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Impact of Macroeconomic Factors on Stock Returns in the Nepalese Market: *A Comprehensive Analysis*

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Abstract: *In numerous countries, such as Nepal, financial markets have become absolutely necessary component of their national economies. The significance of a country's stock market can be estimate from the fact that stock market indices are now utilized as a barometer of the country's financial health. Macroeconomic factors have a significant impact on economic activity and they also influence the success of the stock market. The study has used time series data from 1994 to 2022 in multiple linear regression of OLS approach. The stock market's performance is influenced by several macroeconomic factors, including the gross domestic product (GDP) as a Quantify of economic expansion, inflation as a constraining factor on spending, overall interest rates and broad money supply.. Multiple regression analysis has revealed that both real GDP and broad money supply positive and statistically significant impact the rise in stock return. However, in Nepal, inflation and interest rates negatively affect stock returns, with interest rates exhibiting a significant impact on stock returns, as indicated by this study. Whenever the stock market undergoes a substantial downturn, it raises worry of an upcoming trouble. Consequently, government officials and policy-makers must be mindful of this issue.*

Keywords: *Stock Return, Macroeconomic Factors, Broad Money Supply, Real GDP, Interest Rate, Inflation Rate.*

I. INTRODUCTION

The relationship between economic parameters and stock return has been a subject of profound interest among researchers and investors. The Nepal Stock

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Exchange (NEPSE), established in 1994, has witnessed significant fluctuations and expansions, shaping the country's economic landscape (NEPSE Limited, 1993). Karki (2016) examined into the complexities of this relationship, utilizing extensive time-series data from 1994 to 2016. The study explored the impact of macroeconomic factors such as real GDP, inflation, and overall money supply on Nepal's stock market performance. Through advanced econometric methods like regression analysis and cointegration tests, the research highlighted the positive influence of real GDP and inflation on stock market performance, emphasize the elaborate dynamics between economic parameters and stock returns in Nepal However, the patterns and correlations lies a multitude of unresolved questions, raising significant issues for further exploration. The volatile nature of Nepal's stock market, marked by fluctuations following key political events like the Constituent Assembly elections in 2014, adds layers of complexity to the relationship between economic parameters and stock returns. Furthermore, the role of external factors such as exchange rates and trade balances remain a critical area requiring in-depth analysis, especially given Nepal's position as a developing economy reliant on global trade. Addressing these difficulties is vital for unraveling the nexus between macroeconomic parameters and stock returns, providing valuable insights for investors, policymakers, and market analysts alike. This research endeavor aims to shed light on these unresolved aspects, contributing to a variation understanding of Nepal's stock market dynamics in the context of its macroeconomic prospect.

The stock market serves as the backbone of a nation's financial system, providing a platform for the efficient allocation of resources and enabling governments and businesses to raise long-term capital for new initiatives. In developing countries, macroeconomic factors such as GDP, money supply, interest rates and inflation are likely to affect the equity markets. As the demand for financial products increases, the stock market becomes an integral part of the financial market. Macroeconomic variables play a crucial role in guiding investors to expect higher or lower returns when investing in stocks, hence having a significant impact on stock market fluctuations. In this context raise the issues, what is the significant relationship between various economic parameters, such as GDP growth, inflation rates, interest rates, and money supply, and stock returns in Nepal's financial market, and how can these interactions be clarified to provide valuable insights for investors and policymakers?

The research seeks to establish and analyze the relationship between stock return and essential economic parameters such as real gross domestic product, interest rates, broad money supply and inflation rate in Nepal. The main objective of this study are:

- To assess the relationship between economic parameters on stock return in Nepal
- To examine the impact of economic parameters on stock return in Nepal

II. LITERATURE REVIEW

The theoretical foundation of stock return analysis is based on several theories that have significantly shaped the understanding of financial markets. In explaining the

relationship between macroeconomic parameters and stock returns in Nepal, the key theoretical frameworks of this study are the Efficient Market Hypothesis (EMH), Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Theory (APT) to guide investors understanding. The EMH, pioneered by Fama (1965) asserts that financial markets rapidly integrate all publicly available information, rendering it difficult for investors to consistently outperform the market. CAPM, developed by Sharpe (1964) connects an asset's expected return to its systematic risk, measured by beta relative to the overall market. The APT introduced by Ross (1972), extends this understanding by suggesting that an asset's anticipated return can be influenced by multiple macroeconomic factors of risk. These foundational theories offer a theoretical framework to analyze the relationship between macroeconomic parameters and stock returns in the context of market dynamics in Nepal. By examining these relationships, this research seeks to identify the complex interdependencies between macroeconomic factors and stock returns within the unique setting the financial market of Nepal.

