THE INTERNATIONAL JOURNAL OF BUSINESS & MANAGEMENT

Interest Rate and Stock Market Performance in Nigeria, South Africa and Ghana: 1986 - 2018

Emmanuel Isaac John
Lecturer, Department of Accounting and Finance,
Arthur Jarvis University, Akpabuyo, Cross River State, Nigeria
Vincent N. Ezeabasili
Professor, Department of Banking and Finance,
Chukwuemeka Odumegwu Ojukwu University, Igbariam Campus, Anambra State, Nigeria
Patrick Kanayo Adigwe
Professor, Department of Banking and Finance
Nnamdi Azikiwe University, Awka, Anambra State, Nigeria

Abstract
This study examined the effect of interest rate on stock market performance in Nigeria, South Africa and Ghana using time series data from 1986 to 2018. The study seeks to ascertain if interest rate alone can influence stock market performance in the three economies. Autoregressive Distributed Lag Model (ARDL) was employed in analysing the data sourced. Results of the study revealed that interest rate has a negative but not significant effect on stock market performance in Nigeria in both short-run and long-run. Results for South Africa indicated that interest rate has a negative effect in the short-run and a positive effect in the long-run, on stock market performance. However, the results were not significant at 5% level. Results for Ghana showed that interest rate has a negative but not significant effect (in both short-run and long-run) on stock market performance. Therefore, the study concluded that interest rate alone cannot significantly influence stock market performance in Nigeria, South Africa and Ghana. The conclusion is based on the result that interest rate has no significant effect on stock market performance in Nigeria, South Africa and Ghana, taking a bivariate regression model into consideration with only interest rate as the independent variable. Thus, the study recommended that interest rate as a macroeconomic factor should not be used alone to predict or influence the performance of stock markets in Nigeria, South Africa and Ghana. Rather, other macroeconomic factors such as inflation rate, unemployment rate, GDP growth rate and money supply should be considered along with interest rate.

Keywords: *Interest rate, ARDL, stock market performance, Nigeria, South Africa, Ghana*

1. Introduction

A stock market is an institutional mechanism for raising capital for productive purposes through the issuance or buying and selling of shares. It promotes investments, effective allocation of financial resources and corporate governance. A well-functioning stock market signals the financial and economic strength of an economy. However, poor performance of the stock market may prevent the smooth functioning of financial markets and adversely affect the state of the economy. Some economic factors affect the functioning of the stock market. Among a number of economic variables, interest rate is considered to be one of the key variables which have a significant effect on stock prices (Muktadir-Al-Mukit, 2013). As such, investors in stock markets need to know how interest rate affects their investments. Also, policy makers need to know if interest rate could be used alone to influence stock market performance. Therefore, the objective of this study is to examine the effect of interest rate on stock market performance in Nigeria, South Africa and Ghana.

2. Literature Review

Interest rate is the amount due per period as a proportion of the amount lent, deposited or borrowed (the principal). It is the amount a lender charges the borrower, expressed as a percentage of the principal borrowed. It is usually calculated on an annual basis. The key or benchmark interest rate is used by Central Banks to implement monetary policy. Nigeria lowered its key interest rate (Monetary Policy Rate) by 0.5% from 14% to 13.50% in March 2019; South Africa lowered its key interest rate by 0.25% from 6.50% to 6.25% in January 2020 and Ghana lowered its key interest rate by 1% from 17% to 16% in January 2019. The reduction in the rate by the three economies is expected to weaken prices (lower inflation), revitalise the economies and increase exports.

This study is based on Arbitrage Pricing Theory (APT) propounded by Ross in 1976. The theory opined that returns on assets are subject to some factors such as interest rate, exchange rate, inflation rate, dividend yield, gross domestic product, consumer price index, industrial production index, unemployment rate, domestic savings, stock market liquidity, et cetera. The theory, according to Izedomni and Abdullahi (2011), is a risk-return equilibrium-based model. As

noted by Talla (2013), macroeconomic factors can be a standard for investors to predict the performance of the stock market. The nature of macroeconomic forces provides some significant positive as well as negative effect on stock market performance.

