The Effect of Macro Economic Variables on Stock Market Returns at the Nairobi Securities Exchange

Dr. Duncan Elly Ochieng (PhD, CIFA)[1] and Esther Nyambura Ndegwa[2]

Abstract

Purpose – This paper sought to establish the effect of Macro Economic Variables on the Stock Return at the Nairobi Securities Exchange.

Methodology – The study employed a regression and correlation analysis. Monthly secondary data for the period July 2011 to June 2016 was collected from the Central Bank of Kenya (CBK) and Nairobi Securities Exchange (NSE). Data was analyzed using regression and descriptive statistics.

Findings - The study established that there was a weak positive effect of 15.7% of the macroeconomic variables that were selected for the study on the stock returns at the NSE. The study further established the exchange rate (US$/Kes) had a major effect on the stock return for the period of study while money supply (M2) and the CBK lending rate had an insignificant effect on the stock return. Money supply was found to have a positive effect on the exchange rate whereas the CBK lending rate was negatively influenced by the money supply and the exchange rate.

Implications –All the stakeholders at the Nairobi Securities Exchange should be aware of the macroeconomic variables as they have an effect on the stock return. The exchange rate also ought to be monitored keenly as it had a higher positive effect on the stock return. The Capital Markets Authority of Kenya and the Nairobi Securities Exchange should ensure there are adequate policies related to share pricing as well as enhancing its regulation on the share trading at the Nairobi Stock Exchange. The Government has to continue ensuring that it gives report on the macroeconomic variable status in country as this affects the investor returns that impacts the economy as a whole.

Value - The study recommends that the CBK lending rate could be used to lower simultaneously the amount of money supply in the economy and the rate of foreign currency exchange to the Kenya Shilling. The study also recommends that CBK should continue ensuring that it improves on measures that control the money supply, the exchange rate and CBK lending rate as they affect earnings at the stock market.

***Key Words**: Money supply (M2), macroeconomic variables, stock market return, Nairobi Securities Exchange (NSE)*

[1]Lecturer University of Nairobi, School of Business, Department of Finance and Accounting and a Certified Investment and Financial Analyst (CIFA) [2]MBA Student University of Nairobi, School of Business, Department of Finance and Accounting

Introduction

The stock market has a fundamental part in raising capital for both private and government entities in order to support growth in their projects. Savers are attracted into the stock market by the opportunities available for returns in terms of value increase and bonuses. Fisher (1930) and Solomon (2012) studies indicated that there has been a great interest of the relation regarding the macro-economic variables and the stock market both in the theoretical and empirical literature.

A lot of research has concluded that the returns at the stock market are highly dependent on macroeconomic variables like money supply, rate of inflation, exchange of foreign currency, GDP. Country economies are linked to efficient functioning of stock markets, Osamuonyi and Evbayiro-Osagie (2012), Ochieng and Adhiambo (2012) and Ilahi, Ali and Jamil (2015). The importance of the stock market to the development of a country is linked to the effectiveness, governance, and the appropriate regulatory framework designed by both policy makers and politicians. The stock market performance is indicated by the index that reflects on the return that has been earned on investments made at a particular period (Ologunde, Elumilade, & Asaolu, 2006).

Malkiel and Fama (1970) in their study of the efficient market hypothesis (EMH) described that the existing price of stock reflect the information acquired about an organization's value and it is difficult to make extra earnings by use of available information. The EMH theory supported the study in that the returns at the stock market reflect happenings in the macroeconomic variables disparity. In addition, Ross (1976) classical model of Arbitrage Pricing Theory (APT), linked the macroeconomic variables to stock market returns.

Empirical evidence from Kenyan studies indicated that there has been changes in the macroeconomic variables that affect the stock returns at the Nairobi Securities Exchange. Ouma and Muriu (2014) in their study noted that according to the Government of Kenya the stock market was better in the year 2012.The Nairobi Securities Exchange 20 Share Index went up by 928 in 2012 compared to year 2011. In addition, the yearly inflation in

2012 decreased by 4.6% compared to the previous year 2011. The year 2012 however experienced decline in the Kenya shilling thus there was more of foreign investment as compared to local investors.

Research Objective

The study sought to establish the effect of macroeconomic variables on the Stock Return at the Nairobi Securities Exchange.

Methodology

A descriptive research design was employed in the study as it sought to explain the consequence of the macroeconomic variables on the stock returns for previous years. Descriptive statistics were used to reach the objectives of the study. The techniques that were carried out to show the nature and basic characteristics of the variables included the mean and standard deviation. Descriptive research design is a statistical method that quantitatively synthesizes the empirical evidence of a specific field of research. The study sought to understand how the macro-economic variables had affected the returns at the stock market (NSE) for the period July 2011 to June 2016.

