EMPIRICAL ANALYSIS OF INTEREST RATE AND STOCK RETURNS SHOCKS ON NIGERIAN ECONOMIC GROWTH

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Abstract
The paper assesses the relationship between Nigeria's stock market returns, interest rate and gross domestic product from 1991Q1 to 2016Q4. VAR model and analysis were used; the results show an inverse relationship between interest rate and stock return. And interest rate shocks affect stock market and gross domestic product. The study recommendation of the study implies that a timely monetary policy adjustment by the monetary policy committee (MPC) and real adjustments in inflation targets and money supply will help to achieve stability in the stock market and economic growth. Also this will help in promoting the desired confidence among participants and economic stability in the stock market.

Introduction

The introduction of financial reforms in 2005 led to so many reactions from the variables either caused by or related to the monetary tools in the economy. The changes led to the sharpening and creation of related regulatory authorities in the financial institution. Interest rate strictly related to monetary policies for expansion or contraction of the economy through the monetary channels. Achieving price stability is one of the key objectives of applying any economic policy, and hence, to reach this objective requires the use of a broad range of instruments like the MPR, security sales and purchase by the government, open market operations among others. The main aim is creating a balanced atmosphere where economic growth and development can be achieved and possibly sustained.

According to Mishkin (1995), a Contractionary monetary policy that leads to a rise in interest rate makes bonds more attractive than equities which just a translation that the demand for equities will fall and hence, make returns to drop proportionately or even more.

In Nigeria, growths in the stock market and constant changes in the listing of players in the stock market have implications in the economy. Adjustments in interest rate policies can have a great impact on the returns in the NSE market. Even though not all economically capable inhabitants of the nation are literally aware of the monetary transmission mechanisms effect on the economy, and the stock market in general, a clear monetary policy in the market can still influence the nature and causes of growth in the stock market.

The objective of this paper is to test the relationship between interest rate and stock market returns in Nigeria.

The next sections of the paper will present the literature review; the third section will be presenting the methodology, where in the fourth section an empirical data analysis summary and be presented thereby, concluding the work in the last section, section 5.

Literature Review
Literature on the relationship between interest rate and stock market returns is something clearly and evidently cited by many scholars such as Maku (2009) Emenike (2014). Mishkin, (1995) states that interest rate changes are a transmission mechanism through which monetary policy affects the prices of assets. When there is an excess demand for money, individuals and firms will reduce their expenditure. The stock market is among the places where they spend money; therefore, a reduction of expenditure in the stock market will lead to a low demand for the stocks, which will eventually lead to a decrease in their prices and subsequently a fall in the rate of their returns. There are studies that argue that interest rate is not enough to influence the returns of stock market because assets prices are volatile and hence unpredictable, therefore interest rate should just altered when price changes in the stock market are expected to affect inflation Bernanke and Gertler (1999, 2001).

Mishkin (2009) states that a cut in MPR during crises leads to an abnormal rise in expected future dividends. One of the most nearly recent study by Abdul Qayyum and Anwar (2011) showed that market returns in Pakistan are not affected significantly by its lag, but by monetary policy via variations in the repurchasing rates (repo rates). An increase in repo rates, leads to a decrease in the returns of stock markets. All the studies conducted gave a signal of a negative relationship between interest rate and stock returns.

Empirical literature
Farka (2008) indicated that an unanticipated rise in policy rate by 1% causes a decline of around 5.6% in stock returns. Thorbecke (1997) used a VAR methodology and found out that monetary policy shocks has a greater impact on smaller capitalization shocks. Similarly,

Cassola and Morana (2004) applied cointegrated VAR system with inclusion of other variables to determine the transmission mechanism of monetary policy in the Euro area. The results after analyzing impulse response showed that a permanent positive monetary shock has a temporary positive effect on real stock prices.

Belratti and Morana (2006) explored the causal linkages from macroeconomic volatility to stock market volatility. The result they obtained reports that, a prolonged period of high stock market volatility during the phase of economic growth is associated with an increase in money growth value.

Emenike and Nwankwegu (2013) investigate whether stock market returns protect investors against inflation. Monthly All-share Index and monthly consumer price index from January 1985 to March 2011 were analysed for evidence of cointegration using the Engle and Granger two steps cointegration model. Results of the cointegration analyses indicate that the stock returns and inflation are cointegrated. Similarly, results of the error correction model suggest that stock returns and inflation converge to long-run equilibrium but the speed of adjustment to equilibrium is slow. The results also suggest that inflation does not have significant short-term effects on stock returns.

