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Impact of Macro-economic Variables on stock market price in Nepal

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Abstract *– This paper examines the impact of macro-economic variables on stock market price in Nepal using monthly data over the period of 2016 January to 2019 December. Data were sourced from Nepal Rastra Bank, SEBON, NEPSE and Ministry of Finance. This study uses correlation analysis and regression model to examine such impact. The result of such test suggests that there is negative correlation between exchange rate, interest rate measured by (91 days: Treasury bill) and Stock Price indicated by NEPSE Index whereas there is positive correlation between inflation and stock price. From the regression analysis it is found that exchange rate and short term interest rate are a significant variable which means they have significant impact on stock price. But inflation is insignificant variable which means that it hasinsignificant impact on stock price in Nepal. This study helps to understand a key macro-economic variable that have major impact so that it helps to design policies to stimulate the stock market performance in Nepal.*

Key Variables: *Exchange rate, Interest rate, Inflation, Stock price, Correlation, Regression analysis.*

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I. Introduction

A stock market is a market which is known as loose network of economic transactions of stocks where the buyers and sellers are present for performing such transactions. Stock market is also known as equity market or share market. As we know, stock market plays crucial role in the growth of Nepalese economy. Stock market makes it possible for the economy to ensure long-term commitments in real capital (Otogunde et. al., 2006). Such stock market provides long-term funds to listed companies in stock exchanges by pooling the funds from various investors which allow companies to expand their business and it provides investors an alternative investment opportunity.

There are several macroeconomic factors that affect the Nepalese economy. Among such factors, exchange rate, inflation and interest rate have significant impact on stock price fluctuations and such factors tend to have strong influence and effect on stock market price. It is very important to understand the effect of such macroeconomic variables on stock prices so that it becomes convenient to gain knowledge on positive and negative impact that such variables may possessed. Knowledge of stock market sensitivity to macro-economic variables is important in many areas of investments and finance which will be helpful to understand the relationship between macro-economic variables and stock market prices (index).

Nepal's stock market

Looking at the evolution of Nepal's Stock Exchange market, it began in 1937 with Nepal Bank limited and Biratnagar Jute Mills Ltd. contributing floatation shares. Later on, in 1993 the securities Exchange was converted to the Nepal Stock Exchange (NEPSE) and in 1994 it commenced trading on the trading floor. NEPSE is an Organized Stock Exchange in Nepal which is considered as secondary market operating under Securities Act, 2006. The basic objective of NEPSE is to impact free marketability and liquidity to the government and corporate securities by facilitating transactions in its trading floor through market intermediaries, such as broker, market makers etc.

This study focuses on determining the impact of selected macro-economic variables in stock market price (index) in Nepal. Such variables include exchange rate, interest rate measured by (91 days Treasury bill) and inflation.

II. Literature Review

This section will present a short review of the literature on the impact of key macro-economic variables on stock market price (index) in Nepal. In another words, the relationship between exchange rate, interest rate and inflation on stock market price (index) are presented in this section.

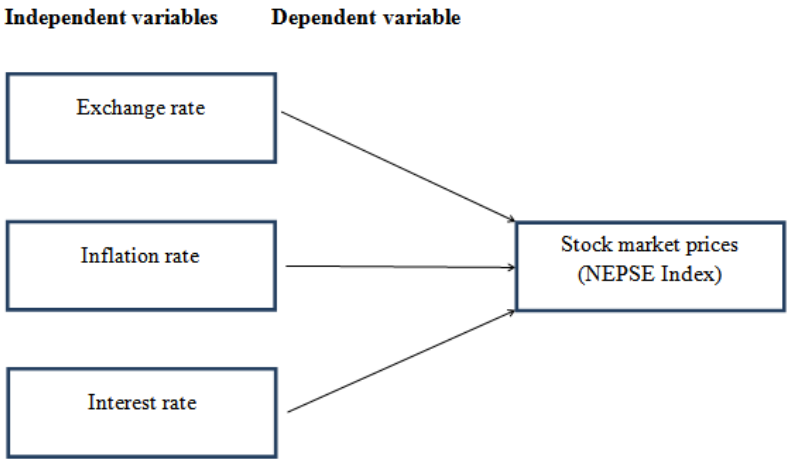
Dependent variable (stock market price (index))

The variable whose value should be predicted or estimated using other independent variables is known as dependent variable. In this study, stock market price representing through NEPSE index is predicted and relationships with its determinants are shown. The cost of purchasing a security on exchange which can be affected by a number of things including volatility in the market, current economic condition and popularity of the company is known as stock market price.