The descriptive statistics technique used in the study provided a useful quantitative summary of macroeconomics variables and the stock return as indicated by the NSE 20 share index. The technique described the patterns and general trends of the observable data and summarized it in single value to draw conclusions. The study focused on the NSE 20 share index and therefore the study had an inclusion of all the companies that have been used to determine the index for the period July 2011 to June 2016. Data for the macroeconomic variables i.e. the broad money supply, exchange rate and the CBK lending rate was obtained from the Central Bank of Kenya. Data for the independent variable i.e stock returns referenced by the NSE 20 share index was acquired from the NSE The study analyzed the NSE 20 share index as it related to the quoted companies that were considered blue chip and had superior profitability and dividend indicated in the stock return.

Analytical Model

The regression model analyzed in the study was as under;

First the NSE 20 share index was converted into monthly stock return as follows:

$$Rt = \frac{(NSEt-NSEt-1)}{NSEt-1}$$

Where R = Monthly Stock Market Return

NSEt-1 = NSE share index at beginning of the period

NSEt = NSE 20 Share index at end of the period

After the NSE 20 share index had been converted into stock market return, the following linear model.

Rt= ß 0 + ß1X1+ ß2X2+ ß3X3 + εt

Where Rt = The stock market return at period t

X1 = Broad Money Supply (M2)

X2 = End of month exchange rate (Kes/US$)

X3 = CBK average monthly lending rate

ß0 = Intercept

ß1 ß2 ß3= macroeconomic variables co-efficient in the model

εt = Normally distributed error term

Results and Discussions

Monthly data on NSE 20 share index was collected from NSE and the monthly Broad money supply (M2), exchange rate US$/Kes and CBK lending rate were obtained from the Central Bank of Kenya.

Table 1 Descriptive Statistics

	N	Minimum	Maximum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
Stock Return	60	-.10	.08	-.0005	.00548	.04245
Money Supply (M2)	60	1197837.00	2330742.00	1724093.7667	46088.57266	357000.54869
Exchange Rate US$	60	82.97	105.29	90.9840	.88248	6.83568
CBK Lending Rate	60	6.25	18.00	10.8417	.43525	3.37142
Valid N (list wise)	60					

Results from the descriptive statistics indicated the average stock return for the period of study was -0.0005 with a small standard deviation around the mean of 0.04245.The lowest return for the period was -0.10 while the highest was 0.08. The average for the variables money supply (M2) was 1,724,093.77, exchange rate 90.98 and CBK lending rate was 10.84. The money supply had a minimum and maximum of 1,197,837 and 2,330,742 respectively. The US$ exchange rate had a minimum of 82.97 and maximum of 105.25 in the period of the study. The CBK lending rate on the other hand had a minimum and maximum of 6.25% and 18% respectively.

Diagnostic Tests

The statistical methods applied assumed that variables were normally distributed. Normality test were undertaken and the results were as shown below.

Histogram
Dependent Variable: Zscore(StockReturn)

Mean = -7.98E-17
Std. Dev. = 0.974
N = 60
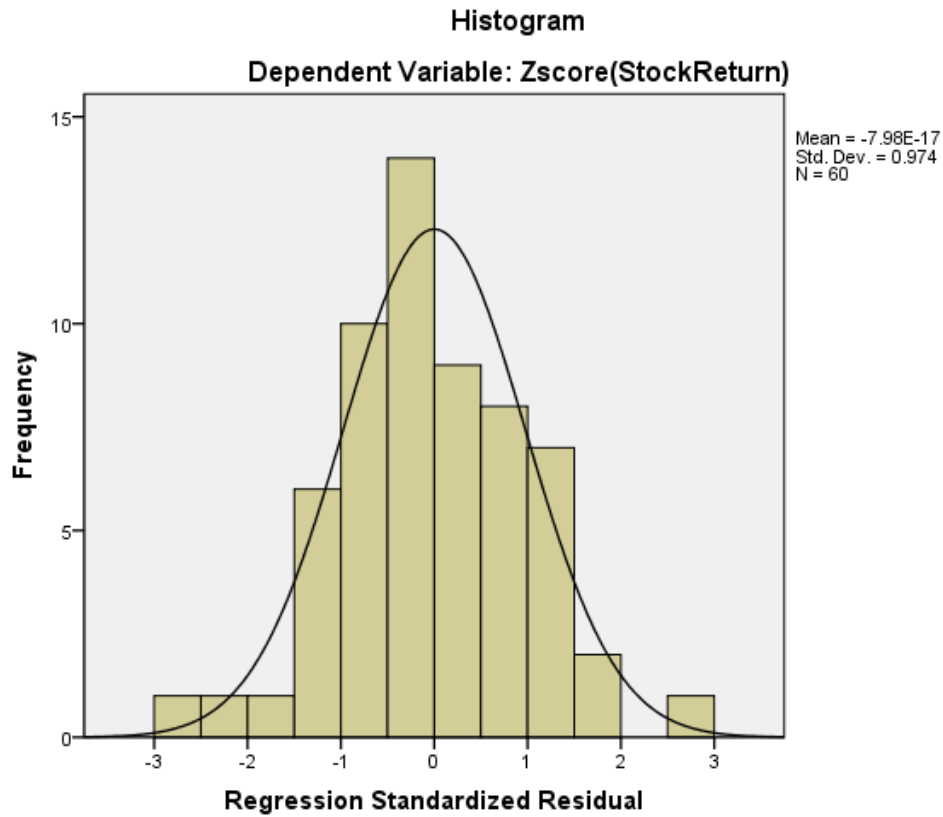
Correlation Analysis