Akingunola, Adekunle and Ojodu (2012) studied the impact of interest rate on capital markets growth and to shed some light on how other macroeconomic variables such as inflation rate, exchange rate also influence capital markets growth, they employed multiple regression analysis of the ordinary least square to determine the impact of interest rate as well as other macroeconomic variables such as inflation rate, exchange rate on capital market growth. Pooled data regression method was also employed to estimate the specified model equations. Augmented Dickey – Fuller (ADF) Test was used to determine the order of integration that is the number of times a variable has to be differenced before it becomes stationary. Findings of the study revealed that interest rates have an adverse effect on capital market growth. The study concludes by saying that in order to enable the capital market to take full advantage of the various opportunities and cope with challenges, interest rates must be properly put at check.

Khan *et al.* (2012) explore the impact of interest rate, exchange rate and inflation on stock returns of KSE 100 index. Ten years monthly data from July, 2001 to June 2010 was used in the consideration. Multiple regression models is applied on the data and the result shows that there is a weak relationship between the dependent variable and independent variables. The impact of interest rate and inflation is insignificant on stock returns of KSE 100 index while the exchange rate has significant impact on stock returns of KSE 100 index.

Addo and Sunzuoye (2013) examine the joint impact of interest rates and Treasury bill rate on stock market returns on Ghana Stock Exchange over the period between January 1995 and December 2011. Using Johansen's Multivariate Cointegration Model and Vector Error Correction Model the study establish that there is cointegration between Interest rate, Treasury bill rate and stock market returns indicating long run relationship. Their results also show that Treasury bill rate and interest rate both have a negative relationship with stock market returns but are not significant. These

results lend support to the idea that interest rate and Treasury bill rate both have negative relationship but weak predictive power on stock market returns independently. The study conclude that interest rate and Treasury bill rate jointly impact on stock market returns in the long run.

Methodologies:
The importance of assessing the effects of monetary policy innovations on market capitalization is of great importance thus, the need to find a model that fits best is crucial. In literature, most previous studies have used the VAR, since most studies used VAR, the present study intends to employ VAR as its method of analysis, including VAR Granger causality, which constitutes an existing framework to complement and observe the previous works in order to contribute to scientific knowledge.

The Reduced form of VAR model specified below:

$$\Delta asi_t = +\beta_{11}\Delta realint_t + \beta_{12}\Delta asi_{t-1} + \beta_{12}\Delta gdp_{t-2} + U_{1t} \dots\dots\dots\dots\dots\dots\dots\dots (1)$$

$$\Delta realint_t = \beta_0 + \beta_{21}\Delta asi_t + \beta_{22}\Delta realint_{t-1} + \Delta gdp_{t-2+}U_{2t} \dots\dots\dots\dots\dots\dots\dots\dots\dots (2)$$

Below is the vector matrix of VAR:

$$A = \begin{bmatrix} 1 & A22 \\ A21 & 0 \\ 1 & 1 \end{bmatrix} C = \begin{bmatrix} C1 \\ C2 \end{bmatrix}, Z = \begin{bmatrix} INT \\ gdp \\ ASI \end{bmatrix}, Z_{t-1} \begin{bmatrix} INt \\ gdp \\ ASI \end{bmatrix}, U_{t-1} = \begin{bmatrix} u \\ u \\ u \end{bmatrix}$$

Above is VAR matrix specification model

Empirical Result
This section presents the results of empirical analysis. The data are quarterly from 1990 to 2016. There will be result presentation of the data in graphs, which includes the impulse response diagram, unit root test, cointegration test, VAR granger causality test, variance decomposition, VAR stability test and correlation.
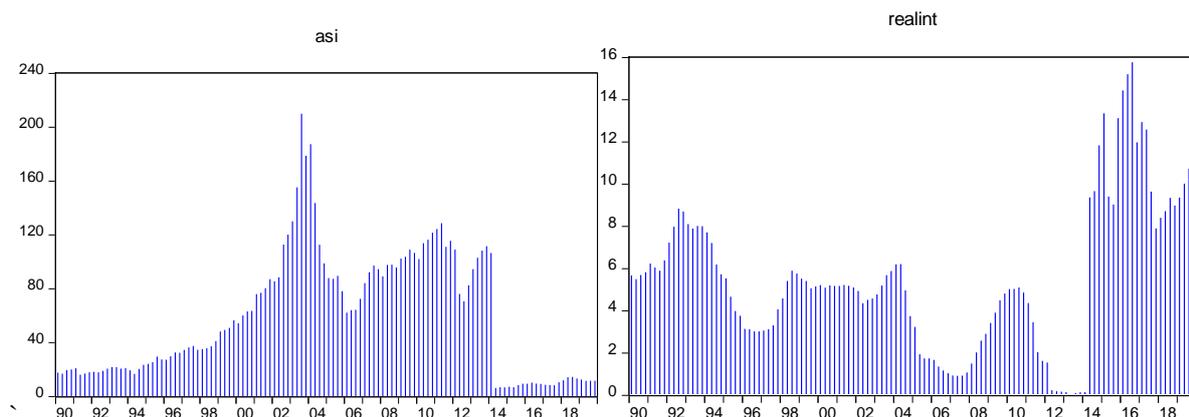