Independent variables (macro-economic variables)

Key macro-economic variables under this study are exchange rate, interest rate and inflation. Independent variables are those variables whose values are used for making prediction of those variables which depends on it.

2.1 **Theoretical Framework**



Theoretical framework is the structure that guides your research which shows the impact of independent variables on dependent variables. In this study, exchange rate, inflation and interest rate are independent variable and stock price is dependent variable.

The Theoretical Model is set below:

$Y = a + b1ER + b2INF + b3INT + \dot{\varepsilon}$

Where,

Y measures the variability of stock market prices measured by NEPSE Index where the data set will consist of monthly observations of the average stock price index.

ER is exchange rate of the US Dollar defined as the average monthly exchange rate.

IR is the interest rate defined as the average short term interest rate (91 days T-bill).

INF is the inflation rate defined as the average monthly inflation rate.

a is the constant or intercept and $\dot{\varepsilon}$ is the error term.

2.2 Empirical framework

Empirical research is research conducted using empirical evidence to know the impact of one variable to another variable.

2.2.1. Empirical evidence on the impact of exchange rate on stock price

The study conducted by Dimitrova (2005) reveals that an increase in stock price leads to decrease in exchange rate while a weak association exits between exchange rate and stock price, depreciation of the currency may lead decrease the stock market to decline.

Elhendawy E. O., (2017): Stock prices and exchange rate dynamics: Empirical evidence from Egyptby applying the GARCH (1, 1) model and Granger Causality Tests it is concluded that there was a significant inverse relationship between the stock market price and exchange rate.

The study conducted by Bala Sani & Hassain, Arabian (2018): Exchange rate and Stock market interaction: Evidence from Nigeria using Autoregressive Distributed Lag (ARDL) model and Granger Causality tests shows exchange rate have positive and significant impact on the stock market over the study period.

2.2.2 Empirical evidence on the impact of interest rate on stock price

Gaire, H.N., (2018) reveals that there is long-run equilibrium relationship between the NEPSE index, short term interest rates using the unit root (ADF) tests and Co-integration (Johansen).

Uddin, M.G.S., and Alam, M.M. (2010) reveals that Interest Rate has significant negative relationship with Share Price and Growth of Interest Rate also has significant negative relationship with Growth of Share Price.

Nepal Rasharan., (2019) in his study confirms that the stock market and interest rates are inversely related. The small changes in interest rate may cause a big change in the stock market.

2.2.3 Empirical evidence on the impact of inflation on stock price

The study conducted by Adusei, M., (2014) finds that there is a negative statistically significant relationship between inflation and stock returns in the short run and a positive statistically significant relationship in the long run.

Dr.Aurangzed (2012) conducted research which results also indicate the negative but insignificant impact of inflation on stock market performance in South Asia.This study identifies the factor affecting performance of stock market in South Asia.

III. Research Data And Methodology

3.1 Research Design

This study uses both descriptive and analytical method of analysis. The variables of the study are NEPSE Index, inflation. Interest rate (short term interest rate:91 days Treasury bill) and exchange rate. NEPSE Index is dependent variable and inflation, interest rate and exchange rate are independent variable.

3.2 Nature and Sources of Data

This study is based on the macro-economic variables. Data are secondary in nature. This study is based on time series data collected from various sources. Monthly data are used for making analysis spanning from 2016 from Jan-Dec to 2019 Jan-Dec which are collected from NRB (trading economics), SEBON and Ministry of Finance.

3.3 Methodology

3.3.1 Descriptive Statistics

Before running any test to check the connection between key variables using any econometric technique it is necessary to check and understand the statistical behavior and descriptive behavior. Descriptive statistics is the process of quantitative analysis of the collected raw data. It provides the summary about the given sample quantitatively which is easy to understand. Mean, median, standard deviation, minimum and maximum values of the variables, kurtosis and skewness are measures used to describe and check the data set. Descriptive statistics are major tool to support or make judgement about the performance of time series analysis.

