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Monetary Policy and Stock Market Prices in Nigeria

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Abstract
This study investigated the impact of monetary policy on stock market prices in Nigeria. The study relied on Johansen cointegration test and Vector Autoregression models to capture the impact of fluctuations in relevant monetary policy variables on stock market prices. Quarterly time series data for the period 1986 to 2020 was sourced from Central Bank of Nigeria Statistical bulletin and World Bank Group. The result of Johansen cointegration test indicates that there is no long run cointegrating relationship between monetary policy and stock market prices in Nigeria. The impulse response function and variance decomposition further revealed that all monetary policy variables under investigation had marginal effects on stock prices behavior with the exception of exchange rates which had significant effect on stock market prices. The paper concludes that significant variations of stock market prices in Nigeria are not due to changes in key monetary policy variables while external balances are more important than internal balances in influencing the direction of stock prices movements in Nigeria. The study therefore recommends among other things a workable and fruitful policy of devaluation. This is predicated on the knowledge that devaluation has the potential of spurring foreign investments in the capital market thereby raising the prices of equity.

Keywords: Monetary Policy, All-Share Index, Cointegration, Vector Autoregressive Model

1. Introduction

Studies in financial and monetary economics have shown that a functional and deterministic relationship exists between several monetary policy variables and stock market prices. Money supply, inflation rates, interest rates and exchange rates among other monetary policy variables have bearing in the movements of stock market prices, either positively or negatively (Muradoglu, Metin & Argac, 2001; Maged, 2012; Clem &

Bernard, 2016). In different economies of the world, monetary policy effect on stock market varies according to peculiarity and prevailing economic conditions (Chude, Ifurueze & Inkiru, 2015).

Markets in developing countries are regarded as emerging markets and most of such markets are fragile and responsive to shocks; hence macroeconomic factors are more likely to influence investment prices and returns in these markets (Evans, Nelson & Perez, 2014). As one of the emerging economies in Africa, the Nigeria stock market performance is highly dependent on the nature of the behavior of its macroeconomic variables. Monetary policy variables are therefore considered to be a major cause of price variability in the Nigerian stock exchange market. The central bank uses monetary policy frequently to cause the desired level of change in real activities and it has been seen to have significant effect on the Nigerian capital market (Akani, 2013).

The observed pattern of influence of monetary policy variables and the magnitude of such influence on stock prices in the Nigerian capital market varies from one study to another as deduced from the reviewed literature. Different empirical evidences by Ajie and Nenbee (2010); Zhao (2010); Osamuonyi and Evbayiro-Osagie (2012); Clem and Bernard (2016); Martin and Marcus (2019); Osakwe and Chukwunulu (2019), among others have produced conflicting results as their findings are mixed and to a noteworthy extent contradictory. This has made the debate open and receptive to new approaches to this phenomenon. Moreover, the continuous emergence of new data and structural reforms in the Nigerian macroeconomic environment necessitate repeat of studies that have already been carried out in this area. This is so to the extent that generating new findings can be of help in detecting whether findings from previous researches carried out in this area can stand the test of time.

Recent events in the macroeconomic environment in Nigeria have created an empirical gap in the relationship between monetary policy and the Nigerian stock market. Early in the year 2020, at a time that Nigerian economy was still grappling with a weak recovery from the 2016-2017 economic recession, the novel Covid-19 pandemic broke out and its resultant effects of lockdown and breakdown of global economic activities took Nigeria back into recession which lasted through the third and fourth quarters of the year 2020. These chronological events created lots of shocks in the Nigeria economy. This development made the Central Bank of Nigeria (CBN) to adopt several stabilization policies, including an abrupt reversal of its pre-pandemic tight monetary policy to make way for the introduction of an expansionary monetary policy regime (Ozili, 2020). This in turn had major

effect on the behaviors of monetary policy variables as well as the stock market prices. For example, headline inflation rate registered an upward trend from 12.56% in the second quarter of 2020 to 15.75% in the fourth quarter of the same year. Money supply which was expected to grow positively by 13% in 2020 following the Economic Recovery and Growth Plan grew marginally with 6.45% in the fourth quarter of 2019, 3.28% in September 2020 and ending the year with 10.97%. While MPR which is the official interest rate was stable at 13.5% from 2019 through the second quarter of 2020, it saw an abrupt cut to 11.5% in the third quarter of 2020 (CBN, 2020).

