Stock Market Responses to Macroeconomic Dynamics

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Abstract

This study aims at examining how the stock market reacts to macro-economic dynamics. Using the annual data set of 28 years from 1995 to 2022, the study employed the OLS Regression model. Macroeconomic variables like Inflation rate, Interest rate, Exchange rate, and Gross Domestic Product were used in this study. The findings suggest that the Nepal stock market is significantly affected by gross domestic product and exchange rate whereas interest is insignificantly negative Nepal stock market. Understanding the way macroeconomic factors affect NEPSE can assist evaluate the state of the economy as a whole and its capacity to provide wealth and prosperity for both venture capitalists and the wide-ranging community.

Keywords: Inflation, Nepal stock exchange, Gross domestic product, Exchange rate.

Introduction

With the trading of 18 securities Nepal Stock Exchange (NEPSE) was founded in the year 1994. Since its inception, NEPSE has evolved to become the sole stock trading platform in Nepal, playing a pivotal role in the nation's economic development. The primary function of NEPSE is to develop the economy of the nation by providing a platform for businesses and investors where the trading of securities can take place to mobilize reserve from the excess segment to the scarcity region. In 2007, NEPSE introduced an automated trading platform, representing a notable technological advancement in the realm of securities trading within the country. Over the years, there has been a notable enhancement in the trading of securities, driven by the adoption of innovative computerized technologies, consequently attracting a growing number of participants, both individual and corporate, from across the nation.

Efficiently developed stock markets can attract foreign direct investment into the local industry, thereby contributing significantly to the overall economic advancement of a country. It is widely acknowledged in the literature that the stock market plays a pivotal role in improving economic growth and nurturing development (Shahbaz et al., 2016). Numerous academic studies have delved into the intricate relationship between various macroeconomic indicators such as the inflation rate,

foreign interest rate, exchange rate, GDP, gold price, and money supply, among others, and their impact, whether positive or negative, on the performance of the stock exchange within a nation. Studies like Kim et al. (2004), Fama (1981), and Wei & Wong (1992) have all underscored the robust correlation between stock prices and macroeconomic variables. By conducting an extensive analysis encompassing G-20 countries and considering numerous variables including stock market turnover, market capitalization, value of stocks traded, GDP, oil prices, inflation rate, foreign exchange rate, and interest rate. Pradhan et al. (2015) have provided empirical evidence supporting the existence of a general long-term equilibrium relationship among those variables, with any deviations promptly rectified through economic growth mechanisms. Through the application of bound testing methodology within the emerging stock market of Malaysia, Bekhet and Mugableh (2012) have identified a significant association between stock prices and macroeconomic variables, highlighting a positive correlation between stock prices and GDP while observing a negative relationship with the M3, producer price index, and inflation as measured CPI, and exchange rate.

Likewise, in the specific context of Nepal, it has been observed that the stock market exhibits a positive response to GDP, inflation rate, and money supply, but conversely reacts negatively to the interest rate according to Karki (2018). Through the utilization of ARDL bound testing, Rana (2021) has unveiled the substantial long-term effects of real GDP growth on the stock market returns, coupled with the detrimental impact of the exchange rate and inflation rate in the Nepalese context. The scholarly investigation posits that policymakers ought to formulate strategic initiatives aimed at accelerating the pace of economic advancement and promoting export-oriented policies to sustain a favorable outlook on the stock market performance. The principal aim of this research endeavor is to scrutinize the prevailing trends in macroeconomic dynamics, such as the inflation rate, interest rate, exchange rate, and Gross Domestic Product in conjunction with the Nepal Stock Exchange, and to assess the stock market responses to these macroeconomic dynamics within the Nepalese setting.

Literature Review

Verma and Bansal (2021) provided evidence that GDP, FDI, and FII have a positive impact on both developing and established countries' stock market while the gold price is negatively related to the stock market. The macroeconomic indicators such as Inflation, money supply and GDP have the same effect on sartorial indices as they do on broad market indices. Bekhet and Mugableh (2012) conducted a study that revealed a significant relationship between stock prices and a group of macroeconomic variables. Their study demonstrated that stock prices exhibit a positive correlation with GDP while displaying a negative correlation with the producer price index, M3, CPI, and exchange rate. In a similar vein, Khan, Abbas, and Indres (2022) conducted their own analysis and observed a negative relationship between inflation, exchange rates, and interest rates, while noting a positive relationship between industrial production and stock market returns. Moreover, they employed Johansen Cointegration, Granger, and Toda Yamamoto (TY) Causality tests to explore these relationships further. Neifar et al. (2021) utilized these tests to show that there is an absence of co-integration between the variables under consideration. Additionally, their findings indicated that there is no causal relationship between macroeconomic factors and stock

returns, except for a unidirectional causal link from the exchange rate to stock prices. Furthermore, through the implementation of Granger non-Causality/Block Exogeneity Wald Tests, it was revealed that both inflation and exchange rate growth Granger cause fluctuations in the UK stock market return. Interestingly, the results of the ADL specification pointed towards a steady long-term effect of all the macroeconomic factors taken into account on the UK stock price. To be precise, the outcomes of the Error Correction Model (ECM) underscored that all the macroeconomic indicators considered play a crucial role in driving the UK stock price towards long-run equilibrium at a rapid pace.

