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Monetary Policy and Stock Market Returns: Evidence from Nigeria

Godwin Chigozie Okpara

Department of Finance and Banking, Abia State University, Uturu, Nigeria

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ABSTRACT To analyze the effect of monetary policy on the Nigerian stock market returns, we employed the Two Stage Least Squared Method on a set of simultaneous equations which were found to be over identified. The reduced form equation was tested for stationarity using the Augmented Dickey Fuller Unit Root Test and Cointegration Test. A Vector Error Correction Model and the Forecast Error Decomposition Analysis were also used to determine the long and short run dynamic properties of the equations. Our major findings are that, monetary policy is a significant determinant of long-run stock market returns in Nigeria. Specifically, high Treasury bill rate reduces stock market returns and thus, shows an evidence of monetary policy efforts to slow down the economy. While current and one period lag interest rate exert a positive and significant influence on the stock market returns. The lagged error correction term is negatively signed, suggesting that about 32 percent of deviation from the long-run equilibrium between stock returns and the Treasury bill rate cum interest rate is corrected periodically. Also the salient feature of the variance decomposition results is that the predominant sources of returns fluctuations are due largely to stock returns shocks and interest rate shocks. Thus the innovations of rate of interest can be a better predictor of stock market returns in Nigeria.

INTRODUCTION

Monetary policy is a measure designed to influence the availability, volume and direction of money and credits to achieve the desired economic objectives. In Nigeria, the authority to carryout monetary policy is vested in the central bank of Nigeria (CBN) through decrees 24 and 25 1991. These laws, which replaced previous legislation on the matter enjoin the CBN, under the guidance of the federal government to promote monetary stability and a sound financial system. CBN initiates monetary and banking policies and sends the proposal to the government for amendment, approval or rejection (Ayogu and Emunuga 2009). In the words of Ologunde (2006) interest rate along with monetary aggregates form targets of monetary policy in Nigeria. Using the direct monetary policy measures, the monetary authorities directly influence items of the balance sheet of commercial banks. In such a system interest rates are set and credits are allocated by monetary authorities in accordance with the governments economic plan. Under this system, the financial system, and especially financial market conditions, play no role in the determination of financial prices or returns and allocation of credits.

On the other hand, there is a causal nexus between indirect monetary policy and financial system as both of them influence each other. The decontrol of interest rates and the use of indirect monetary policy are crucial steps towards the development of financial markets. Particularly there is a mutual relationship between the operation of indirect monetary control and the existence of well functioning capital markets (Ncube 2009).

According to the Central Bank of Nigeria (CBN) Brief (1999), there are various views among economists on the exact mechanism by which monetary policy affects the economy. Nevertheless, liquidity, credit and exchange rate channels have been generally accepted as avenues for the influence of monetary policy. Under the liquidity channel of monetary transmission, changes in the money supply, initiated by various techniques of monetary policy, influence interest rates (short and long term). In this way, the initial monetary impulse is transmitted to economic activities (consumption, investment, etc.) through the effect of the changes in interest rate on cost of capital.

Another channel is the credit which works mainly through portfolio adjustment in banks, households and firms' balance sheets in favor of assets that have higher returns during periods of monetary fluctuations. Under normal circumstances, those assets commanding higher demand would be produced more and thus, stimulate the economy. A special case of credit channel is the bank loan in which a credit squeeze forces banks to ration credit. In such a situation, customers who depend on bank loans would be crowded out of the loan market and investors will switch over to capital market. On the other hand, if the

rate of interest paid by banks to depositors is increased owing to reduction in rediscount rate, investors will patronize the banks the more and fewer investors will invest in the capital market. This will lead to a decrease in capital investment in the economy. Also, variation in interest rate might cause investors to either go to the bank or buy government development stock (bond); thereby helping in the development of the economy. Modigliani (1971) and Mishkin (1977) point that lower interest rates increase stock prices which in turn leads to increased business investment. Bosworth (1975) agree with this but added that higher stock prices lower the yield on stock and reduce the cost of financing investment spending through equity issuance.