Despite the theoretical foundations provided by these models, the complication of the relationship between macroeconomic parameters and stock return continue to be debated and explored. Scholars have assessed these theories, identifying limitations and areas for refinement. Understanding the details of these theoretical constructs is paramount for clarifying the nexus between economic parameters and stock returns, especially in the unique context of financial market in Nepal. This theoretical review lays the groundwork for research endeavor, providing a comprehensive understanding of the key theories that will inform our analysis and contribute to the ongoing discourse in financial research.

Review of Empirical Studies

The exploration of the intricate relationship between macroeconomic variables and stock returns has been a significant focus in the global research landscape. Within Nepal's unique financial context, several studies have delved into the interplay between various macroeconomic factors and stock market performance, offering invaluable insights into the dynamics of Nepal's stock market. This literature review provides a comprehensive overview of these studies, meticulously analyzing their methodologies and outcomes.

Real Gross Domestic Product (GDP)

The connection between Gross Domestic Product (GDP) and stock returns has been meticulously examined. Reddy (2012) emphasized the positive impact of increased GDP on stock performance, underscoring the vital role of economic growth in driving favorable outcomes. Cole, Moshirian, and Wu's (2008) comprehensive analysis established a significant connection between bank stock returns and future GDP growth, illuminating the symbiotic relationship between financial institutions and broader economic indicators. Singh, Mehta, and Varsha (2011) studied further reinforced the positive association between GDP and stock returns, highlighting the interdependence between national economic health and stock market performance. Ghimire (2022) found that market

dynamics of Nepal confirmed a positive correlation between GDP and stock prices, indicating the influential role of economic growth in shaping market values. Setiawan (2020) provided empirical support for the long lasting influence of GDP on the stock market, establishing a long-term connection between economic growth and stock returns.

Broad Money Supply (M2)

Comprehensive studies by Panta (2020), Karki (2018), Paul and Pokharel (2020), Shrestha and Pokhrel (2019), and Tsai, Chang, and Tzang (2022) explored the relationship between broad money supply and stock returns in Nepal's financial landscape. Panta (2020) revealed a robust positive relationship between broad money supply and the NEPSE index, emphasizing the substantial influence of money supply fluctuations on stock market performance. Karki (2018) and Paul and Pokharel (2020) reinforced positive correlation, underscoring the enduring nature of this relationship over time. Shrestha and Pokhrel (2019) and Tsai, Chang, and Tzang (2022) also verified these findings, collectively highlighting the pivotal role of monetary policy and liquidity dynamics in shaping stock market trends in Nepal.

Inflation Rate (INF)

The relationship between inflation rates and stock market returns has been a significant area of study. Naik and Padhi (2012) studied in India uncovered a complex relationship between inflation and asset prices, influenced by multifaceted factors. Amtiran, Indiastuti, Nidar, and Masyita (2017) described how macroeconomic factors such as economic growth, inflation, and the exchange rate affect stock returns on the Indonesian stock market. Data from 2007 to 2014 were used by the researchers to apply the idea of arbitrage pricing. Shrestha and Subedi (2014) looked into empirical analysis of market index determinations in Nepal. The study consists of time series monthly data from 2000 to 2014. NEPES index annual real GDP, CPI index 91-day Treasury bill rate, political event dummy, and political change dummy are the study's primary variables. The study's components include the NEPE Index, which is reliant on annual real GDP, the CPI Index, the 91-day Treasury Bill Rate, and the political environment. The study found that the NEPSE index is positively impacted by inflation and the bread money supply, while negatively impacted by interest rates. Hsing (2011) conducted a research study on the Hungary stock market index and its relationship with several macroeconomic variables using data from the period of 2000 to 2010. The study revealed that there was a positive relationship between the stock market index and GDP, government debt, and effective exchange rate. However, there was a negative correlation between the German stock market and real interest rates, inflation rates bond yields and money supply.