Moya-martinez, Ferrer-Lapena and Escribano-Sotos (2015) examined the relationship between changes in interest rates and the Spanish stock market at the industry level over the period ranging from January 1993 to December 2012 using a wavelet-based approach. The results of the study indicated that Spanish industries exhibited significant interest rate sensitivity; interest rate affected their stock prices. In particular, stocks of regulated industries such as Utilities, highly indebted industries such as Real Estate, Technology, Telecommunications and Banking industry emerge as the most vulnerable to interest rates. Akpan and Chukwudum (2014) assessed the impact of interest rate changes on the Nigerian stock market for a period covering 1986 to 2011. The study used data obtained from Central Bank of Nigeria (CBN) and Nigeria Stock Exchange (NSE) publications. A bivariate linear regression model was adopted to test for the relationship between All Share Index (ASI) and Interest rate, while a multiple linear regression model was adopted to control for other important variables, namely, inflation rate, unemployment rate and GDP. The results revealed that interest rate is not significant when other variables affecting stock prices are controlled.

Muktadir-Al-Mukit (2012) explored the effect of interest rates and exchange rates on stock market performance using time series data for the economy of Bangladesh over the period of 1997 to 2010. The study employed Cointegration, Error Correction Model, Variance Decomposition and Granger causality test. The results of the analysis revealed that in the long run, interest rate has a negative and exchange rate has a positive impact on stock prices. Ajagbe (2015) studied the effect of interest rate on capital market growth in Nigeria covering 1985 to 2009 using Ordinary Least Square (OLS) method of analysis. The study revealed that interest rate has a negative effect, while consumer price index has a positive effect on the capital market as proxied by All Share Index. Uddin and Alam (2007) examined the linear relationship between share price and interest rate as well as share price and changes in interest rate. In addition, they also explored the association between changes in share price and interest rate and lastly changes in share price and changes in interest rate in Bangladesh. They find for all of the cases that Interest Rate has significant negative relationship with Share Price and Changes in Interest Rate has significant negative relationship with Changes in Share Price.

Otieno, Ngugi and Wawire (2017) examined the effects of interest rate on stock market returns in Kenya using Autoregressive Fractionally Integrated Moving Average (ARFIMA) model and Granger causality test. The study used monthly data from January 1993 to December, 2015. The study found that 3-month treasury bill rate, lending rate and stock market returns are fractionally integrated, meaning that shocks to the variables persist but eventually disappear. Ali (2014) assessed the impact of interest rate on Pakistani stock market from January 2004 to December 2013. Correlation and regression analyses were used in the study. The study found that interest rate has a negative impact on stock market. Kamal (2018) studied the impact of treasury bill rate and interest rate on the stock market returns in Egypt between November 2004 and November 2017. The study employed cointegration test, OLS regression and error correction model. The results showed that there is a negative relationship between Treasury bill rate, interest rate, and Egyptian Stock Market returns.

Uddim and Alam (2010) examined the impact of interest rate on stock market using data from Dhaka stock exchange from May 1992 to June 2004. OLS regression technique was used for the analysis. It was found 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. Khalid (2017) assessed the effect of interest rate and exchange rate on stock market performance of Pakistan using Johansen cointegration approach, error correction model (ECM) and variance decomposition as tools of analysis on data covering 1990-2017. The study found long-term relationships among the examined variables and ECM showed a speed of correction of 22% per annum. The results of Maysami, Howe and Hamzah (2004) however, indicated a sharp contrast from the above findings, the study reports a significant positive relationship between interest rates and stock market returns in Malaysia. The authors employed monthly data for the period of 1989 to 2001 with a Vector Error Correction Model.

Okyere, Fosu and Boakye (2014) used the Granger Causality test to ascertain the sensitivity of interest rate to stock returns and reported a statistical significance between interest rate sensitivity to stock returns. This outcome was supported by the study of Khalid (2012) that also reported a significant impact of interest rate sensitivity on stock return for different countries. Muktadir-Al-Mukit (2013) examined the effects of interest rates on stock market performance in Bangladesh by using monthly time series data over the period of 1991 to 2012. By employing Cointegration test, the study revealed a stable and significant long-run relationship between the variables. The estimated error correction coefficient indicated that 0.12 percent deviation of stock returns are corrected in the short-run. Impulse response function of the study also affirmed the negative relationship between the variables. The result of Variance decompositions suggested that about 99.57 % of the variation in stock market returns is attributable to its own shock which implies that stock market returns are largely independent of the other variables in the system. The results of Granger causality analysis suggested the existence of a unidirectional causality from interest rate to market index.