In relatively open economies, exchange rates transmit monetary changes into internal and external sectors of the economy. Basically, the existence of interest and exchange rate differentials, resulting from monetary policy actions, induce substitution between domestic and foreign assets (foreign currencies, bonds, securities and real estate) as well as domestic and foreign goods and services (CBN Brief 1999). This mechanism in effect affects the security returns. Cook and Hahn (1988) and Rigobon and Sack (2001) showed that changes in monetary policy affect short run stock returns in the United States. Jensen and Johnson (1995) focusing on the longrun monthly as well as quarterly performance found that expected stock returns are significantly greater during expensive monetary periods than in restrictive periods, using data from United States covering 1962 through 1991. Conover et al. (1999) extending their analysis to international market found that 12 out of 15 countries suggested that stock prices tend to be greater (lower) during periods in which the federal reserve was lowering (raising) the discount rate. In another study, Jenson et al. (2005) concluded that by using a simple rate to determine the monetary policy stance, investors can out perform the US market. Durham (2005) however argued that investors could not earn superior returns by fed watching.

Monetary policy can be used by the CBN to determine short-term interest rates which in the capital asset pricing model affects the returns of a firm.

$$Rj = Rf + \phi (R_m - R_f)$$

Thus, the CBN is able to affect asset prices through expectations about the future path of money rates (Belke and Polliet 2004). Besides, monetary policy is used to control inflation, which has an impact on the current prices of long-term assets. Thus, long-term returns usually contain an inflation premium and as such any attempt in manipulating inflation rate results to manipulation of the volume of returns.

This paper is therefore set to investigate the impact of monetary policy on the stock market returns in Nigeria. The paper is divided into seven sections. Section 1 is the introduction, section 2 deals in the model building, section 3 discusses the method of data analysis, section 4 verifies the identification conditions of the specified models, section 5 deals in the data analysis; sections 6 is the discussion while section 7 is the conclusion and recommendation.

MODEL SPECIFICATION

Monetary Policy – Stock Market Return Model

The major goals of monetary policy are to promote price stability, maximum employment and moderate long-term interest rates. Stable prices prevent risk of erosion of asset values resulting from inflation.

The initial link in the chain between monetary policy and the economy is the market for balances held at the central banks. Depository institutions maintain reserved account with the CBN which trades on this balances at an interest rate called rediscount rate. The CBN exercises considerable control over the minimum rediscount rate through its influence on the supply of and demand for balances at the CBN. The CBN sets the minimum rediscount rate at a level it believes will foster financial and monetary conditions consistent with achieving its monetary policy objectives and adjusts that target in line with evolving economic developments.

A change in the CBN rediscount rate can trigger off a chain of events that will affect other short-term interest rates, longer-term interest rates, the foreign exchange value of Naira and stock prices and can also spill over into aggregate demand and output. Thus, Central Bank influences the levels and direction of changes in interest rate movements through its intervention on various money market assets such as the minimum rediscount rate (MRR) and the stop rate at the weekly tender for treasury bills. Based on

this contention, we posit that interest rate (intrate or simply i) is a function of minimum rediscount rate (MMR). That is,

$i = f(MRR)$

According to Belke and Poliet (2004), short term interest rates, such as those on treasury bills and commercial papers are affected not only by the current level of the rate but also by expectations about the overnight rate over the duration of the short-term contract. The minimum rediscount rate influences other interest rates whether short or long-term and it is therefore the anchor of interest rate management. Thus, Treasury bill rate (TBrate) is a function of rediscount rate (MMR). That is

$TBrate = f(MMR)$

In his study, he contends further that changes in long-term interest rates also affect stock prices, which can have a pronounced effect on household wealth. Investors try to keep their investment returns on stocks in line with the return on bonds, after allowing for the greater riskiness of stocks. For example, if long-term interest rates decline, then all things being equal, returns on stocks will exceed returns on bonds and encourage investors to purchase stocks and bid up stock prices to the point, at which expected risk-adjusted returns on stocks are once again aligned with returns on bonds. Moreover, lower interest rates may convince investors that the economy will be stronger and profits higher in the near future, which should further lift equity prices.