3.3.2 Correlation Analysis

It is one of econometric tools used to show the relation between dependent and independent variables. It is the combination of two words which reflects unit change in one variable is reacted by an equivalent change in another variable directly or indirectly. The main result of correlation is correlation coefficient which is represented as r. it ranges from -1 to +1.

Positive Correlation

If positive correlation exists between two different variables the increase in one variable lead to increase in another variable and vice-versa.

Negative correlation

If negative correlation exists between two different variables then increase in one variable leads to decrease in another variable and vice-versa.

No correlation

When value is 0 then there may exits no-correlation.

3.3.3. Regression Analysis

Regression analysis is used to show the functional relationship between variables to make future projections. To check the impact of independent variables on dependent variable it is used. Stock price represented by NEPSE Index is dependent variable while exchange rate, interest rate and inflation are independent variable. Monthly data is used for analysis.

IV. Analysis And Interpretation

4.1 Table 1: Descriptive Statistics

	ER	INF	INT	NEPSE
Mean	108.3590	5.547917	2.427667	1386.922
Median	108.0250	4.600000	2.161500	1323.035
Maximum	116.9300	12.10000	5.820000	1862.800
Minimum	102.1300	2.300000	0.050000	1105.530
Std. Dev.	4.175662	2.543995	1.740472	214.1385
Skewness	0.258150	1.121515	0.366993	0.530217
Kurtosis	2.054634	3.228104	1.822673	2.037084
Jarque-Bera	2.320565	10.16642	3.849670	4.103456
Probability	0.313398	0.006200	0.145900	0.128513
Sum	5201.230	266.3000	116.5280	66572.25
Sum Sq. Dev.	819.4992	304.1798	142.3744	2155200.
Observations	48	48	48	48

The descriptive statistics for all four variables are shown in Table 1. A distribution is considered normal if the kurtosis and skewness are 3 and 0 respectively. From the above table 1, it can be observed that skewness values of exchange rate, interest rate and NEPSE Index are close to 0 which represents a normal distribution. Jarque-Bera measures the difference of the skewness and kurtosis of the series with those from the normal distribution. From the probability values of Jarque-Bera statistic of three variables i.e. exchange rate, interest rate and NEPSE; we fail to reject the null hypothesis at 5% level of significance implying that these variables have a normally distributed curve whereas, probability value of inflation is less than 5% level of significance we reject null hypothesis that is distribution is not normal.

4.2 Table 2: Correlation Analysis

	NEPSE	ER	INFL	INT
NEPSE	1.000000	-0.633564	0.161071	-0.460639
ER	-0.633564	1.000000	0.082026	0.080614
INFL	0.161071	0.082026	1.000000	-0.288742
INT	-0.460639	0.080614	-0.288742	1.000000

From the above table, it can be seen that there is negative correlation i.e. insignificant relationship between dependent variable NEPSE Index and independent variable Exchange rate. Similarly, there is negative insignificant relationship between NEPSE Index and Interest rate. But there exits positive insignificant relationship between NEPSE Index and inflation. It means that in case of negative correlation, if the value of NEPSE Index increases then the value of exchange rate and interest rate decreases and vice-versa. But in case of positive correlation, if the value of NEPSE index increases it will lead to increase in value of inflation.

4.2 Table 3: Regression analysis

Dependent Variable: NEPSE
Method: Least Squares
Date: 03/22/20 Time: 04:41
Sample: 2016M01 2019M12
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	4849.394	543.8768	8.916345	0.0000
EXCHANGE	-31.33446	5.060930	-6.191444	0.0000
INFL	8.485762	8.648226	0.981214	0.3319
INTEREST	-47.03293	12.63939	-3.721140	0.0006