Shubita and Al-Sharkas (2010) used VAR to analyze the causal relationship between interest rates, inflation rate, and real activity and stock returns in the USA, and reported that stock appeared to be Granger-causal with the macroeconomic variables, including interest rate. They also computed the impulse response functions and the generalized forecast error variance decomposition. The results revealed an unrestricted VAR as a function of the size of stock returns. Findings suggested that stock returns are an indicator of macroeconomic performance, however, though stock returns are affected by interest rate, it does not lead to real economic activity as represented by industrial production. Vaz, Ariff and Brooks (2008) studied the effect of changes in official interest rates on the stock returns of the major banks in Australia during the period spanning 1990 to 2005 using regression analysis. The study found that Australian bank stock returns

are not negatively impacted by the announced increases in official interest rates. Furthermore, the study affirmed that banks apparently experience net-positive abnormal returns when cash rates are increased, which is consistent with dividend valuation theory that suggests if income effects dominate, then stock returns need not be negatively impacted.

3. Methodology

The study used ex post facto research design. Ex post facto research design involves the use of facts, information or data already available to make critical evaluation of the variables or situations studied. Time series data on interest rate and stock market indices spanning 1986 - 2018 were used. The data were sourced from World Bank (World Development Indicators 2018), Central Bank of Nigeria Statistical Bulletin 2018, Johannesburg Stock Exchange Market Statistics 2018 and Ghana Stock Exchange Market Reports (various issues up to 2018). The data covered Nigeria, South Africa and Ghana. The study adapted the model of Alam and Rashid (2014) as stated below:

KSE it= α + β1EXRit + β2INFit + β3IPIit + β4M2it + β5IR it+ ut

Where, KSE is the stock market returns of KSE-100 at time t. α is the constant. β1 is the slope coefficient of exchange rate at time t. Similarly, β2 is the coefficient of inflation at time t. β3 is the slope coefficient of industrial production at time t. In addition, β4 is the slope coefficient of money supply at time t. Finally, β5 is the coefficient of interest rate at time t and ut is the error term.

The models for this study are stated as follows:

Model 1: Model for Nigeria

$NSEASI = \beta_0 + \beta_1 ITR_t + \mu$

Model 2: Model for South Africa

$JSEALSI = \beta_0 + \beta_1 ITR_t + \mu$

Model 3: Model for Ghana

$GSECI = \beta_0 + \beta_1 ITR_t + \mu$

Where:

NSEASI = Nigeria Stock Exchange All Share Index

JSEALSI = Johannesburg Stock Exchange All Share Index

GSECI = Ghana Stock Exchange Composite Index

ITR = Interest Rate

β_0 - β_1 = Coefficients

t = Time

μ = Error Term

Augmented Dickey-Fuller (ADF) test was employed in determining the stationarity of the variables. Autoregressive Distributed Lag Model (ARDL) was used estimate both short-run and long-run effect of the independent variable on the dependent variable. Breusch-Godfrey Serial Correlation Test was employed to detect the present or otherwise of autocorrelation. Autoregressive Conditional Heteroskedasticity Test was used to determine if the residuals have constant variance or not. Ramsey RESET Test was employed to check for model misspecifications.

4. Results and Discussion

Variable	Augmented Dickey-Fuller (ADF) Test Statistic	1% Level Critical Value	5% Level Critical Value	10% Level Critical Value	Order of Integration	Prob. *	Durbin-Watson Statistic
Nigeria							
Interest Rate	-3.804505	-3.653730	-2.957110	-2.617434	I(0)	0.0069	1.975065
NSEASI	-5.710911	-3.670170	-2.963972	-2.621007	I(1)	0.0001	1.925889
South Africa							
Interest Rate	-5.251897	-3.670170	-2.963972	-2.621007	I(1)	0.0002	2.279483
JSEALSI	-3.439705	-3.661661	-2.960411	-2.619160	I(1)	0.0170	2.004974
Ghana							
Interest Rate	-4.060190	-3.670170	-2.963972	-2.621007	I(1)	0.0038	1.913318
GSECI	-3.179766	-3.752946	-2.998064	-2.638752	I(1)	0.0345	1.924977

Table 1: Stationarity (Unit Root) Test Results
Source: Computed by the author using E-Views 9

The Unit Root test results presented in Table 1 showed that only interest rate for Nigeria is stationary at level. Interest rate for South Africa and Ghana and stock market indices for the three economies are stationary when differenced once. It means that the variables for Nigeria have a mixed stationarity (level and first difference), while variables for South Africa and Ghana are stationary at first difference. As such, Autoregressive Distributed Lag Model (ARDL) was the appropriate technique used for analysis.