In line with this argument, we posit our model that stock market return (Rt) is a function of long-term interest rate which in turn has been said to be a function of rediscount rate, a variant of monetary policy, thus;

$R_t = R(i)$

From the macro-economic theory, the real rate of interest is the nominal interest rate i, less the expected inflation (π^*) this is given by

$i_r = i - \pi^*$

while the expected inflation $\pi^* = (\pi_t - \pi_{t-1}) + \pi_t = \Delta\pi_t + \pi_t$, this implies that the nominal interest rate is equal to

$i = i_r + \Delta\pi_t + \pi_t$

Where π_t is the current inflation rate, π_{t-1} is the immediate past rate, $\Delta\pi_t$ is the change in the inflation rate. This identity equation implies that increased inflationary expectations, given the nominal interest rate, lower the real interest rate (Dornbusch and Fischer 1981:437).

Moyer et al. (1987:152) noted that in practice, the periodic return of security j can be computed using linear equation as follows.

$R_j = a_j + b_j R_m + e_j$

Where R_j is the periodic return for security j, a_j is a constant term determined by the regression, b_j is the computed historical beta for security j, R_m is the periodic return for the market index, and e_j is a random error term.

In modeling the monetary policy impacts on stock market returns, we take a pragmatic view of the relationship between the short-term interest rate (as a money market rate) and the stock market performance. In the tradition of the Capital Asset Pricing Model (CAPM), we assume that there is a linear relation between the stock market performance measure and risk – free interest rate which is the Central Bank short-term interest rate, plus a risk premium which is assumed to be stationary (time-invariant).

With this in view, we investigate the empirical relation between monetary policy (Short term interest rates) and stock market returns in Nigeria over the period 1984 to 2006 following the work of Balke and Polleit (2004) on the economy of Germany, but using the Nigerian data. The specified model is given as:

$R_t = ø + \beta rf_t + \varepsilon_t$

Where R_t = the return measured in period t

Ø= the constant risk premium

rf_t = the risk-free rate (the CBN short term interest rate)

$å_t$ = the white noise assumption.

The coefficient of the short term rate β should be positive, if a rise in short-term interests reflects the central bank's policy of adjusting the price of money to improved growth profit expectations as reflected by rising prices. With $\beta > 0$, the central bank simply responds passively to the economic environment. β will be negative if a higher short term rate is evidence of monetary policy efforts to slow down the economy. In such a case, the central bank takes pre-emptive action against bubbles during the upswing as emphasized for instance by Cecchetti et al. (2002) and follows an "active" or "anti-cyclical" policy approach (see Belke and Poleit 2004).

Functional combination of the R_t equations will imply

$R_t = f(i, rf_t)$

Recalling all the equations, our complete monetary policy-stock market returns equations, which form a simultaneous equations are given by

1. R_t = f(i, rf_t), $f_i > 0$, $f_{rft} < 0$
2. i = i(MRR), $i_{MRR} > 0$
3. i = $i_r + \Delta\pi_t + \pi_t$
4. rf_t = f_t(MRR), $f_{MRR} > 0$

Where

R_t = stock market return
i = nominal interest rate
i_r = real interest rate
$\Delta\pi_t$ = change in inflation rate
π_t = inflation rate
rf_t = TBrate = risk free rate
MRR = minimum rediscount rate

METHODS

To capture the most current priced activities and returns over time, we use (average of) the end of the month quoted stock prices listed through out the period January, 1985 to December 2006 on the Nigerian stock exchange. The monthly returns, are determined using log transformation of price ratios (as used by Kukah et al. in their work; CBN 2007) to convert the data into continuously compounded rates rather than using discrete compounding. This is given by

$R_t = Ln(P_{jt}/P_{jt-1})$

Where

Ln = natural logarithm
P_{jt} = current price level
P_{jt-1} = last years price level

To carry out the analysis of the data, we shall first determine the identification condition of the formulated simultaneous equations and use the appropriate econometric method based on the identification to get our reduced form of the model. The reduced form equation will be tested for stationarity using the Augmented Dickey Fuller Unit root test and then cointegration test. A Vector Error Correction Model and the Variance Decomposition Analysis will be used to determine the short run dynamic properties of the reduced form equation.