To confirm the linear connection that was there between the variables, the study analyzed data using the Pearson's correlation coefficient. The Correlation Analysis indicated the relationship between the variables in the model. The correlation further indicated the strength of the linear relationship between the variables as shown in the table 4 below.

Table 2: Correlations

Correlations

		Stock Return	MoneySupplyM2	Exchange Rate US$	CBK Lending Rate
Pearson Correlation	Stock Return	1.000			
	Money SuppyM2	-.206	1.000		
	Exchange Rate US$	-.365	.711	1.000	
	CBK Lending Rate	.171	-.350	-.194	1.000

Using the Pearson correlation, the correlation coefficient indicated that all the selected macro-economic variables had a linear link with the stock return. Money supply and exchange rate negatively affected the stock return whereas the CBK lending rate had relation that was positive on the stock return. The money supply was found to have a negative effect of -0.206 to the stock return. The exchange rate had a negative effect of -0.365 to the stock return while the CBK lending rate had a positive effect to the stock return of 0.171. This means that an increase in unit of money supply and exchange rate lead to a decrease of stock return whereas an increase in CBK lending rate lead to an increase of stock return.

A study by Tobin (1969) found a clear relationship of movement between the monetary policy and the stock market. The study laid emphasis on the importance of stock returns as a connection amongst the economic results. They study established a clear link in the economy and the stock returns. Tobin (1969) demonstrated that growth in money supply led to deficits in budgets that eventually affected stock returns.

Table 3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	.396ª	.157	.112	.04002	.157	3.470	3	56	.022	2.485

The selected macroeconomic variables i.e money supply (M2), US$/Kes exchange rate and CBK lending rate had an effect of 15.7% on the stock returns for the period July 2011 to June 2016. This meant that other macroeconomic variables that were not included in the model had an effect of 84.3% on the stock returns. Using the Adjusted R Square, the macroeconomic variables had an effect of 11.2% on the variability in the Stock Return at the NSE.

Table 4 Analysis of Variance (ANOVA)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.017	3	.006	3.470	.022ª
	Residual	.090	56	.002		
	Total	.106	59			

The ANOVA analysis resulted into an F value of 3.470 which was higher than the critical F-value of 2.76 and thus the model of study was statistically significant for the study. The study indicates that sum of squares as a result of regression was 0.017 with 3 degrees of freedom and mean square of 0.006. The sum of squares as a result of residual is 0.090 with 56 degrees of freedom and mean square of 0.002. The F calculated value is 3.470 but the F critical using 5% level of significance is 2.76. Since the F calculated-Value is higher that F-critical, the model of study was statistically significant thus the selected macroeconomic variables had an effect on stock return.

Coefficients

These showed the relationship between the dependent and the independent variables. From the standardized beta coefficient under Table 5 below, the analytical model was expressed using the following regression model:

$R_t = 0.204 + 0.169X_1 - 0.458X_2 + 0.142X_3$

Where

R_t = Stock Return at NSE

X_1 = Money Supply

X_2 = Exchange Rate

X_3 = CBK Lending Rate

If all the factors were held constant, the stock return would have been 0.204. Using the P value rule ($P<0.05$, $P>0.05$) the model coefficients results showed that exchange rate has a significant effect on the stock returns as it has a significance of 0.011 which is less than 0.05. Money supply and CBK lending rate has an effect on stock returns but they are not significant as their P value significance are higher than 0.05 at 0.360 and 0.285 respectively.