Null Hypothesis: No long-run relationships exist						
Test Statistic	Nigeria		South Africa		Ghana	
	Value	K	Value	K	Value	K
F-statistic	12.29827	1	6.961954	1	11.11893	1
Critical Value Bounds						
Significance	I0	I1	I0	I1	I0	I1
10%	4.04	4.78	4.04	4.78	4.04	4.78
5%	4.94	5.73	4.94	5.73	4.94	5.73
2.5%	5.77	6.68	5.77	6.68	5.77	6.68
1%	6.84	7.84	6.84	7.84	6.84	7.84

Table 2: ARDL Bounds Test Results for Nigeria, South Africa and Ghana
Source: Computed by the author using E-Views 9

The ARDL Bounds test results presented in Table 2 indicated that the F-statistic for Nigeria, South Africa and Ghana is higher than the upper bound at 5% level of significance. The results imply that long-run relationships exist between the dependent and the independent variables in Nigeria, South Africa and Ghana. Thus, the null hypothesis is rejected.

Nigeria Dependent variable: D(NSEASI)			South Africa Dependent variable: D(JSEALSI)			Ghana Dependent variable: D(GSECI)		
Long-run Coefficients								
Variable	Coefficient	Prob.	Variable	Coefficient	Prob.	Variable	Coefficient	Prob.
ITR	-155.88750	0.6303	D(ITR)	-319.859857	0.5057	D(ITR)	-28.736110	0.3167
C	4941.55250	0.5313	C	1791.203117	0.0132	C	87.921402	0.1612
Short-run Coefficients								
Variable	Coefficient	Prob.	Variable	Coefficient	Prob.	Variable	Coefficient	Prob.
D(ITR)	-147.724518	0.6330	D(ITR, 2)	251.957012	0.2073	D(ITR, 2)	-24.348020	0.2575
ECT(-1)	-0.947635	0.0000	ECT(-1)	-0.534610	0.0030	ECT (-1)	-0.847297	0.0006
R-squared = 0.012337 Adjusted R-squared = -0.058210 Durbin-Watson stat = 1.921245			R-squared = 0.325510 Adjusted R-squared = 0.250567 Durbin-Watson stat = 2.213609			R-squared = 0.057294 Adjusted R-squared = -0.021265 Durbin-Watson stat = 1.902087		

Table 3: ARDL Long-Run and Short-Run Coefficients for Nigeria, South Africa and Ghana
Source: Computed by the Author Using E-Views 9

The long-run and short-run coefficients presented in Table 3 revealed that interest rate for Nigeria has a negative effect on Nigeria Stock Exchange All Share Index (NSEASI) in both long-run and short-run with a high speed of adjustment to equilibrium as the Error Correction Term (ECT) is approximately 95%. However, the result is not significant at 5% level. The result for South Africa showed that interest rate has a positive short-run effect but a negative long-run effect on Johannesburg Stock Exchange All Share Index (JSEALSI). The result for South Africa showed an average speed of adjustment of approximately 54%. Also, the result for Ghana indicated that interest rate has a negative but not significant effect on Ghana Stock Exchange Composite Index (GSECI) in both short-run and long-run with a high speed of adjustment of approximately 85%. The non-significance of the results means that interest rate alone cannot affect stock market performance in Nigeria, South Africa and Ghana. The R-squared and Adjusted R-squared for the three economies support the assertion as interest rate accounts for a minute percentage of the changes in the stock market index of the studied economies. The Durbin-Watson statistic showed no sign of autocorrelation, as the rule of thumb of 2.0 is not violated. The result of this study is in line with the findings of Akpan and Chukwudum (2014) who found no significant effect of interest rate on Nigerian stock market performance. However, the findings of this study contradict the results of Ajagbe (2015) who found a significant negative effect of interest rate on stock market performance in Nigeria.

Breusch-Godfrey Serial Correlation Lagrange Multiplier Test				
Nigeria				
F-statistic	2.254337		Prob. F(3,25)	0.1068
Obs*R-squared	6.600551		Prob. Chi-Square(3)	0.0858
South Africa				
F-statistic	0.946975		Prob. F(2,25)	0.4014
Obs*R-squared	2.183111		Prob. Chi-Square(2)	0.3357
Ghana				
F-statistic	1.452944		Prob. F(1,23)	0.2403
Obs*R-squared	1.604285		Prob. Chi-Square(1)	0.2053

Table 4: Serial Correlation Test Results for Nigeria South Africa and Ghana
Source: Computed by the author using E-Views 9

The results of serial correlation test presented in Table 4 indicated that there is no serial correlation in the analyses for Nigeria, South Africa and Ghana. This is evidenced as the probability of both F-statistic and Chi-square for the three economies are greater than 5% level of significance.