Verification of Identification Conditions for the Specified Models

For an equation to be identified, the total number of variables excluded from it but included in other equations must be at least as great as the number of equations of the system less one (Koutsoyiannis 1976).

A system of equation is identified if the equation is exactly identified or over identified. The order condition for identification may be symbolically expressed as

$K - M \geqslant G - 1$

Where

K = total number of variables (endogeneous and predetermined in the model
M = number of variables, endogenous and exogeneous, included in a particular equation.
G = total number of equations (= total number of endogenous variables)

Applying this to our complete system of equations, we get

1. $7 - 3 > 4 - 1 \Rightarrow 4 > 3$ overidentified
2. $7 - 2 > 4 - 1 \Rightarrow 5 > 3$ overidentified
3. $7 - 4 > 4 - 1 \Rightarrow 3 = 3$ identified
4. $7 - 2 > 4 - 1 \Rightarrow 5 > 3$ overidentified

The simultaneous equation could be said to be over identified under the order condition for identification and could be estimated using the two – stage least squares methods (2SLS).

DATA ANALYSIS

The monetary policy-stock market return models stated a set of simultaneous equations above, which was found to be over identified using order condition for identification are estimated and analyzed using the data presented in in the appendix. The summary of the result of the sub model is presented as follows

Summary of Estimated Model

Equation 2.

intrate = 7.160 + 0.810 MRR
St (3.71) (0.241)
Tc (1.915) (3.357)
R^2 = 36%, F (1,20) = 11.27, DW = 2.2

Interest rate is a positive and significant function of minimum rediscount rate. That is, the higher the minimum rediscount rate, the higher the rate of interest. The two variables are highly correlated (r = 60%) and the overall regression is significant with no serial correlation. The fourth equation when estimated is shown as follows.

Equation 4.

Rf_t = 4.453 + 1.227 MRR
SE (1.44) (0.094)
t (-3.084) (13.062)
R^2= 89.52%, F (1, 20) = 170.613, DW = 1.44

The estimated equation shows that the Risk free rate is also a positive and significant func-

tion of minimum rediscount rate. Increase in minimum rediscount rate leads to increase in the risk free rate and vice versa. The two variables are highly correlated, highly fitted and the overall regression is significant. The Durbin Watson's statistic shows that the relationship is not autocorrelated (DW = 1.40 > 1.22). Since R^2 < DW and both of them are equally good, the above regressions do not suffer from spuriousity (Granger and Newbold 1986; Gujarati 2006).

Having ascertained the reliability of our sub models, we move to solving the reduced form of our structural model, Rt = f(i, Rf) for the stock market returns using the long –run test approach. The result of the Augmented Dickey Fuller (ADF) test for stationarity of the series is presented in table 1.

Table 1: Unit root tests

Variable	*Augmented dickey fulter test statistic*	*Max lag*	*Order of integration*
$D(R_t)$	-4.623310	1	1
D(TBRATE2)	-5.115620	1	1
D(INTRATE2)	-5.541361	1	1
$D(MRR_t)$	-5.116445	1	1

Critical value 1% = -3.8304, 5% = -3.0294, 10% = -2.6552

The results from the Augumented Dickey – fuller test in table I show that all the variables are integrated of order one, I(1) at the one percent level of significance with lag 1. Thus, the reduced form equation follows an integrating I(1) process, so that the stock returns equation is a stationary process. Thus, the first condition under the Engel and Granger (1987) approach is satisfied. The existence of a long-run equilibrium relationship, which is a test of stationarity in the residuals of the longrun regression are therefore examined and given in table 2.

