-value of 0.3513 which is greater than the common significance levels (0.01, 0.05, 0.10). In this case, the p-value of 0.3513 is greater than 0.05. Hence, there is no evidence of the omitted variables and wrong functional form (Table 9). Regarding, the serial correlation

LM test, the F-statistic value is 1.4406 with a p-value (Prob. F) of 0.2722. Here, the p-value of 0.2722 is much greater than 0.05. This suggests that there is no significant evidence of serial correlation in the residuals. Similarly, regarding the heteroscedasticity test, the F-statistic value is 1.2071 with a p-value (Prob. F) of 0.3581. Here, the p-value of 0.0.3581 is much greater than 0.05. Hence, the Breusch-Pagan-Godfrey test results suggest that there is no significant evidence of heteroskedasticity in the residuals. This indicates that the variance of the residuals is constant across observations, meaning the model does not suffer from the heteroskedasticity issues based on this test (Table 9). Finally, the Jarque-Bera statistic is 0.6667 with a p-value of 0.7165. Evidently, the p-value greater than 0.05 indicates that the residuals are normally distributed. Therefore, we can conclude that the residuals of the ARDL model are approximately normally distributed based on this test (Table 9).

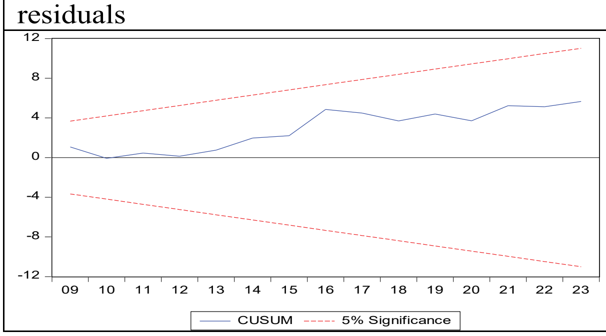
Stability Test Result

The plot of cumulative sum of recursive estimate residuals line remains within the 5 percent significance level critical bounds throughout the sample period from 1994 to 2023. This indicates that there are no significant deviations in the cumulative sum of the residuals that would suggest instability. Similarly, the cumulative sum of the squares line also remains within the 5 percent significance level critical bounds throughout the sample period. This indicates that there are no significant deviations in the cumulative sum of the squared residuals that would suggest instability in the variance of the residuals. Therefore, we can conclude that the variance of the residuals is stable over the period from 1994 to 2023 and there is no evidence of changes in volatility or variance instability in the ARDL model (Figure 1).

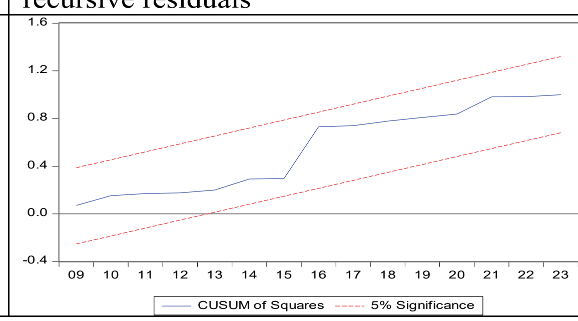
Figure 1

CUSUM Sum and SUSUM Sum of Square Recursive Residuals

Plot of cumulative sum of recursive estimate residuals



Plot of cumulative sum of square of recursive residuals



Discussion

The findings revealed unidirectional causality from broad money supply to NEPSE index, this result is aligned with the studies such as Brahmasrene and Jiranyakul (2007), Olulu-Briggs and Ogbulu (2015), but contrasting with the findings of Taamouti (2015) as it could not find any causality between them. Conversely, the studies such as Al-Kandari and Abul (2019), John & Ezeabasili (2020) found causality from the stock index to money supply. Likewise, the current study found by-directional causality between real GDP and NEPSE index and unidirectional causality from remittance flow to NEPSE index, but the absence of causality between interest rate and NEPSE index. The estimated long-run coefficients (Table 7) provide critical insights into the factors influencing the NEPSE index. Moreover, broad money supply exhibits a long-run and positive and highly significant relationship with the NEPSE index, with a coefficient of 1.287 ($P<0.01$). This suggests that a 1 percent increase in the money supply leads to a 1.287 percent rise in the NEPSE index, this is likely due to enhanced liquidity in the economy, which fosters investment in the capital market. The result is aligned with the findings of John & Ezeabasili (2020). But, this result contrasts with Ahmad et al. (2015), which showed negative effect on the same. The interest rate (IR) is negatively related to the NEPSE index, with a coefficient of -0.242 ($P<0.10$). This indicates that a 1 percent rise in interest rates reduces the NEPSE index by 0.242 percent. It may suggest that higher interest rates increase borrowing costs and reduce corporate profitability, making equities less attractive relative to fixed-income securities. Both of these results align with previous studies such as Ndlovu et al. (2018), Khan & Khan (2018), Shawtari et al. (2016), Shrestha & Subedi, (2014) and Sahu et al. (2011). But, this result contrasts with the study of Ahmad et al. (2015), which could not find a statistically significant effect of interest rates on a stock market index.

Moreover, real GDP positively impacts the NEPSE index, with a significant coefficient of 1.387 ($P<0.01$). This implies that a 1 percent increase in GDP boosts the NEPSE index by 1.387 percent. It is so because economic growth enhances corporate earnings and investor confidence, leading to increased stock prices. The finding, as positive but statistically insignificant coefficient of remittance inflow, is 0.170 ($P=0.662$), and it indicates no clear long-run relationship with the NEPSE index. This suggests that remittances inflow amount in Nepal have been predominantly used for consumption or real estate investment rather than stock market investment, as the study found by Subedi (2016), the substantial proportion of remittance amount is used for land purchases and real estate. The error correction model (Table 8) demonstrates the short-run dynamics. Similarly, the result reveals that broad money supply and real GDP have positive and significant effects on the NEPSE index in the short-run. The error correction term is negative and highly significant with coefficient value as −0.653 ($P<0.01$), indicating that 65.3 percent of deviations from the long-run equilibrium are corrected within one period, reflecting a stable and rapid adjustment process. These results highlight the critical roles of liquidity, economic growth, and interest rates in shaping Nepal's stock market dynamics while underscoring the limited influence of remittances in this context.

Conclusion and Policy Implications

This study explored the influence of money supply and other macroeconomic variables on stock market performance in Nepal, with a focus on understanding their roles in shaping market dynamics. The findings indicate that the money supply has a significant positive impact on the NEPSE index, both in the long run and short run. But, the interest rate has a negative and significant impact in the long-run but it is insignificant in the short-run. This underscores the role of increased liquidity in driving stock market performance, as higher money supply facilitates investment in financial markets. The adjustment process to long-run equilibrium was stable and rapid, with deviations corrected by 65.3 percent in each period. Moreover, real GDP plays a crucial role in driving stock market performance, with a positive and significant relationship in both the short and long run. This finding reflects the close association between economic growth, corporate earnings, and investor confidence. Remittance inflows, however, show no significant long-run relationship with the NEPSE index. Perhaps, it suggests that remittances are predominantly directed toward consumption or real estate rather than stock market investments. Overall, this study highlights the importance of macroeconomic stability, particularly in managing money supply and interest rates, to foster sustainable growth in Nepal's stock market. It also provides critical insights for policymakers, investors, and stakeholders on the interplay between economic factors and stock market dynamics.

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