Autoregressive Conditional Heteroskedasticity Test				
Nigeria				
F-statistic	0.209277		Prob. F(2,28)	0.8124
Obs*R-squared	0.456573		Prob. Chi-Square(2)	0.7959
South Africa				
F-statistic	0.06961		Prob. F(1,28)	0.9341
Obs*R-squared	0.07456		Prob. Chi-Square(1)	0.9312
Ghana				
F-statistic	2.642585		Prob. F(1,24)	0.1171
Obs*R-squared	2.578849		Prob. Chi-Square(1)	0.1083

Table 5: Heteroskedasticity Test Results for Nigeria, South Africa and Ghana
Source: Computed by the author using E-Views 9

The Heteroskedasticity test results shown in Table 5 revealed that the probability of F-statistic (for Nigeria, South Africa and Ghana) is higher than 5% level of significance. The results imply that the residuals have a constant variance (homoskedastic), thus, rejecting the existence of heteroskedasticity.

Nigeria							
t-statistic	0.744931		Df	27		Probability	0.4627
F-statistic	0.554922		Df	(1, 27)		Probability	0.4627
South Africa							
t-statistic	0.104080		Df	14		Probability	0.9186
F-statistic	2.205193		Df	(3, 6)		Probability	0.1883
Ghana							
t-statistic	0.282324		Df	23		Probability	0.7802
F-statistic	0.079707		Df	(1, 23)		Probability	0.7802

Table 6: Ramsey RESET Test Results for Nigeria, South Africa and Ghana
Source: Computed by the author using E-Views 9

Results of Ramsey RESET test presented in Table 6 show that the probability of both t-statistic and F-statistic for Nigeria, South Africa and Ghana are higher than 5%, depicting the rejection of model misspecification. This means that the models were correctly specified.

5. Conclusion and Recommendations

Interest rate alone cannot significantly influence stock market performance in Nigeria, South Africa and Ghana. The conclusion is based on the result that interest rate has no significant effect on stock market performance in Nigeria, South Africa and Ghana, taking a bivariate regression model into consideration with only interest rate as the independent variable. As such, interest rate only cannot be reliable in predicting or affecting the performance of the stock market. Thus, the study recommended that interest rate as a macroeconomic factor should not be used alone to predict or influence the performance of stock markets in Nigeria, South Africa and Ghana. Rather, other macroeconomic factors such as inflation rate, unemployment rate, GDP growth rate and money supply should be considered along with interest rate.

6. References

i. Akpan, I. T. & Chukwudum, Q. (2014). Impact of interest rate on stock prices: an analysis of the All Share Index. *International Journal of Finance and Accounting, 3(2), 96-101*
ii. Ali, I. (2014). Impact of interest rate on stock market; evidence from Pakistani market. *IOSR Journal of Business and Management (IOSR-JBM), 16(1), 64-69*
iii. CBN (2018). Statistical bulletin
iv. GSE (2019). Ghana Stock Exchange overview. Available on https://www.gse.com.gh/
v. Izedonmi, F. & Abdullahi, I. B. (2011). Effects of macroeconomic factors on the Nigerian stock returns: A sectoral approach. *Global Journal of Management and Business Research, 11(7), 70-85*
vi. JSE (2019). Johannesburg Stock Exchange history and company overview. Available on http://www.jse.co.za/
vii. Kamal, A. L. M. (2018). The impact of treasury bill rate and interest rate on the stock market returns in Egypt. *International Journal of Development and Sustainability, 7(2), 604-619*
viii. Khalid, W. (2017). Effects of interest rate and exchange rate on the stock market performance of Pakistan: A cointegration approach. *Journal of Finance and Economics, 5(5), 219-232*
ix. Moya-Martinez, P., Ferrer-Lapena, R. & Escribano-Sotos, F. (2015). Interest rate changes and stock returns in Spain: A Wavelet Analysis. *BRQ Business Research Quarterly, 18, 95-110*

x. Muktadir-Al-Mukit, D. (2013) The effects of interest rates volatility on stock returns: Evidence from Bangladesh. *Int. J. Manag. Bus. Res. 3(3), 269-279*

xi. Otieno, D. A., Ngugi, R. W. & Wawire, N. H. W. (2017). Effects of interest rate on stock market returns in Kenya. *International Journal of Economics and Finance, 9(8), 40-50*

xii. Uddim, M. G. S. & Alam, M. M. (2010). The Impact of Interest Rate on Stock Market: Empirical Evidence from Dhaka Stock Exchange. *South Asian Journal of Management*

xiii. Vaz, J. J., Arif, M. & Brooks, D. R. (2008). The effect of interest rate on bank stock returns. *Investment Management and Financial Innovation, 5(4), 221-236Sciences, 4(1), 21-30*

xiv. World Bank (2017). World economic indicators