Table 2: Residual test

Log No.	*Res*	*Critical value 1%*	*Critical value 5%*
1	-4.685933	-3.8304	-3.0294
2	-3.095188	-3.8572	-3.0400
3	-3.928707	-3.8877	-3.0521

The test on the residual from the static regression of stock market return on the explanatory variables, interest rate and risk free rate presented in table 2 was significant at 5% level for all lags. We therefore reject the null hypothesis of no cointegration and conclude that the variables in the long-run models are cointegrated. In order to strengthen this finding, we employ the Soren Johanson (1991) procedure in a vector auto regression (VAR) system so that we can determine the number of cointegrating equations. The particular test assumption is linear deterministic trend in the data with a lag interval of 1 to 3. The test result is presented in table 3.

Table 3: Johanson cointegration test

Sample: 1985 2006Included observations: 18Test assumption: Linear deterministic trend in the dataSeries: R_t INTRATE2 TBRATE2Lags interval: 1 to 3

Eigenvalue	*Likelihood ratio*	*5 percent critical value*	*1 percent critical value*	*H ypothesized no. of CE(s)*
0.999624	182.2595	29.68	35.65	None**
0.873503	40.30473	15.41	20.04	At most 1**
0.157693	3.088998	3.76	6.65	At most 2

*(**) denotes rejection of the hypothesis at 5% (1%) significance levelL.R. test indicates 2 cointegrating equation(s) at 5% significance levelUnnormalized Cointegrating Coefficients:

R_t	INTRATE2	TBRATE2
-0.000398	-0.247890	0.166650
0.030390	0.252711	-0.373239
-0.006316	0.118415	-0.196720

Normalized cointegrating coefficients: 1 Cointegrating equations(s)

R_t	INTRATE2	TBRATE2	C
1.000000	622.9970	-418.8252	-5917.532
	(219.557)	(145.616)	
Log likelihood	-84.12670		

Normalized cointegrating coefficients: 2 Cointegrating equations(s)

R_t	INTRATE2	TBRATE2	C
1.000000	0.000000	-6.781677	74.54898
		(0.48296)	
0.000000	1.000000	-0.661389	-9.618153
		(0.00311)	
Log likelihood	-65.51883		

The result of the Johanson cointegration test in table 3 shows that there are only 2 cointegrating equations at 5 percent level of significance. This implies that there are only two linear combinations of the variables that are stationary. The first normalized cointegrating coefficient gives the long-run relationship and this is given by

$$R = 622.997\ \text{intrate}\ 2 - 418.825\ \text{TBrate} - 5917.5$$
$$(219.557) \qquad (145.616)$$

Given that cointegration was developed to make the concept of long-run equilibrium operational, the dynamics of stock return is then speci-

fied in an error correction model (ECM_t), incorporating the one period lagged residual from the static regression. The error correction model is designed to capture the short-run deviations that might have occurred in estimating the long-run co-integrating equation. The autoregressive distributed lag technique was used with a maximum lag of 2 to obtain an over-parameterized equation. Finally, through sequential reduction, a parsimonious result was obtained and presented in table 4.

The Parsimonious result in table 4 indicates an R^2 of 91.8% which shows that the model explains about 92% of the variation in stock market returns. We observed that 1 to 3 period lags of the trend component of stock market returns exert positive and significant influence in explaining variations in the trend components. We also observed that 1 to3 period lags of the trend component of risk –free rate (Treasury bill rate) exert significant but negative influence on the stock market returns. This implies that high treasury bill rate reduces stock market returns. While current and one period lag in interest rate exert a positive and significant influence on the stock market returns.

The result therefore shows that monetary policy is a significant determinant of long-run stock market returns in Nigeria. In other words, long-run behavior of stock market returns in Nigeria is influenced largely by monetary variables. The lagged error correction term is negatively signed, suggesting that about 32 percent of deviation from the long-run equilibrium between stock returns and the Treasury bill rate cum interest rate is corrected periodically either by the interplay of market mechanism or by the intervention of financial market authorities..