Fig. 1: Time Series Plot Analysis

We can clearly see from the graph that there is a negative relationship between market capitalization and interest rate. Their relationship seen clearly as strong thus, we cannot explain extensively about their relationship using the graph because it is too traditional. However, we will go a little bit dippers to test unit root, granger causality, cointegration, and correlation in order to get more robust results out of the data. There is a strong negative relationship between the two variables represented by the coefficient of correlation as -0.57831 approximately.

Unit Root Test
The time series properties of the data were examined through the Augmented Dickey-Fuller (1979) and Phillips-Perron (1988) tests. The Dickey-Fuller test depends on a nuisance parameter so the Phillips-Perron test acts as a complementary test, as it known to be robust to nuisance parameters. The results of ADF test (Table 1) suggest a non-stationary I (0) time series for the two variables while the Phillips-Perron test suggest stationarity at I (1) in table 2. The joint hypothesis of a unit root and no linear trend could be rejected for each of the variables following the P-P test.

Table 1: Unit Root Test Results

Augmented Dickey-Fuller test statistic	Test critical values:		Prob.*
		t-Statistic	
	1% level	-1.590961	0.4841
	5% level	-3.486064	
	10% level	-2.885863	
		-2.579818	

Source: Authors compilation using E-views software 9

Table 2: Unit Root Test Results

Critical value	t-Statistic	Prob.*
1% level	-9.466446	0.0000
5% level	-3.486551	
10% level	-2.886074	
	-2.579931	

Source: Authors compilation using E-views software 9

Table 3: REAL INTEREST RATE UNIT ROOT TEST

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.936996	0.0443
Test critical values:	1% level	-3.489117	
	5% level	-2.887190	
	10% level	-2.580525	

Source: Authors compilation using E-views software 9

Table 4: REAL INTEREST RATE UNIT ROOT TEST (FIRST DIFFERENCE)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.370853	0.0006
Test critical values:	1% level	-3.492523	
	5% level	-2.888669	
	10% level	-2.581313	

Source: Authors compilation using E-views software 9

Table 5: Gross domestic product Unit root test at first deference

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.370853	0.0007
Test critical values:	1% level	-2.492523	
	5% level	-1.888669	
	10% level	-2.581313	

Source: Authors compilation using E-views software 9

Table 6: JOHANSEN COINTEGRATION TEST

No. of CE(s)	Eigenvalue	T-Statistic	0.05 Critical Value	Prob.**
None	0.094214	13.73740	15.49471	0.0904
At most 1	0.020295	2.357922	3.841466	0.1246

Source: Authors compilation using E-views software 9

Due to the feature of OLS as a long run, estimate which tries to obtain the long run relationship between variables. The trace statistics shows that there is no single co-integrating equation at conventional 1% and 5% levels of significance. The result obtained using Johansen co-integration test.

VARIANCE DECOMPOSITION

Table 7: VARIANCE DECOMPOSITION OF ALL SHARE INDEX (ASI)

Period	S.E.	ASI	REALINT	GDP
1	13.67558	100.0000	0.000000	0.000000
2	18.91484	99.99334	0.006662	25.61916
3	22.66626	99.97904	0.020957	28.04884
4	25.61916	99.95832	0.041684	30.10062
5	28.04884	99.93224	0.067764	31.86318
6	30.10062	99.90176	0.098239	33.39578
7	31.86318	99.86775	0.132253	34.74053
8	33.39578	99.83095	0.169051	35.92876
9	34.74053	99.79203	0.207967	0.207967
10	35.92876	99.75158	0.248417	0.248417

Source: Authors compilation using E-views software 9

Table 8: VARIANCE DECOMPOSITION OF REAL INTEREST RATE (REAL INT)

Period	S.E.	ASI	REALINT	GDP
1	1.226814	15.42910	84.57090	0.000000
2	1.679406	16.27316	83.72684	35.61916
3	1.993119	17.10346	82.89654	25.04884
4	2.232487	17.91698	82.08302	31.10062
5	2.423639	18.71110	81.28890	332.86318
6	2.580501	19.48356	80.51644	343.39578
7	2.711614	20.23246	79.76754	34.74053
8	2.822688	20.95624	79.04376	35.92876
9	2.917767	21.65371	78.34629	0.207967
10	2.999835	22.32396	77.67604	0.448417

Source: Authors compilation using E-views software 9

Forecast error Variance decomposition helps to identify the main channels each variable influence the other. From the results obtained, 99% of variation in Market Capitalization is explained by itself, with just 1% variation from real interest rate.