It is worthy of note that the effects of these recent changes in monetary policy variables on the Nigerian stock market have not yet received the necessary empirical coverage. Past studies such as Ajie and Nenbee, (2010); Eze (2011); Osamuonyi and Evbayiro-Osagie (2012); Yusuf (2015); Clem and Bernard (2016); Osakwe and Chukwunulu (2019) were conducted outside the scope of these new macroeconomic events. However, Nigeria as a developing economy whose capital market is highly responsive to changes in its macroeconomic variables requires consistently renewed empirical examination of the effects of key policy variables on its stock market prices.

Moreover, the dynamism of the Nigerian stock market and the complex structure of the Nigerian macroeconomic environment necessitate a more robust technique than the adoption of granger causality, ARDL and OLS approaches all of which have been rendered incapable of testing for dynamic relationship among volatile economic indicators and in measuring the effects of structural shocks among economic variables. They therefore have been rendered not robust enough in investigating the reaction of stock market to unexpected changes in macroeconomic variables (Beltagi, 2015; Sanqing, Yu, Jianhai, Wanzeng, Kun, Yanbin & Xun, 2013).

The aim of this paper therefore is to empirically analyze the long run deterministic relationship between monetary policy and the Nigerian stock market and to examine how stock market prices respond to shocks in monetary policy in Nigeria. Following the introduction, the remaining parts of the paper are as follows: section 2 is the literature review and theoretical framework; section 3 presents materials and methods of analysis while major findings are presented and discussed in section 4 and section 5 concludes the paper.

2. Literature Review

2.1 Empirical Review

A large amount of empirical studies have been conducted within and outside Nigeria with respect to the deterministic relationship between

monetary policy and stock market prices. Osakwe and Chukwunulu (2019) employed Johansen cointegration and OLS to analyze the relationship between monetary policy variables including interest rate, money supply as exchange rate and the stock market in Nigeria. The findings of the study showed that money supply and exchange rate fluctuations have significant positive effect on stock market prices, while fluctuations in Interest rate have insignificant effect on stock market price movement. The study concludes based on the findings that monetary policy decisions can be used to control activities in the Nigerian stock market.

Ajie and Nenbee (2010) used the method of co-integration and Error correction modeling (ECM) to examine the empirical relationship between monetary policy variables including money supply and interest rate and stock prices in Nigeria for the period 1986-2008 using annual data. They found a positive and significant relationship between money supply and stock prices and also inflation and stock prices and they concluded that the stock market is a good hedge against monetary policy variables in Nigeria.

The finding of Ajie and Nenbee was corroborated by a similar study conducted by Clem and Bernard (2016) who adopted OLS, Johansen co-integration and granger causality tests to investigate the long run effect of monetary policy on stock market performance in Nigeria for the period 1986-2013 with the All-share index as indicator of the stock market and Monetary Policy Rate (MPR), Treasury Bill Rate (TBR), Lending Interest Rate (LIR), Liquidity Rate (LR), Deposit Rate (DR) as explanatory variables. The result of their study shows that the co-integration result indicates a long run relationship between monetary policy and stock market performance in Nigeria while the causality analysis revealed All-share index has a causal relationship with lending and deposit rates in Nigeria. The study concludes that monetary policy has a potential influence on stock market whereas stock market performance has influenced the direction of monetary policy in Nigeria through lending and deposit rates.

Most studies conducted within Nigeria indicate positive association between monetary policy and stock prices. However there are exceptions. Prominent among them include Osamuonyi and Evbayiro-Osagie (2012) who studied the short-run dynamics as well as long-run relationship between the Nigerian stock market index and selected macroeconomic variables from the Nigerian economy. Relying on annual time series data for the period 1975 to 2005, and employing Vector Error Correction Model (VECM), they found that Money supply (M2) had negative relationship with Stock Market Index in both the short- run and long run.

In the same vein, Onyeke (2016) examined the impact of monetary

policy on stock returns in Nigeria between the period January, 2003 and June, 2014. The empirical investigation was conducted using a six variable VAR model with six lags including consumer price index (CPI), inter-bank rate (IBR), open buy-back (OBB), Treasury bill rate (TBR), exchange rate (XGR) as explanatory variables and all share index (ASI) the independent variable. The dynamic interactions among the variables were based on variance decompositions and impulse response functions generated from the VAR. The outcome of the study indicated that a positive and significant relationship exist between OBB and all-share index.