Forecast Error Variance Decomposition

To examine further the short- run dynamic properties of stock market returns, we employ the forecast error variance decomposition and generalized impulse response analysis. By definition, the variance decomposition shows the proportion of forecast error variance for each variable that is attributable to its own innovation and to innovation in the other endogenous variables. This method provides complementary information on the dynamic behavior of the variables in the system. It is possible to decompose the forecast variance into the contributions by

Table 4: Parsimonious vector error correction estimates
Date: 02/22/09 Time: 20:25
Sample(adjusted): 1989 2006
Included observations: 18 after adjusting endpoints
Standard errors & t-statistics in parentheses

Cointegrating eq:	*Coint eq1*	*Coint eq2*
RTM(-1)	1.000000	0.000000
INTRATE2(-1)	0.000000	1.000000
TBRATE2(-1)	-6.781677	-0.661389
	(0.48296)	(0.00311)
	(-14.0418)	(-212.615)
C	74.54898	-9.618153

Error correction:	*D(RTM)*	*D(INT-RATE2)*	*D(TB-RATE2)*
CointEq1	-2.471168	0.066459	0.100523
	(0.42498)	(0.13419)	(0.20245)
	(-5.81474)	(0.49528)	(0.49652)
CointEq2	-17.98490	-1.448697	-0.680859
	(4.94987)	(1.56289)	(2.35804)
	(-3.63341)	(-0.92693)	(-0.28874)
D(RTM(-1))	1.009966	-0.056362	-0.085643
	(0.28327)	(0.08944)	(0.13494)
	(3.56542)	(-0.63016)	(-0.63466)
D(RTM(-2))	0.355377	-0.035288	-0.052017
	(0.17579)	(0.05551)	(0.08375)
	(2.02155)	(-0.63574)	(-0.62113)
D(RTM(-3))	0.421205	-0.019831	-0.030269
	(0.16025)	(0.05060)	(0.07634)
	(2.62843)	(-0.39194)	(-0.39651)
D(INTRATE-2(-1))	13.73566	0.477073	0.701426
	(4.41262)	(1.39326)	(2.10210)
	(3.11281)	(0.34242)	(0.33368)
D(INTRATE-2(-2))	5.067145	-0.133518	-0.197255
	(2.73611)	(0.86391)	(1.30344)
	(1.85195)	(-0.15455)	(-0.15133)
D(INTRATE-2(-3))	1.906962	0.179660	0.259902
	(2.40897)	(0.76062)	(1.14759)
	(0.79161)	(0.23620)	(0.22648)
D(TBRATE2-(-1))	-23.59293	-0.320627	-0.469602
	(5.24836)	(1.65714)	(2.50023)
	(-4.49529)	(-0.19348)	(-0.18782)
D(TBRATE2-(-2))	-11.90367	0.007403	0.009618
	(3.69947)	(1.16808)	(1.76237)
	(-3.21767)	(0.00634)	(0.00546)
D(TBRATE2-(-3))	-5.078623	-0.051256	-0.065345
	(2.57325)	(0.81249)	(1.22585)
	(-1.97362)	(-0.06308)	(-0.05331)
C	0.121542	0.166739	-0.343436
	(3.52698)	(1.11362)	(1.68019)
	(0.03446)	(0.14973)	(-0.20440)
R-squared	0.917901	0.668283	0.507973
Adj. R-squared	0.767386	0.060136	-0.394077
Sum sq. resides	1173.127	116.9538	266.2309
S.E. equation	13.98289	4.415008	6.661217
F-statistic	6.098401	1.098883	0.563132
Log likelihood	-63.13440	-42.38356	-49.78682
Akaike AIC	8.348267	6.042617	6.865202
Schwarz SC	8.941848	6.636199	7.458784
Mean dependent	0.661111	0.377778	-0.030556
S.D. dependent	28.99205	4.554062	5.641702
Determinant residual covariance		0.291195	
Log likelihood		-65.51883	
Akaike information criteria		11.94654	

each of the different shocks. When calculated by the structural shocks, as in our case, the FEVD provides information on the importance of various structural shocks explaining the forecast error variability of stock market returns and its determinants. The FEVD test of the three endogenous variables is presented in table 5.