If all the variables in the model were standardized to be on the same scale, the multiple regression money supply and CBK lending rate would be positively linked to the stock returns whereas the exchange rate would be negatively linked to the stock returns. Increase in money supply and CBK lending rate promotes investment and thus stock returns but increase in the exchange rate lowers investment at the NSE.

Table 5: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.204	.080		2.542	.014		
	MoneySupply M2	2.012E-8	.000	.169	.922	.360	.447	2.235
	ExchangeRate US$	-.003	.001	-.458	-2.616	.011	.491	2.037
	CBKLendingRate	.002	.002	.142	1.079	.285	.871	1.148

a. Dependent Variable: StockReturn

Granger Casuality Test

The Granger Causality test was carried out as outlined in table 6 to determine whether the money supply, exchange rate or the CBK lending rate were significant in predicting the stock returns. The Granger Cause results had a lag of 2 and if the P value was less than the critical value of 0.05, the null hypothesis was rejected.

Table 6 Granger Causality Test

Date: 10/23/16 Time: 23:41 Sample: 2011M07 2016M06			
Null Hypothesis:	Obs	F-Statistic	Prob.
CBK_Rate does not Granger Cause STOCKRETURN	58	2.80636	0.0694
STOCKRETURN does not Granger CauseCBK_Rate		3.07815	0.0544
EXCHANGE_RATE does not Granger Cause STOCKRETURN	58	5.19172	0.0087
STOCKRETURN does not Granger Cause EXCHANGE_RATE		3.38587	0.0413
MONEY_SUPPLY__M2_ does not Granger Cause STOCKRETURN	58	2.92626	0.0623
STOCKRETURN does not Granger Cause MONEY_SUPPLY__M2_		1.95945	0.151
EXCHANGE_RATE does not Granger CauseCBK_Rate	58	4.7109	0.0131
CBK_Rate does not Granger Cause EXCHANGE_RATE		3.61048	0.0339
MONEY_SUPPLY__M2_ does not Granger CauseCBK_Rate	58	1.21502	0.3048
CBK_Rate does not Granger Cause MONEY_SUPPLY__M2_		1.62153	0.2072
MONEY_SUPPLY__M2_ does not Granger Cause EXCHANGE_RATE	58	5.60443	0.0062
EXCHANGE_RATE does not Granger Cause MONEY_SUPPLY__M2_		3.6112	0.0339

The CBK lending rate and money supply does not Granger Cause stock returns and thus they are not significant in predicting the stock market returns. The exchange rate is a significant variable in predicting stock market returns as it Granger Causes stock market returns. The Exchange rate had a Granger cause to the CBK lending rate and therefore the exchange rate can be used to predict the CBK lending rate. Money supply does not Granger Cause CBK lending rate and therefore it cannot be used to forecast the CBK lending rate. Money supply Granger Causes exchange rate hence it can be used to predict the exchange rate.
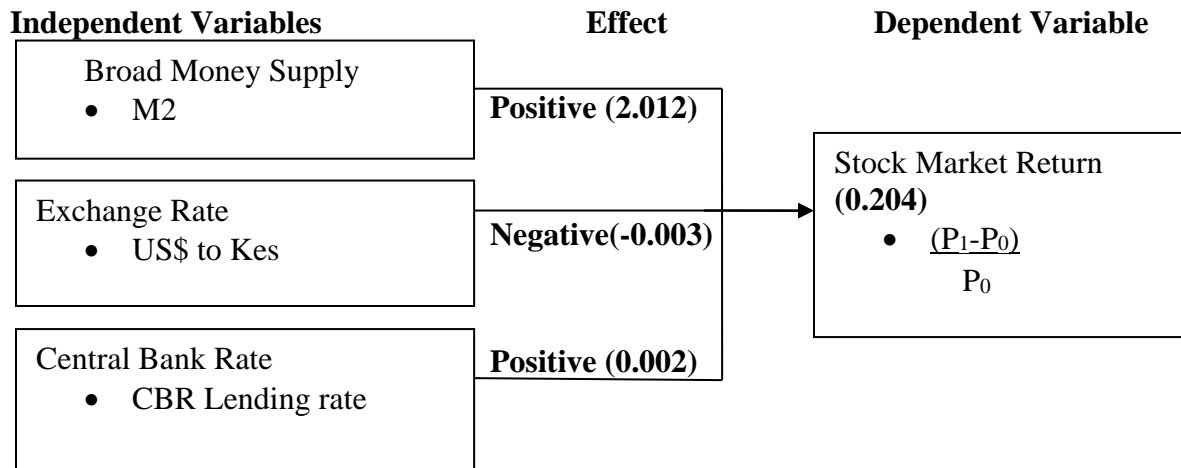
Conclusions

The study concluded that the selected macro-economic variables had a weak positive effect of 15.7% on the stock returns for the period of study July 2011 to June 2016. The effect was varying for the variables as money supply was found to have a positive effect on the stock returns, the exchange rate had a negative effect on stock returns and the CBK lending rate was found to have a weak positive effect on the stock returns. The money supply had a positive effect on the exchange rate and negative effect to the CBK lending rate. The exchange rate had a negative effect on CBK lending rate.