However, relationship among other important policy variables was insignificant. The study concludes that monetary policy variables did not have a significant impact on the Nigerian stock market and as such stock market prices cannot be taken as being a good transmission channel yet for monetary policy implementation in Nigeria.

Similarly, there is absence of consensus in findings with respect to studies conducted outside Nigeria. A recent study by Martin and Marcus (2019) relying on monthly and weekly data adopted the vector autoregression and Granger tests to analyze the impact of monetary policy on stock market liquidity in Sweden. Their findings revealed that a clear effect of monetary policy on stock liquidity cannot be ascertained. However, findings suggest that disturbance in stock market liquidity is linked to change in monetary policy. Moreover, results of Granger tests also suggest bidirectional causality between monetary policy and stock market.

Sellin (1998) relying on both theoretical and empirical evidences and emphasizing how monetary policy affects stock market prices investigated the interaction between money supply, inflation and real stock market returns. The study found a positive and significant association between money supply and stock returns. The study also found inflation to be a good hedge against equity market prices.

Gowriah, Boopen, Lamport and Seetah (2014) used the ARDL model to investigate the short and long run impact of monetary and fiscal policies on Mauritius stock exchange between for twenty years period, that is, June 1989 and June 2011. The study adopted money supply (M2), inflation ((INF) and interest rates (EER) as monetary policy variables while budget deficit (BD) was used to represent fiscal policy. The result of this study showed a significant short and long run association between monetary policy and stock prices but found an insignificant association between fiscal policy and the Mauritius stock prices.

Evans et al (2014) employed the GARCH model to investigate the relationship between key macroeconomic variables on Kenya stock market

returns and their volatility using quarterly data. The study found that negative shocks (bad news) or negative news about changes in macroeconomic variables under study had a larger effect on the conditional variance (volatility) of stock returns than positive shocks (good news) of the same magnitude. In another study, Zhao (2010) studied the relationship between exchange rate and stock prices in China relying on VAR and multivariate generalized autoregressive conditional heteroscedasticity (GARCH) models. The study revealed that shocks in the stock markets led to volatility in the foreign exchange market, and vice versa. Relying on its finding, the study concluded that there is a stable long-term equilibrium relationship between real effective exchange rates and the Chinese stock prices.

2.2 Theoretical Framework

In a bid to find a workable theoretical underpinning for this paper, a number of theories hypothesizing the relationship between macroeconomic factors and the stock market are considered. Important among these theories include the stock valuation model, efficient market hypothesis and capital asset market theory. The stock valuation theory is interested in predicting potential market prices and thus helps investors to profit from price movements. In the context of this paper, the stock valuation model is limited. This is so to the extent that it pays primal attention on how stock price is valued without specifying factors that are exogenous to the equity market-macroeconomic or otherwise that may cause changes in prices of securities (Frederic & Apostolos, 2011). However, the Efficient Market Hypothesis (EMH) unlike the stock valuation model recognizes the place of macroeconomic factors in stock valuation through market efficiency. However, it undermines the role of such factors as the theory concludes that new information on macroeconomic factors is not strong enough to bring about market efficiency (Bailey, 2005).

Moreover, a functional theory that fully recognizes the influence of macroeconomic policy variables in determining prices in the capital market is the capital asset pricing model (CAPM). The CAPM seeks to predict the relationship between risk and stock market conditions. CAPM is built on the principle that the appropriate risk premium on an asset will be determined by its contribution to the risk of an investor's overall portfolio (Anthony & Marcia, 2012). Given this principle, the theory suggests that if an investor holds a large portfolio of stocks, some of the stocks in the portfolio will go up in value because of positive company-specific events and some will go down in value because of negative company-specific events. The net effect on the overall value of the portfolio will be relatively small as these positive and

negative effects will tend to cancel each other out. What follows is that, with portfolio formation, some of the variability associated with individual stocks is eliminated by diversification of risks.