Table 5: Variance decomposition of returns

	Variance decomposition of RTM:			
Period	*S.E.*	*RTM*	*INTRATE2*	*TBRATE2*
1	8.073025	100.0000	0.000000	0.000000
2	11.43501	50.17806	49.80658	0.015360
3	23.61891	15.13528	84.84685	0.017868
4	27.01845	23.39493	76.59092	0.014150
5	27.53823	22.52213	77.46256	0.015307
6	28.02196	22.54853	77.43542	0.016047
7	28.87007	25.91856	74.06603	0.015412
8	31.97130	21.25039	78.73296	0.016648
9	34.62096	20.44100	79.54256	0.016438
10	35.38523	22.38233	77.60166	0.016013
11	36.47335	21.08125	78.90210	0.016647
12	37.37615	21.78416	78.19920	0.016637
13	38.10686	22.59228	77.39116	0.016556
14	40.26164	20.36431	79.61867	0.017019
15	41.45463	21.25950	78.72375	0.016742
16	41.97423	21.65710	78.32616	0.016740
17	43.24843	20.50606	79.47681	0.017133
18	44.09553	21.48633	78.49673	0.016935
19	44.83227	21.39449	78.58848	0.017028
20	46.33876	20.26803	79.71471	0.017257
21	47.10518	21.22414	78.75882	0.017041
22	47.73350	21.01904	78.96378	0.017176

Source: Computed from our data.

From the computation in table 5 the "Own shocks" (return shock) variation ranged from 21 per cent to 100 percent over the twenty two- year horizon. The innovations of risk free rate which accounts for the forecast error variance of stock market returns ranged from 0 to 1.8 percent. The persistence of past stock return shocks after twenty two years of the shocks explains about 21 percent of the variation in current stock returns while interest rate accounts for about 79 percent.

Interest rate shocks (Table 6) constitute the predominant source of variation in interest rate forecast errors. The variation ranged from 83.6 per cent to 87.7 percent over the twenty-two year horizon. The salient feature of the variance decomposition results is that the predominant sources of returns fluctuations are due largely to interest rate shocks and own shocks. In sum, the forecast error variance decomposition shows that the innovations of rate of interest can be a better predictor of stock market returns in Nigeria. The variance decomposition of interest rate analyzed is presented in table 6.

Table 6: Variance decomposition of interest rate

	Variance decomposition of INTRATE2:			
Period	*S.E.*	*RTM*	*INTRATE2*	*TBRATE2*
1	2.549006	12.31130	87.68870	0.000000
2	2.678602	12.95700	87.04262	0.000381
3	2.684508	13.31975	86.67776	0.002489
4	2.836657	13.63494	86.36213	0.002925
5	2.984024	14.32799	85.66770	0.004308
6	3.113407	14.34138	85.65235	0.006267
7	3.306601	14.06159	85.93119	0.007213
8	3.411816	14.86360	85.12878	0.007621
9	3.474892	15.09853	84.89319	0.008278
10	3.579651	15.03822	84.95280	0.008983
11	3.695436	15.49996	84.49062	0.009424
12	3.810992	15.43016	84.55983	0.010014
13	3.921086	15.41540	84.57412	0.010486
14	4.000715	15.86155	84.12771	0.010734
15	4.083635	15.84223	84.14663	0.011137
16	4.181683	15.86126	84.12723	0.011509
17	4.271509	16.13913	83.84913	0.011743
18	4.365919	16.04095	83.94698	0.012070
19	4.453586	16.13217	83.85552	0.012315
20	4.526827	16.36427	83.62324	0.012496
21	4.610940	16.27698	83.71026	0.012768
22	4.696117	16.37323	83.61381	0.012962

Source: Computed from our data.

DISCUSSION

Interest rate and the risk free rate are positive and significant function of minimum rediscount rate. In other words, the higher the minimum rediscount rate, the higher the interest rate and risk free rate.

The results from the argument Dickey-fuller test show that all the variables are integrated of order one, 1(1) at the one percent level of significance with lag I implying that the reduced form equation follows an integrating I(I) process, so that the stock returns equation is a stationary process. The test of residuals confirms that the longrun model is cointegrated.