Interest Rate (INT)

The relationship between interest rates and stock returns has been extensively researched. Alam and Uddin (2009) revealed a significant negative association between interest rates and share prices, highlighting the universal impact of interest rate changes on stock prices. Amarasinghe (2015) regression analysis further confirmed the substantial

influence of interest rates, indicating a noteworthy negative correlation between interest rates and Sri Lanka's All Share Price Index (ASPI). Hamrita and Trifi (2011) explored the complex relationship of interest rates, exchange rates, and stock index returns. Ahmad, Rehman, and Raoof (2010) established the significant impact of interest rate changes on stock returns across their sample period. Devkota (2018) explained the exploration in Nepal from 1994 to 2016 highlighted the sensitivity of Nepal's stock market to interest rate fluctuations, indicating the need for cautious consideration of monetary policy decisions when analyzing stock market trends.

Hence, the diverse findings and insights emphasize the complex nature of these interactions, emphasizing the need for refinement analyses and a deep understanding of Nepal's economic context when exploring the stock return.

III. METHODOLOGY

The study examines the connection between stock return and macroeconomic factors utilizing descriptive and analytical research design. It utilizes a quantitative approach to attain the objectives of the study. The model-building process uses annual time series data spanning 29 years from 1994 to 2022. The annual Nepse index is taken from the annual report of the Nepal stock exchange. Data from selected four macroeconomic variables are taken from the Quarterly Economic Bulletin (NRB). Gautam (2022) and Devkota (2018) have taken data from this source in their study.

This study adopts a rigorous methodology to investigate the relationship between macroeconomic factors and stock returns in the Nepalese market. This initial step involves descriptive statistics to summarize the data using measures of minimum, mean, maximum and standard deviation of the characteristics of both macroeconomic variables and stock returns. Correlation coefficients are calculated to assess the strength and direction of the relationships between macroeconomic variables and stock returns. Multiple regression models are estimated to determine the extent to which macroeconomic factors predict stock returns (Pant, 2020 & Thapa, 2023). This analysis allows for the assessment of the individual and collective impact of various macroeconomic variables on stock returns.

Augmented Dickey-Fuller test is performed to assess the stationarity of time series data. Stationarity is essential for reliable regression analysis and interpretation of results. Test for serial correlation and VIF are conducted to detect autocorrelation and multicollinearity in the residuals of the regression model. Heteroscedasticity test is used to examine whether the variance of the residuals is constant across observations. A histogram of the residuals is visually inspected to assess the distribution's shape and identify potential outliers or skewness.

Model Specification

Regression analysis has done to find the impact of independent variables real GDP, inflation rate, interest rate, and broad money supply on the dependent variable stock return. Paul and Pokharel (2020), Zakaria and Shamsuddin (2012). Stock Return (R_t) has

calculated as ($\frac{Pt}{Pt-1}$) and taking the natural logarithm of M2, INF, INT and Rt for normalize the data.

Stock return (R_t) = f (GDP, Interest rate, Broad money supply, Inflation rate)

This study hints at the given models to examine the relationship between the variables--dependent and independent.

$$InR_t = \beta_0 + \beta_1 lnM_2 + \beta_2 lnGDP_t + \beta_3 lnNT_t + \beta_4 lnINFt + \varepsilon_t$$

Conceptual Framework

Literatures have linked different macroeconomic factors that effect on stock return. Stock prices are reflected by market indices, the majority of them focused mainly on a number of macroeconomic parameters including real GDP, inflation rate, interest rates and broad money supply. (Measured as NEPSE Index in Nepal). Given the literature review, the conceptual framework for the study is given as follows:

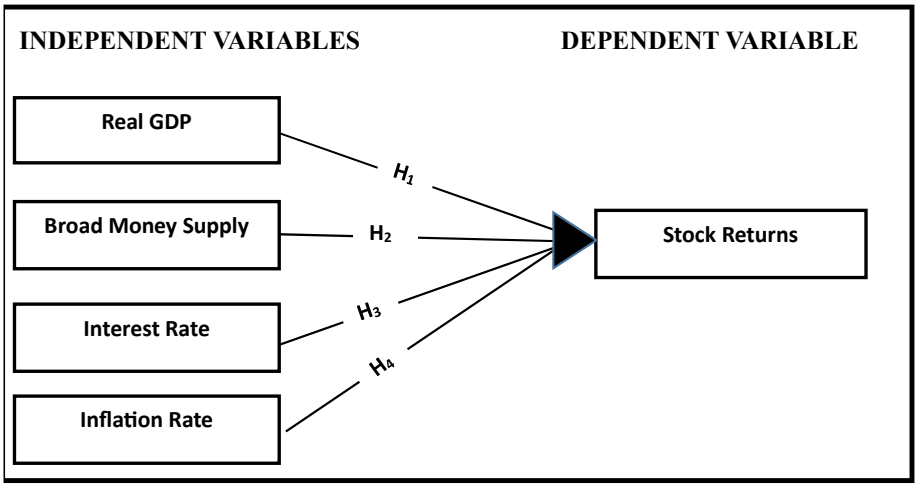

Figure 1. *Conceptual Framework for Macroeconomic Parameters on Stock Return*

Research Hypotheses

The study adopted the following alternative hypotheses:

H_1: Real GDP strongly effect on stock returns

H_2: Broad money supply strongly effect on stock returns

H_3: Interest rate strongly effect on stock returns

H_4: Inflation strongly effect on stock returns

IV. RESULT AND DISCUSSION

The average NEPSE Index of Nepal is observed 736.92 over the 29 years period with a minimum index is 163.4, a maximum 2883.4 points, and a standard deviation

669.8. Real GDP is found that Maximum 8.6%, a minimum of negative 2.4%, and an average 4.2% over the study period. Broad money supply shows that maximum of Rs. 5154853 billion, a minimum 69777 billion, and an average 1133063 billion. During the study period average interest rate and the inflation rate was 4.08% and 6.7% respectively.

The table 1 shows the descriptive statistics of the data examined in this study.

Table 1
Descriptive Statistical Analysis

Variable	Unit	Minimum	Mean	Maximum	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	N
NI		736.92	2883.4	163.4	669.8	1.49	4.86	14.88	29
M_2	Rs	1133063	5154853	69777.1	1382128	1.5	4.29	12.94	29
GDP	%	4.2	8.6	-2.4	2.28	-0.75	4.31	4.77	29
INT	%	4.08	10.93	0.13	2.72	0.81	3.16	3.2	29
INF	%	6.7	11.24	2.27	2.77	-0.18	1.74	2.08	29

Correlation Analysis

The correlation matrix represents the pairwise correlations between the variables LNRT (Natural Logarithm of Stock Returns), LNM2 (Natural Logarithm of Money Supply), LNGDP (Natural Logarithm of Gross Domestic Product) and LNINT (Natural Logarithm of Interest Rates), and LNINF (Natural Logarithm of Inflation). There is a very weak positive correlation (0.002) between LNRT and LNM2. This suggests that there is almost no linear relationship between the natural logarithm of stock returns and the natural logarithm of money supply. There is a weak positive correlation (0.2) between LNRT and LNGDP. This implies a slight positive linear relationship between the natural logarithm of stock returns and the natural logarithm of gross domestic product. It indicates that as GDP increases, stock returns tend to show a modest positive trend.

There is a moderate negative correlation (-0.542) between LNRT and LNINT. This indicates a significant negative linear relationship between the natural logarithm of stock returns and the natural logarithm of interest rates in Nepal. As interest rates increase, stock returns tend to decrease, and vice versa. There is a weak negative correlation (-0.156) between LNRT and LNINF. This suggests a slight negative linear relationship between the natural logarithm of stock returns and the natural logarithm of inflation. As inflation increases, stock returns tend to show a modest decrease.

There is a moderate positive correlation (0.535) between LNM2 and LNINF. This indicates a significant positive linear relationship between the natural logarithm of money supply and the natural logarithm of inflation in Nepal. As money supply increases, inflation tends to rise.

The results suggest that interest rates have a notable impact, exhibiting a negative correlation with stock returns. Additionally, there are weak to modest relationships

between stock returns and variables such as money supply, gross domestic product, and inflation. These findings contribute to a clearer understanding of the nexus between macroeconomic factors and stock returns in the Nepalese capital market.

The table 2 shows the correlation analysis of the data examined in this study.

Table 2
Correlation Analysis

Variables	LNRT	LNM_2	LNGDP	LNINT	LNINF
LNRT	1				
LNM_2	0.002	1			
LNGDP	0.2	-0.156	1		
LNINT	-0.542	0.014	0.044	1	
LNINF	-0.156	0.535	0.04	-0.108	1

Unit Root Test

Augmented Dickey-Fuller (ADF) tests were conducted by Setiawan (2020) and Shrestha and Subedi (2014) to evaluate the stationarity of the data series, with the following result obtained upon carrying out the ADF test for normality test of time series data.