The CAPM argues that there are two forms of risks that can affect market stocks; systematic and unsystematic risks. Unsystematic risk or (firm-specific risk) is the risk which affects a single stock or a small group of stocks while systematic risk or (market risk) is the risk which affects a large number of stocks. When investors combine stocks into portfolios, the unsystematic, events (both positive and negative) tend to cancel out once the investor has more than just a few stocks. However, not all risk can be diversified away through portfolio formation. For example, uncertainties about general economic conditions, such as GDP, interest rates, money supply or inflation, affect nearly all stock values. An unanticipated increase in inflation, for example, affects wages and the costs of supplies that companies buy; it affects the value of assets that companies own; and it affects the value and price of companies' stock.

The implication of this is that unsystematic risks can be diversified but the systematic risks cannot. Moreover, since systematic risk affects almost all stock prices to some degree, no matter how many stocks an investor puts into his portfolio, the systematic risk does not go away (Bailey, 2005). This theory fully recognizes the influence of macroeconomic policy variables in determining prices in the capital market through systematic risk diversification. Hence the capital asset pricing model is befitting of theoretical framework on which this paper is anchored.

3. Materials and Methods

3.1 Source of Data

Data for this study were sourced from Central Bank of Nigeria's statistical bulletin, 2019 and World Bank Group, 2020.

3.2. Model Specification

In line with the empirical and theoretical reviews, the model adopted by this paper is anchored on the capital asset pricing model. This model was chosen because it facilitates the analysis of investment portfolios while registering the significance of macroeconomic variables through the concept of unsystematic risk. The choice of this model follows closely that of Evans et.al. (2014) with little modification. The model is given as

$$R_j = a_j + \beta_j + R_m = \mu_j \quad \text{.....(1)}$$

Where: R_j and R_m required returns on the average stock or market j portfolio (e.g. NSE All-share Index), while α and β are constants in the

model, μ_j captures all other random variables. Equation one is guided by the general market assumption that all shares in the stock market are affected by the same determinant factors at a point in time.

In the case of macroeconomic variables the factor model is specified as:

$$R_{it} = \alpha_{it} + \beta_1 F_{1t} + \beta_2 F_{2t} + \beta_{kt} F_{kt} \mu_{it} \quad (2)$$

For macroeconomic variables ($F_1 \ldots\ldots F_k$) each security has a k relationship ($\beta_1 \ldots\ldots \beta_k$).

Factoring in monetary policy variables of interest gives

$$ASI = f(M2, MPR, REXR\ INF) \quad (3)$$

$$ASI_t = f(M2_{t-j} + MPR_{t-j} + REXR_{t-j} + INF_{t-j}) \quad (4)$$

The model in econometric function is specified as

$$ASI = \beta_0 + \beta_1 M2 + \beta_2 MPR + \beta_3 REXR + \beta_4 INF + \mu_{1t}) \quad (5)$$

Where: ASI is All-share index, M2 is broad money supply, MPR is monetary policy rate REXR is exchange rate INF is inflation rates.

3.3 Estimation Technique

The estimation technique adopted by this paper is the vector autoregressive (VAR) model. The motivation for the use of VAR in this study has to do with the concern for possible structural changes over the sampled period to which stock market prices are expected to respond. The specification of our time-varying VAR follows closely that in Judi and Luca (2013).

Given that:

$$\beta_0 y_t = \alpha + \beta_1 y_{t-1} + \beta_2 y_{t-2} + \ldots \beta_t y_{t-p} + \mu_t \quad (6)$$

Where α is constant, β is (nxn) matrix of coefficients, and μ_t is (nx1) vector of white noise structural disturbances, with covariance matrix (Σ). If $y_t = (\Delta ASI_t, \Delta ME_t, \Delta MPR_t, \Delta EXCH_t, \Delta INF_t)$, the relationship between these variables and structural shocks is assumed to take the form of an autoregressive model with a reduced form of y_t as

$$y_t = A_{0,t} + A_{0,}y_{t,1} + A_{2,t}y_{t-2} + \cdots + A_{p,t}y_{t-p} + e_t \quad (7)$$

$$A(L)y_t = \mu_t \qquad A(L) = 1_k - A_2L_2 - \ldots - A_pL_p \quad (8)$$

Where $A_{0,t}$ is a vector of time-varying intercepts, and A_{it} for i=1…, are matrices of time-varying coefficients, and e_t represents shock with zero mean and covariance matrix Σ_t. The above model can be changed to moving average (MA) format which is the forecast error impulse response (FEIR):

$$y_t = C(L)u_t \quad (9)$$

$$C(L) = A(L)^{-1}, C(L) = C_0 + C_1L_1 + \ldots C_pL_p \qquad C_0 = 1_k \quad (10)$$