In the context of Nepal, adopting vector auto regression (VAR) and a vector error correction model (VECM), Phuyal (2016) provided evidence that the stock marketplace had a long-run equilibrium association with various elements of macroeconomic variables such as inflation rate, interest rate, and remittance flow. Karki (2018) provided evidence that the stock market reacts positively to the GDP, Inflation rate, and money supply however, it is negatively related to interest rate. The study also stated that there was no co-integrating evidence between macroeconomic variables and the stock market index which suggest that the stock price movement in Nepal is not clarified by the macroeconomic variables. Besides, the study settled that the random walk hypothesis theory is supported in the Nepalese stock market. Using the bound test, Devkota and Dhungana (2019) confirmed that there is long-run relation among the variables. The ARDL investigation discovered that the interest rate is the uttermost defining element for the stock Market Index while the gold price has an insignificant influence on the stock exchange in Nepal. Correspondingly, the exchange rate has an insignificant influence on NEPSE even though Nepal's economy is vastly remittance-based. Similarly, with the same methodology, Rana (2021) revealed that there is a significant long-run impact of real GDP growth and a negative impact of the exchange rate and inflation rate on stock market returns in Nepal. The outcome derived from the process of error correction analysis indicates that when examining short-term discrepancies in a system, there exists a notable speed of adjustment equivalent to 47.57 percent over a single year. This signifies the ability of the system to rectify any imbalances or inconsistencies within a relatively brief timeframe, showcasing its dynamic nature and capacity for self-correction. Acharya (2019) concluded that the interest rate and wholesale price index have more explanatory power than the exchange rate.

Research Methodology

The study used time series data collected from secondary sources with 28 years of the period from 1995 to 2022. The data source includes the historical prices and returns of the stocks listed in the Nepal Stock Exchange NEPSE and some other data from the Central Bureau of Statistics and Nepal Rastra Bank. Macroeconomic variables like Interest rate, Inflation rate, Exchange rate, and Gross Domestic Product were used in this study. NEPSE index was used to measure the stock market whereas CPI was used to measure the inflation rate. Similarly, the US rate was used as measure of exchange rate and average interest rate published by Nepal Rastra Bank was used to measure interest rate. Descriptive statistic as well as inferential statistics was applied. OLS regression model was adopted to establish the causal relationship macro economics variables and stock market.

Econometric model

Model 1: $SM = \alpha + \beta_1 INT + \beta_2 INF + \beta_3 GDP + \mathcal{E}$

Model 2: $SM = \alpha + \beta_1 INT + \beta_2 INF + \beta_3 EXC + \mathcal{E}$

Where,

SM=Stock market index, α= constant term, β= Beta Coefficient, INT =interest rate, INF = inflation rate, GDP=Gross domestic product, EXC=Exchange rate, $\mathcal{E}$ =error term

Results and Analysis

Descriptive Statistics

Descriptive statistics of the variables under study for empirical analysis are presented in Table 1. The mean value of NEPSE, Interest rate, Inflation rate, Gross Domestic Product, and Exchange rate are 788.16, 3.99 percent, 6.59 percent, Rs. 16723.93 and 84.038 percent respectively. NEPSE reached a maximum of 2883.4 and a minimum of 163.4 during the study period 1995-2022. The maximum and minimum values of real gross domestic product are 40830 and 4400 respectively. In addition, the maximum and minimum values of interest rate are 10.93 and 0.13 respectively. Moreover, the maximum and minimum values of the inflation rate is 11.24 and 2.278 respectively. Likewise, the maximum and minimum values of the exchange rate during the study period are 125.2 and 51.89 respectively.

Table 1: The descriptive statistics of variables under study

Variables	NEPSE	INT	INF	GDP	EXC
Mean	755.16	3.99	6.59	16723.93	84.04
Maximum	2883.40	10.93	11.24	40830.00	125.20
Minimum	163.40	0.13	2.28	4400.00	51.89
Std. dev	674.71	2.73	2.79	11708.31	20.72
Skewness	1.53	0.95	-0.08	0.60	0.53
Kurtosis	2.33	0.64	-1.28	-1.01	2.33

Note. Inflation rate (INF), Interest rate (INT) and Exchange rate (EXC) is in percentage, NEPSE is denoted in points and Real Gross Domestic Product (GDP) in Rupees.