In specifying the dynamics of the stock in an error correction model (ECM_t), the parsimonious result shows that 1 to 3 period lags of the trend component of stock market returns exert positive and significant influence in explaining variation in the trend. It is also observed that one to three period lags of the trend component of risk free rate (treasury bill rate) exert significant but negative influence on the stock market returns.

The result therefore shows that monetary policy is a significant determinant of long-run stock market returns in Nigeria. In other words, long-run behaviour of stock market returns in Nigeria is influenced largely by monetary variables. This is in line with the findings of Jensen

and Johnson (1995), Conover et al. (1999) in the United States. The lagged error correction term is negatively signed, suggesting that about 32 percent of deviation from the longrun equilibrium between stock returns and treasury bill rate cum interest rate is corrected periodically either by the interplay of market mechanism or by the intervention of financial market authorities.

To provide complementary information on the dynamic behaviour of the variables in the system, the forecast error variance decomposition and generalized impulse response analysis were used. The results show that the predominant sources of returns fluctuations are due largely to interest rate shocks and return shocks. In other words, the innovations of rate of interest can be a better predictor of stock market returns in Nigeria. This supports the findings of Mishkin (1977) and Modigliani (1971) using US data and Okpara (2009) using Nigerian data.

CONCLUSION AND RECOMMENDATION

Monetary policy is a significant determinant of long-run stock market returns in Nigeria. In other words, long-run behavior of stock market returns in Nigeria is influenced largely by monetary variables. Specifically, high Treasury bill rate reduces stock market returns indicating that monetary policy efforts have been to slow down the economy. While current and one period lag interest rate exert a positive and significant influence on the stock market returns. The lagged error correction term is negatively signed, suggesting that about 32 percent of deviation from the long-run equilibrium between stock returns and the Treasury bill rate cum interest rate is corrected periodically either by the interplay of market mechanism or by the intervention of financial market authorities.

A complementary information on the dynamic behavior of the variables provided by forecast error variance decomposition shows that the predominant sources of returns fluctuations are due largely to interest rate shocks and returns shocks. This result in sum indicates that the innovations of rate of interest can be a better predictor of stock market returns in Nigeria.

A high interest rate attracts more savings and discourages the flow of capital to the stock markets leading investors to demand for a higher risk premium which impedes investment and slows down economic development. Whereas a low interest rate encourages higher capital flows to the stock market in expectation for a higher rate of return.

In the light of this, the government through the monetary authorities should be cautious enough to avoid discretionary policies that might hike the rate of interest, otherwise the flow of fund to the market will be derailed. Investors on the other hand should watch the fluctuative trend of interest rate in order to avert risk.

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APPENDIX

Year	*Rtm*	*Tbrate*	*MRR*	*Intrate*
1985	19.6	8.50	10.00	9.25
1986	24.3	8.50	10.00	10.50
1987	15.3	11.75	12.75	17.50
1988	20.2	11.75	12.75	16.50
1989	33.1	17.50	18.50	26.80
1990	45.7	17.50	18.50	25.50
1991	42.3	15.00	14.50	20.01
1992	34.5	21.00	17.50	29.80
1993	33.5	26.90	26.00	18.32
1994	35.3	12.50	13.50	21.00
1995	83.7	12.50	13.50	20.18
1996	31.7	12.25	13.50	19.74
1997	-8.2	12.00	13.50	13.54
1998	-12.7	12.95	14.31	18.29
1999	-8.2	17.00	18.00	21.32
2000	43.2	12.00	13.50	17.98
2001	31.4	12.95	14.31	18.29
2002	8.9	18.88	19.00	24.40
2003	49.7	15.02	15.75	20.48
2004	17.9	14.21	15.00	19.15
2005	1.0	7.00	13.00	17.85
2006	32.1	8.80	12.30	17.00

Sources: 1. Calculated from the Nigerian Stock Exchange Data. 2. Central Bank of Nigeria.