Where (L) is (kxk), a convergent matrix polynomial in the lag operator L,

If y_t is a covariance stationary vector, the Wold moving average theorem implies that equation (3) can be written

$$asy_t = e_{t-1} = (L)e_t \quad (11)$$

However, from equation (10) there are many equivalent representations for the model because the equation is not identified. In other words, the MA in equation (8) cannot be used directly to assess contemporaneous reactions of the variables of interest. There is need to orthogonalize the different innovations by making the disturbances uncorrelated across time and equations, thereby acquiring the orthogonalized impulse response (OIR) by which the shocks in the VAR model will be identified. A simple way to do this choosing any nonsingular matrix P, such that the positive definite symmetric matrix Ω can be written as the product =PP' (Hilde, 2000). This will give the following:

$$y_t = pp^{-1}e_{t-1}\varepsilon_{t-1} \quad (12)$$

Where: $C_t = C_t p$ and $\varepsilon_t = p^{-1}e_t$. The errors ε_t with covariance matrix $cov(\varepsilon_t) = p^{-1}(p)' = 1$ as they have uncorrelated components, they become orthogonal. There are many possible factorizations of a positive definite Ω. If P is chosen to be a lower triangular matrix with positive diagonal elements, it gives a unique factorization into PP', called the *Choleski* decomposition.

4. Results and Discussion

4.1 Unit Root Test Results

Table 1: Augmented Dickey-Fuller Unit Root Test Result

Variables	Constant	Constant and linear trend
ASI	1.6445	-3.0234
M2	0.9192	-0.4297
MPR	-3.8085	-3.7912
REXR	0.1657	-2.6588
INF	-2.5589	-2.2925
ΔIn ASI	-6.7891***	-6.7604***
ΔIn M2	-11.3391***	-11.6645***
ΔIn MPR	-11.1361***	-11.099951***
ΔIn REXR	-11.2754***	-11.4734***
ΔIn INF	-6.8769***	-6.8005***

Note: Δ denotes deference operator and order of integration. (*), (**), (***) denote order of integration at 10%, 5% and 1%.

Source: Authors' Computation Using Eview 9.0.

The summary of the result for the Augmented Dickey-Fuller tests on table 4.1 revealed that all variables became stationary at 1% level after taking the first difference of the variables. The results of the unit root tests as presented helps us to conclude that all variables adopted by the study have passed the requirement for the VAR model that variables must be stationary at the same order; either at 1(0) or 1(1), hence all variables can be used in the estimation of the model.

4.2 Lag Length Selection Results

Table 2: Optimal Lag Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	4603.165	NA	1.31e+26	74.32525	74.43897	74.37144
1	-3962.184	1219.933*	6.34e+21*	64.39006*	65.07238*	64.66723*
2	-3959.205	5.428304	9.06e+21	64.74525	65.99618	65.25340
3	-3955.276	6.844670	1.28e+22	65.08509	66.90463	65.82423
4	-3949.789	9.115410	1.77e+22	65.39982	67.78796	66.36994

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion
Source: Authors' Computation Using Eview 9.0.

Based on all the criteria in table 2, the lag value to be used in the VAR model is 1. In other words, while the minimum lag is 1, the maximum lag is also 1. Hence, with respect to the nature of the data series of this study being quarterly, intervals are counted as the difference between current quarter and previous quarter.

4.3 Cointegration Test Results

Table 3: Johansen Cointegration Test Result

Hypothesized		Trace	0.05	
No. of CE(s)	Eigen Value	Statistic	Critical Value	Prob**
None	0.151377	59.27922	69.81889	0.2582
At most 1	0.135893	38.76163	47.85613	0.2699
At most 2	0.100332	20.50425	29.79707	0.3893
At most 3	0.041677	7.288065	15.49471	0.5444
At most 4	0.015611	1.966735	3.841466	0.1608

Trace test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values
Source: Authors' Computation Using Eview 9.0.