Correlation Analysis

Table 2: Correlation Coefficient

	NEPSE	EXC	INF	GDP	INT
NEPSE	1	0.849	-0.120	0.850	-0.324

	NEPSE	EXC	INF	GDP	INT
		0.000	0.542	0.000	0.092
EXC		1	-.128	0.939	-0.473[*]
			0.518	0.000	0.011
INF			1	-0.008	0.053
				0.966	0.789
GDP				1	-0.321
					0.095
INT					1

Note. The first row in each cell represents the correlation coefficient and the second represents the p-value.

Table 2 presents the results of the correlation among the variables under study. EXC and GDP have a very strong positive relationship with NEPSE. Both of the relationships are statistically significant at a 1% significant level. Similarly, inflation and interest rates have a negative relationship with NEPSE. The relationship between inflation and NEPSE is statistically insignificant whereas the relationship between interest and NEPSE is statistically significant at a 10% significant level. The results indicate that when exchange rate and GDP increases the stock market will increase. Interest rate and inflation rate are negatively associated with NEPSE as expected and are weakly associated however the relationship is insignificant.

Test of Multicollinearity

Table 1 presents the results of a test of multicollinearity and confirms that the problem of multicollinearity exists between GDP and Exchange as indicated by the Value of VIF > 10. Similarly, panels B and C of Table 3 reveal that there is no problem of multicollinearity when GDP or EXC are excluded since the variables have VIF< 10.

Table 3: Test of Multicollinearity

Panel A Variables	Collinearity Statistics including all variables	
	Tolerance	VIF
EXC	0.074	13.452
GDP	0.087	1.167
INI	0.634	11.491
INF	0.857	1.577
Panel B Variables	**Collinearity Statistics excluding GDP**	
	Tolerance	VIF
GDP	0.897	0.897
INI	0.894	0.894
INF	0.997	0.997
Panel C Variables	**Collinearity Statistics excluding EXC**	
	Tolerance	VIF
EXC	0.984	1.017
INI	0.776	1.288

INF	0.984	1.017

Regression Results

Table 4 presents the coefficient of regression results. Model 1 used a regression model without EXC as the independent variable while Model 1 used a regression model without GDP as the independent variable. The result shows that INF and INT have a negative relationship with NEPSE (β= -26.791 and β= -12.517 respectively. This indicates the increase in INF and INT will lead to a decrease in NEPSE. However, the relationship is statistically insignificant (P-value > 0.05). Likewise, GDP has a positive relationship with NEPSE (β=0.048) indicating the increase in GDP will lead to increase in NEPSE. The relationship is statistically insignificant (p-value < 0.05). The results with model 2 are similar to that of model 1 with the exception of the results of INF. Model 22 shows that INT has a positive relationship with the NEPSE., the relationship is statistically insignificant

Table 4: Regression analysis

Model	Constant	INF	GDP	INT	EXC	F	R square
1	178.799	-26.791	0.048	-12.517		0.001	0.738
		0.300	0.000	0.650			
2	-1770.306	-2.807		24.426	29.110	0.001	0.728
		0.915		0.421	0.000		

Note. The first row in each cell represents regression coefficient whereas second row represent p-value

Discussion and Conclusion

The results of the study reveal a significant relationship between the Gross Domestic Product and the exchange rate concerning the Nepal stock market index. This indicates a substantial interplay between economic indicators and the performance of the stock market in Nepal. Gross Domestic Product, and exchange rate both have a positive significant relationship with the Nepal stock market index. Thus, the improvement of the economic growth of the country triggers the NEPSE to increase. A positive relationship of exchange rate with Nepal stock market index is in contrary with Mehr-un-Nisa and Nishat (2011), Bekhet and Mugableh (2012), Wongbangpo and Sharma (2002). Kyereboah-Coleman and Agyire-Tettey (2008) argued the negative relationship between inflation rate and stock prices exists since high and varying inflation rates generate more uncertainty and thus demand for minimum return will also increase which will reduce the market valuation. Similarly, the negative relationship of interest rate with the stock market is consistent with Hasan and Nasir (2008), Hussainey and Ngoc (2009), Peiro (2015), Devkota and Dhungana (2019) and Rana (2021). As interest rates increase, investors will be reluctant towards the investment in the stock market which causes an increase in the supply of stock as a result that market will fall. Similarly, when the interest rate reduces stock market tends to rise. However, Erdem et al., (2005) and Lobo (2002) found positive relationship between stock market with interest rate.

This study shows how macroeconomic factors affect the NEPSE. Variations in macroeconomic data can raise the level of risk and uncertainty in the stock market. Market players and

policymakers can create better risk management techniques to calm the market during tumultuous times by recognizing and comprehending these relationships. Understanding the way macroeconomic factors affect NEPSE can assist evaluate the state of the economy as a whole and its capacity to provide wealth and prosperity for both venture capitalists and the wide-ranging community.

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