The exchange rate was found to have a substantial effect on the stock returns as its P value was less than 0.05. Money supply and CBK lending rate were found to have an effect on the stock returns but insignificant. The study concluded that an increase in exchange rate would lead to a decrease in the stock return but an increase in money supply and the CBK lending rate would increase stock returns.

The Granger Causality tests concluded that the exchange rate had a P value that was less than the critical value of 5%. This showed that the exchange rate was significant in the study and it could be used to predict the stock returns and the other variables i.e. money supply and CBK lending rate. This is because the exchange rate Granger Causes stock returns. The exchange rate also Granger causes the money supply and CBK lending rate.

A study by Talla (2013), at the Stockholm Stock Exchange established that inflation and currency devaluation had a significant negative influence on stock prices. Interest rate had an insignificant impact on the model and it was negatively correlated with the stock prices. Money supply on the other hand had a positive relationship to stock prices even though it was not significant. From the Granger causality test, no unidirectional relationship was found between the stock prices and all the selected variables. However, the study found one unidirectional causal relationship between the stock prices and the inflation

From the finding of the study, the conceptual framework was found to be as follows:

Independent Variables   **Effect**   **Dependent Variable**

| Broad Money Supply
| • M2 |

Positive (2.012)

| Stock Market Return **(0.204)**
| • $\frac{(P_1-P_0)}{P_0}$ |

| Exchange Rate
| • US$ to Kes |

Negative(-0.003)

| Central Bank Rate
| • CBR Lending rate |

Positive (0.002)

Recommendations

The study recommends that the Central Bank of Kenya (CBK) should increase its regulation on money supply, the exchange rate and its lending rate as it has an effect on the stock returns. The money supply should be not being too much as it leads to a decrease in the stock returns. The exchange rate should also be minimized as it has a significant effect on the stock returns earned. If the exchange rate is higher, the stock returns would be lowered. However the CBK lending rate should be maintained at an affordable rate as it leads to increase in the stock returns as well as curbing the money in circulation and reducing the exchange rate.

The NSE should also ensure that there is free flow of information so that the stocks are not excessively affected by changes in the macroeconomic environment. This is in line with the efficient market hypothesis, so that that information is received in time to avoid effects on the stock returns.

Higher returns at the NSE will attract more investors which is basis of economic development of the country. The government through the Capital Markets Authority should ensure that it puts down policies that promote investment at the NSE

References

Fisher, I. (1930). The theory of interest. *New York*, *43*.

Ilahi, I., Ali, M., & Jamil, R. A. (2015). Impact of Macroeconomic Variables on Stock
   Market Returns: A Case of Karachi Stock Exchange. *Available at SSRN 2583401*.

Malkiel, B. G., & Fama, E. F. (1970). Efficient capital markets: A review of theory and
   empirical work. *The journal of Finance*, *25*(2), 383-417.

Ochieng, D. E., & Adhiambo, E. O. (2012). The relationship between macro economic
   variables and stock market performance in Kenya.

Ologunde, A. O., Elumilade, D. O., & Asaolu, T. O. (2006). Stock market capitalization
   and interest rate in Nigeria: A time series analysis.

Osamwonyi, I. O. (2003). Forecasting as a Tool for Securities Analysis, A Paper
   Presented at a Three-day Workshop on Introduction to Securities Analysis.
   Organized by Securities and Exchange Commission, Lagos, August 17th.

Osamwonyi, I. O., & Evbayiro-Osagie, E. I. (2012). The relationship between
   macroeconomic variables and stock market index in Nigeria. *Journal of
   Economics*, *3*(1), 55-63.

Ouma, W. N., & Muriu, P. (2014). The impact of macroeconomic variables on stock
   market returns in Kenya. *International Journal of Business and Commerce*, *3*(11),
   1-31.

Ross, S. A. (1976). The arbitrage theory of capital asset pricing. *Journal of economic
   theory*, *13*(3), 341-360.

Talla, J. T. (2013). Impact of Macroeconomic Variables on the Stock M arket Prices of
   the Stockholm Stock Exchange (OMXS30). *Jonkoping International Business
   School*.