Table 3
ADF Unit Root Test

Variables	Level	First Diff.
LnR_t	.313	.001
ΔlnM_2	.001	.000
GDP	.000	.005
INT	.166	.001
INF	.006	.000

The findings show that although lnRt, lnM2, INT, and INF are stable in the first difference, GDP is non-stationary at level. However, at a 1 or 5 percent significance level at the first divergence, these series are discovered to be stationary. Unit root tests show that all of these variables are integrated in the sequence I (1).

Histogram test

Keswani and Wadhwa (2019) tested the normality of the data by using a histogram. The test has a null hypothesis that the data is normally distributed.

The p-value (0.791) and Jarque-Bera value (0.469) are above 0.05 and demonstrate that the residuals are normally distributed, there is no reason to deny the null hypothesis. Statistics from the Jarque-Bera test revealed that the residuals are normally dispersed.

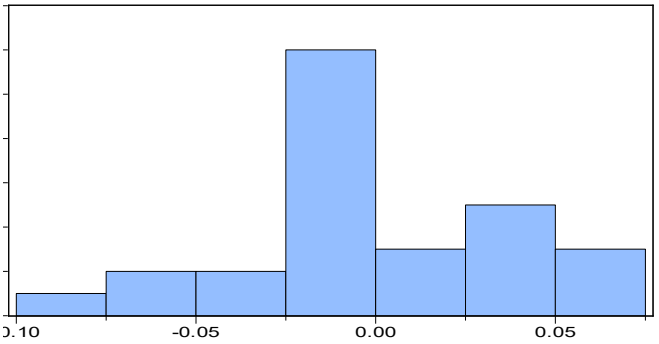

Figure 2. *Histogram Analysis*

Multicollinearity Test

The findings are in line with the results of multicollinearity tests conducted in related studies by Olweny and Omondy (2011), Aroni (2011), and Setiawar (2020), which also reported similar outcomes.

Table 4
Variance Inflation Factors

Variables	Coefficient Variance	Uncentered VIF	Centered VIF
DLNM2	0.020	8.526	1.480
LNGDP	0.000	1.053	1.053
LNINT	0.000	2.382	1.024
LNINF	0.000	21.065	1.463
C	0.001	16.882	NA

Table depicts the outcomes of the variance inflation factor (VIF) analysis, indicating that there is no collinearity among the explanatory variables. This is evidenced by VIF values below 10 for all variables, suggesting the absence of multicollinearity among the explanatory variables considered in the study.

Autocorrelation Test

Table 5
Breusch-Godfrey Serial Correlation LM Test

F-statistic	2.694	Prob. F(2,21)	0.091
Obs*R-squared	7.717	Prob. Chi-Square (2) F(2,21)	0.057

Serial correlation LM test p value is .0574 which is more than .05 so the null hypothesis is accepted.

Setiawan (2020), Devkota and Dhungana (2019) used the serial correlation LM test to test the autocorrelation in the research work. The chi-square test is more likely to be larger to check the autocorrelation, according to the Breusch-Godfrey LM test.

Heteroscedasticity Test

Setiawan (2020) conducted Breusch-Pegan-Godfrey heteroscedasticity test to test the hypothesis.

Table 6
Heteroscedasticity Test:

F- Statistic	2.15	Prob. F(4,23)	0.11
Obs*R-squared	7.62	Prob. Chi-Square(4)	0.11
Scaled explained SS	3.68	Prob. Chi-Square(4)	0.45

There is no evidence to reject the null hypothesis because the P value is .451 which is more than .05.

Multiple Regression Analysis

The cause and effect connection between dependent variable and independent variables are demonstrated by the regression analysis. In order to evaluate the hypothesis, the research uses the basic OLS assumptions that lnRt, lnM2, GDP, INT, and INF are independent variables. Ho: Selected macroeconomic factors in Nepal have no effect on stock return. Table 7 shows the regression result.