Table 3 indicates that based on the trace statistic and maximum Eigen value; there is no cointegrating vector among the variables. The decision rule therefore is to accept the null hypothesis of no cointegration among the variables under investigation at 5% level of significance. Hence, it is concluded that there is no long run equilibrium relationship among the variables of the study. Moreover, the result of cointegration as revealed and presented justifies the use of the VAR.

4.4. Impulse Response Function (IRF) and Variance Decomposition of ASI

Table 4: Response of ASI to Cholesky one S.D

Period	ASI	IFL	M2	MPR	REXR
1	49731.97	0.000000	0.000000	0.000000	0.000000
2	44637.23	202.6649	1278.826	670.4950	59.19756
3	38440.76	629.6599	232.2899	2918.364	4429.277
4	33073.28	860.9834	-653.4121	4541.244	8099.066
5	28220.83	850.6019	-1079.667	5460.237	11127.98
6	23857.80	655.5554	-1153.122	5863.733	13610.48
7	19987.45	325.6856	-939.7316	5916.577	15612.45
8	16597.70	-97.42801	-493.8300	5741.674	17193.75
9	13664.95	-579.3469	138.6833	5428.699	18410.72
10	11158.38	-1092.166	919.0578	5042.147	19315.47

Source: Authors' Computation Using Eview software 9.0.

Table 5: Variance Decomposition of ASI

Period	S.E.	ASI	IFL	M2	MPR	REXR
1	49731.97	100.0000	0.000000	0.000000	0.000000	0.000000
2	66842.20	99.95234	0.000919	0.036603	0.010062	7.84E-05
3	77292.68	99.48586	0.007324	0.028278	0.150087	0.328448
4	84589.51	98.34948	0.016475	0.029576	0.413525	1.190947
5	90040.75	96.62483	0.023465	0.040482	0.732713	2.578515
6	94328.78	94.43662	0.026210	0.051829	1.054031	4.431305
7	97862.97	91.91025	0.025458	0.057374	1.344791	6.662127
8	100903.4	89.16059	0.024040	0.056363	1.588761	9.170246
9	103619.5	86.28673	0.025923	0.053626	1.781041	11.85268
10	106122.8	83.36945	0.035306	0.058626	1.923748	14.61287

Source: Authors' Computation Using Eview 9.0.

Table 4 revealed that the ASI responded positively to unexpected changes in itself throughout the forecasting period. On the other hand, ASI continued to respond positively to a unit shock in INF from the 2nd period until the 7th period. However, during the 8th, 9th and 10th forecasting periods, ASI responded negatively to a unit shock in INF. Further, ASI responded

negatively to M2 between the 4th and 8th periods. However, it responded positively to M2 for the remaining periods. As for the response ASI to shocks in MPR and REXR, there were positive responses of ASI throughout the forecasting periods. In other words, there is positive correlation between an appreciation in ASI, MPR and REXR throughout the forecasting period.

The results of variance decomposition of ASI in table 5 revealed that 100% variation in ASI is due to its own shocks during the first period. This implies that 0% variation in ASI is accounted for by variations in all other endogenous variables of the VAR model in the first forecasting period. In the 2nd to 10th periods however, variations in ASI to itself consistently reduced, though with minimal changes from one forecasting period to another such that even at the 10th period, as much as 83.37 variations in ASI was accounted for by its own shocks. On the other hand, INF and M2 accounted for less than 1% variation in ASI from the 2nd to the 10th period, MPR consistently improved from an influence of 0.01% in the 2nd period to an influence level of 1.92% in the 10th period of forecasting. Finally, the shock in REXR accounted for 7.84% variation in ASI in the 2nd period, then went down to 0.33% in the 3rd period, after which it consistently improved until it accounted for 11.85% and 14.61% variations in the 9th and 10th periods respectively.