R-squared	0.579446	Mean dependent var	1386.922
Adjusted R-squared	0.550771	S.D. dependent var	214.1385
S.E. of regression	143.5253	Akaike info criterion	12.85056
Sum squared resid	906378.8	Schwarz criterion	13.00649
Log likelihood	-304.4133	Hannan-Quinn criter.	12.90948
F-statistic	20.20793	Durbin-Watson stat	0.550215
Prob(F-statistic)	0.000000		

The probability of exchange rate and interest rate is less than 5% we can reject the null hypothesis which means that the two independent variables have significant impact on stock market price (NEPSE Index). The probability of inflation is more than 5% we fail to reject the null hypothesis which means that inflation cannot affect the stock market price. Exchange rate and interest rate are significant variable and inflation is insignificant variable. In case of R-squared and Adjusted R-squared, the more the value of it the more fit the model is. In this study, the independent variable cumulatively explained 57.94% of dependent variables. And looking at Adjusted R-squared the independent variable cumulatively determined 55.08% of dependent variable. Durbin-Watson statistic determines whether the data set has auto-correlation or not. Durbin- Watson test shows no insignificant impact on stock market price at 5% level of significance. For a good regression model Durbin- Watson should be 2.

V. Conclusion

This paper examined the impact of macroeconomic variables on stock market price in Nepal. From the above results and analysis it can be concluded that exchange rate and interest rate have significant impact on stock market price (NEPSE Index) whereas, inflation have insignificant impact on stock market price in Nepal. This paper examined correlation analysis and regression analysis to find out the impact of key variables on stock market price in Nepal. From both the analysis, it is concluded that exchange rate and interest rate is main reason behind the fluctuations that may occur in stock market price in Nepal. If such two variables changes than it will lead to change in stock market price.

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APPENDIX

YEAR	MONTH	NEPSE INDEX	INFLATION	INTEREST RATE	EXCHANGE RATE
	1	1216.11	12.1	0.68	106.36
	2	1283.94	11.3	0.35	108.49
	3	1355.5	10.2	0.53	108.82
	4	1646.9	9.7	1.097	106.54
	5	1532.12	10	1.34	106.43
2016	6	1723.2	11.1	0.12	107.35
	7	1862.8	10.4	0.05	107.86
	8	1797.5	8.6	0.44	107.19

	9	1753.4	7.9	2.05	107.03
	10	1759.7	6.7	2.12	106.74
	11	1608.3	4.8	3.004	106.92
	12	1443.4	3.8	2.342	108.89
	1	1326.6	3.2	1.74	108.74
	2	1299.29	3.3	2.64	108.5
	3	1587.64	2.9	0.74	106.94
	4	1650.78	3.8	0.93	104.21
	5	1608.11	3.4	0.78	103
2017	6	1563.81	2.8	1.03	103.12
	7	1652.69	2.7	0.71	103.28
	8	1580.03	2.3	0.551	102.59
	9	1549.46	3.4	0.481	102.45
	10	1533.53	3.1	1.183	103.99
	11	1537.67	3.9	2.55	103.93
	12	1390.58	4.2	5.52	103.38
	1	1404.49	4	5.82	102.13
	2	1345.99	5	3.93	102.24
	3	1220.29	6	4.7	103.65
	4	1349.01	5.3	4.99	104.1
	5	1307.66	4.1	5.15	106.38
2018	6	1198.54	4.1	4.38	108.19
	7	1191.47	4.6	3.74	109.45
	8	1181.69	4.2	3.34	110.13
	9	1256.71	3.9	2.74	113.52
	10	1221.46	4.7	1.77	116.93
	11	1148.36	4.2	2.203	116.93
	12	1187.28	3.7	0.997	113.52
	1	1161.63	4.6	0.86	112.42
	2	1105.53	4.4	3.44	113.99
	3	1143.59	4.2	3.55	113.22
	4	1298.6	4.4	4.44	110.48
	5	1319.47	5.3	4.29	111.42
2019	6	1244.89	6.2	5.5	111.52
	7	1265.57	6	4.97	110.47
	8	1196.41	7	0.21	111.56
	9	1135.56	6.2	2.73	114.51
	10	1146.17	6.2	4.33	113.64
	11	1112.79	5.8	3.83	113.78
	12	1166.03	6.6	1.64	114.3

Source: NRB (Trading economics), SEBON, NEPSE

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