Table 7
Regression Analysis

Parameters	**Coefficients**	**Std. Error**	**t value**	**P value**
DLNM2	0.18	0.14	1.31	.20
LNGDP	0.01	0.00	1.74	.10
LNINT	-0.03	0.01	-3.77	.00
LNINF	-0.04	0.02	-1.93	.07
C	1.09	0.03	32.71	.00
R-squared	.44	Adjusted R-squared	.34	
F-statistic	4.47	Prob(F-statistic)	.01	
Dependent Variable: LNRT				

The regression equation is specified as follows:

$$lnR_t = 1.09+0.18\ lnM_2+ 0.01\ lnGDP_t-0.03\ lnINT_t-0.04\ lnINFT_t+ \varepsilon_t$$

The coefficient is 0.18, indicating that a one percent change in the money supply is associated with a 0.18 percent increase in the stock returns vice versa. However,

the t-statistic is 1.31, and the p-value is 0.20, suggesting that this relationship is not statistically significant at conventional significance levels. Nkechukwu, Onyeagba, and Okoh (2013), the Nigerian stock market values are positively and insignificantly impacted by the broad money supply on stock return like the result of this study.

The coefficient is 0.01, indicating that a one percent increase in GDP is associated with a 0.01 percent increase in the stock returns. The t-statistic is 1.74, and the p-value is 0.10, suggesting a marginal level of significance at 10 percent. This outcome is consistent with a number of earlier investigations. According to Cole, Moshirian and Wu (2008), Alexius and Sp (2018) and Kisman and Restiyanita (2015) supported to the positive and statistical significant impact of real GDP on stock return of Nepal.

The coefficient is -0.03, indicating that a one percent increase in interest rates is associated with a 0.03 unit decrease in of stock returns. The t-statistic is -3.77, and the p-value is 0.00, indicating that this relationship is statistically significant at 1 percent. The study found that there is a negative and statistically significant impact of interest rates on stock returns at 1 percent level. Olokoyo, Ibhagui, and Babajide. (2020) and Chetri, Bhattarai, and Gautam (2022) also found that the impact of interest rates on stock return was negative.

The coefficient is -0.04, indicating that a one percent increase in the inflation is associated with a 0.04 percent decrease in the stock returns. The t-statistic is -1.93, and the p-value is 0.07, suggesting a marginal level of significance at 10 percent. The negative relation and statistically significant between stock return and the inflation rate at 10 percent level, was also found by Fama (1981).

The intercept is 1.09, representing the estimated natural logarithm of stock returns when all independent variables are zero. The t-statistic is 32.71, and the p-value is 0.00, indicating that the intercept is highly significant.

R-squared value is 0.44, indicating that approximately 44% of the variation in the stock returns is explained by the independent variables in the model. The adjusted R square is 0.34, which adjust the R-squared value for the number of predictors in the model. F-statistic is 4.47, and the associated P value is .01 this suggested that the overall model is statistically significant, indicating that at least one of the independent variables is contributing significantly to the prediction of stock returns.

The regression results suggest that interest rates (LNINT) have a statistically significant negative impact on stock returns (LNRT). The model also indicates potential effects of changes in money supply (DLNM2), GDP (LNGDP), and inflation (LNINF) on stock returns, although the significance levels vary. The overall model is statistically significant, and the R-squared value suggests that the included variables explain a substantial portion of the variation in stock returns in the context of Nepal.

V. CONCLUSION AND IMPLICATION

The stock price in Nepal is affected positively by the real gross domestic product and broad money supply. It indicates that an increased GDP and M_2 cause an increase in the stock price. Interest rate and inflation rate impacts negatively in the stock price of

Nepal. However, an increase in the interest rate and inflation rate leads to a fall in stock prices.

On the basis of analysis, the study recommended following policy implications.

According to the study, there is a favorable correlation between the stock price and the real gross domestic product in Nepal, indicating that the government should encourage economic activities to facilitate the growth of the stock market.

The study also finds a positive link between the money supply and stock prices in Nepal, suggesting that the central bank should regulate the money supply in the Nepalese economy to promote the development of the stock market.

The study indicates an inverse relationship between interest rates and stock prices, meaning that stock prices decline as interest rates increase, and vice versa. Therefore, interest rates have a significant negative impact on the Nepali stock market.

Another finding of the study is a negative correlation between the inflation rate and stock prices. The study suggests that an increase in inflation leads to higher consumption expenditure, lower demand for stocks and a subsequent decrease in stock prices. Conversely, a decrease in inflation has the opposite effect on stock prices.

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Conflict of Interest

The author declared having no conflict of interest in the research work.

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