4.5 Discussion of Findings

The finding of this study, based on the maximal Eigen value and trace statistics is revealing that there are no cointegrating vectors among all variables under investigation. In other words, there is no long run equilibrium relationship among the variables under investigation. Also, unexpected changes in all monetary policy variables in the VAR model accounted for only little negative or positive variations in ASI as revealed from the impulse response and variance decompositions in tables 4.4a and 4.4b respectively. The bulk of the response of ASI to shock was due to unexpected change in itself for the entire forecasting period. Both long run and short run tests results are consistent with the submission of the efficient market hypothesis reviewed earlier in this paper which assumes that market efficiency is not brought about by factors outside of the stock market but by internal factors. Hence, stock market prices do not respond fairly well to macroeconomic factors (Bailey, 2005). In comparison with related theoretical and empirical literature as well as structural changes in the Nigerian economy, the behavior of individual monetary policy variables as they affect the Nigerian capital market are hereby discussed.

A major finding of the study is that the response of stock prices to change in money supply was not consistent during the forecasting period.

While stock price response was found to be positive during earlier periods, and late periods, negative responses was recorded mid-way into the forecasting period. This negative response is counter intuitive to expectations a priori as suggested by economic theory where money supply is believed to functionally determine the prices through the real balance effect. The productive monetary portfolio hypothesis developed by Brunner (1961) viewed money as an asset among other assets in the investors' portfolio. As such money supply shock will lead investors to substitute between money and other assets in an attempt to reestablish their desired money holding. Investors will typically respond with a lag which implies that money supply could help predict stock prices (Sellin, 1998). The finding is contrary to that of Ajie and Nenbee (2010); Osakwe and Chukwunulu (2019) who established a significant positive relationship between broad money supply and stock prices in Nigeria. The finding however supports the work of Osamuonyi and Evbayiro-Osagie (2012) who found a negative relationship between broad money supply and stock market index in Nigeria. Moreover, this finding can be reconciled with the assumption that money supply is able to affect stock prices either positively or negatively through interest rates channel. An increase in money supply may lead to an increase in the discount rates and lower stock prices. However, this negative effect may be countered by the economic stimulus provided by money growth, which would likely increase cash flows and stock prices (Evans et. al., 2014).

The finding further reveal that shock in money supply had insignificant effect on stock prices in Nigeria over the period of the study as it accounted for variations which remained less than 1% for all periods. The implication of this is that even though money supply had a steady growth rate throughout the period of this study, the larger part of the excess money in the hands of economic agents is not used for investments in the capital market. A misalignment between average growth rate of money supply and that of stock price index is telling that economic agents prefer to invest their money safely in the banks and getting a good return rather than making risky investments (Gowriah et al., 2014). Investors in the economy must have opted for safer and quicker money market instead of making risky investments in the highly volatile Nigerian equity market. This further explains why the effect of money supply was negative mid-way into the period of analysis when economic agents where grip with fear of the capital market as a result of the global financial crisis in 2008.

The findings of the study also suggest that contrary to theory, interest rate does not have a negative bearing on the expected prices and rate of returns on stocks in Nigeria. This is because the response of stock market prices to

shocks in monetary policy rates remained positive throughout the period of analysis. The implication of this is that a decision by the CBN to increase the monetary policy rates does not discourage investors from borrowing money from commercial banks in order to invest in the equity market. This could be attributed to slow adjustments of bank rates to change in monetary policy rate. Hence, whenever the official interest rate (MPR) rises, investors do not immediately switch off their investments in stocks to cause a fall in their prices. This is especially so for investors in the financial sector which has been found to benefit from rising interest rates through information asymmetry, as they are quick to increase the lending rate and slow in doing the same for deposit rates. The positive association is evident in the fact that in 2013 when the monetary policy rate was at all-time high of 48% stock market capitalization was also at all-time high of 19.0 Billion Naira. And while interest rate was on a linear decline from 2013 through 2016, market capitalization also fell throughout the same period (CBN, 2016).

In addition to positively affecting stock prices, the results of variance decomposition also suggests a meager impact of interest rate on stock prices in Nigeria. For the standard deviation in All-share index due to interest rates is consistent with the instability recorded in monetary policy rates over the years. As of 2008 to 2011, the MPR was single digit ranging between 6% and 9%, but from 2012 onwards, the MPR was double digit until the last quarter of 2020. This is reflected in the consistent increase of standard deviation from 0.3 in the 5^{th} period, to 1.3 in the 7^{th} and 1.9 in the 10^{th} period of analysis. The policy implication of this therefore is that unstable interest rates regime will continue to cause an increasing positive effect of interest rates on the Nigeria stock market. The finding of this study is consistent with the work of Clem and Bernard (2016), however does not support the works of Onyeke (2016) who found significant negative impact of interest rate on stock prices in Nigeria.