Impulse response function

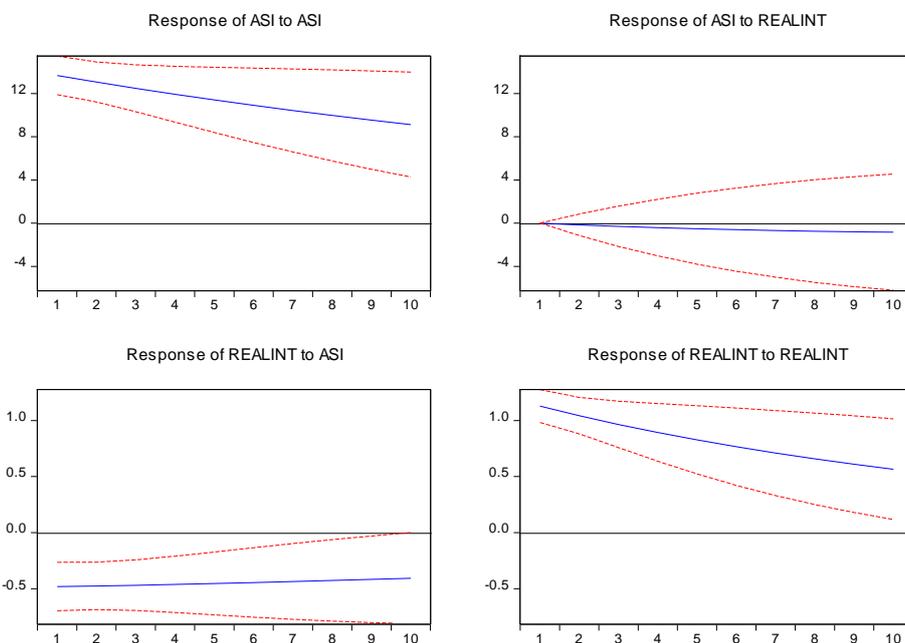Response to Cholesky One S.D. (d.f. adjusted) Innovations ± 2 S.E.

Fig. 2: Impulse response function

The impulse response functions show the reaction of the different variables' response to the dependent variables, as for response of Market Capitalization to itself, there is a positive response, which is the same as that of real interest Rate. From the second and third graphs, we can see clearly that there is an inverse response of Real Interest on Market Capitalization, which is in support of many works done in the past. An increase in interest rate results in a decrease in equities demand, which consequently reduces returns from the market in general.

There is no evidence of granger causality between the two variables after a VAR Granger causality test conducted. The null hypothesis rejected based on probability value.

VAR stability conditions

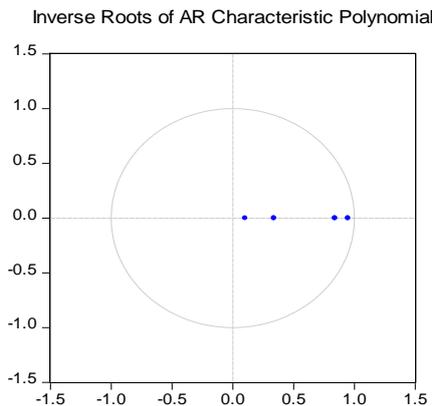Inverse Roots of AR Characteristic Polynomial

Fig. 3: VAR stability conditions

Since no root lies outside the unit circle, VAR satisfies the stability condition.

Hence all the module lie inside the target unit circle.

Granger causality test

Table 9: DEPENDENT VARIABLE: ASI

Excluded	Chi-sq	df	Prob.
REALINT	0.679748	3	0.7119
Asi	0.679748	3	0.7119
GDP	0.567893	3	0.67119

Source: Authors compilation using E-views software 9

Table 10: DEPENDENT VARIABLE: REAL INT

Excluded	Chi-sq	df	Prob.
ASI	2.049107	2	0.3590
All	2.049107	2	0.3590

Source: Authors compilation using E-views software 9

From the above result obtained, there is clear evidence that neither of the three variables granger causes the other and therefore we reject the null hypothesis. Such as GDP, All share index and interest rest

Conclusion and Recommendations
This paper examined the empirical relationship between stock market returns via its proxy, all share indexes and interest rate shocks on gross domestic product between 1991Q1 – 2016Q4.

Since interest rate shocks affect the stock market, hence it also affects economic growth. The monetarists should note that the stock market participants do not buy in for surprises in the monetary policy pronouncements. The MPC should set a target for real and achievable policies, leakages and thereby, targeting to decrease the inflation. This will help in promoting the desired confidence among participants and economic stability in the market.

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