On the relationship between exchange rates and stock prices, the findings revealed that exchange rates shocks have positive impact on stock prices in Nigeria. This is evident from the positive responses generated in the impulse response of stock prices on exchange rates. The positive responses of stock prices to exchange rates imply that depreciation in the Naira will help improve performance of stock prices in Nigeria. Moreover, the result of variance decomposition is also consistent with the generated impulses. The variance decomposition shows increasing positive effects of exchange rates on stock market prices from 1% in the 4^{th} period to 14% in the 10^{th} period. This is not unexpected from an import oriented economy like Nigeria. This implies that relative to other monetary policy variables, innovations in exchange rates have had the most forecasting power on stock market prices. In other words,

apart from the effects of stock prices shocks on itself, variations in exchange rates have had the most impact on stock prices in Nigeria compare to other variables in the VAR model.

A possible mechanism for this effect is that as exchange rates depreciates, foreign exchange becomes dearer; hence investors re-adjust their portfolios to hold more stocks, thereby raising stock prices (Yusuf, 2015). The policy implication of this is that the deregulation of the Nigerian economy following the introduction of Structural Adjustment Programme in 1986 which saw the liberalization of exchange rates has helped improve the external balances while in turn has had a significant positive impact on the Nigerian stock market. In other words, depreciation in the Naira over the years has led to increase in competitiveness of the exports industry, and this therefore has had a positive impact on the domestic stock market in Nigeria. This is because the export-oriented companies quoted on the Nigerian stock exchange market are more attractive to investors and this in turn makes them more profitable and hence, higher stock prices. The finding of this study on the effects of exchange rates on stock prices in Nigeria is consistent with that of Zhao (2010); Osakwe and Chukwunulu (2019) who also found a positive link between exchange rate and stock prices. Moreover, the finding contradicts that of Onyeke (2016) who established a negative association between exchange rates and stock market stock prices in Nigeria.

5. Conclusion and Recommendations

A causal relationship between monetary policy variables and stock prices should exist according to economic theory. However, the empirical relationship between monetary policy variable and stock prices has been a subject of enduring interest to academic researchers, policy makers and investment professionals in the equity market. This study focused on empirical examination of this relationship in Nigeria over the period 1986-2020. The paper concludes that there is no deterministic association between stock prices in Nigeria and key monetary policy variables. The findings of the study demonstrated that a significant variation in stock prices is not due to most of the monetary policy variables. Also, in comparison with other monetary policy variables, exchange rates caused the most variation in stock prices over the period of the study. This suggests that external balances are more important than internal balances in influencing the direction of stock prices movements in Nigeria.

Based on the empirical findings of this paper it is recommended that there is need for the adoption of effective foreign policies towards meaningful and fruitful currency devaluation. This is because exchange rate has been

found to be a good hedge against the NSE All-share index, hence, capable of spurring stock prices in Nigeria. A good policy that supports devaluation as indicated by the paper is capable of improving foreign investments in the capital market thereby raising the prices of equity in Nigeria. However, a well guided policy of Naira devaluation alone may not be enough in view of current socio-political instability that plagues the country. Hence, the current social and political instability especially in the South-East, North-East and North-Western parts of the country must first be addressed as a prerequisite to any beneficial devaluation policy in Nigeria. This will go a long way in gaining and boasting confidence of prospective and existing foreign investors in the country especially those interested in agricultural and solid mineral industries, two sectors that occupy a primal role in the Nigerian capital market as well as the country's macroeconomic objective of economic diversification.

The CBN should pay more attention to attaining the optimum exchange rate and well as ensure that banks immediately adjust their lending and deposit rates to change in the monetary policy rates. The behavior of interest rate in this study showed slow adjustment of expected change in stock market in response to change in interest rate which has been attributed to delay in adjustments by commercial banks to changes in monetary policy rates. In order to ensure immediate compliance to adjustments in monetary policy rates, the CBN can take measures such as setting practicable penalties for non-compliant financial institutions, reducing cash reserve ratios to close the gap between lending and deposit rates of banks as well as ensuring the availability of loanable funds with financial institutions.

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