Impact of Selected Macroeconomic Variables on Stock Market Development and Banking System Liquidity in Nigeria

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Abstract:- **The main goal of this paper is to examine the impact of selected macroeconomic variables on stock market development and banking system liquidity in Nigeria using annualised data from 1986 to 2018. The error correction model was applied in estimating our model while the Johansen cointegration test was employed to determine if cointegrating relationships exist among our variables. We found that inflation, real interest rate and exchange rate had negative impact on stock market development while broad money supply was positively related to stock market development. On the other hand, inflation was found to negative impact on banking system liquidity whereas broad money supply, real interest rate and exchange rate had positive impact on banking system liquidity. We therefore conclude that inflation hinders stock market development and the liquidity of the banking system while broad money supply stimulates both indices. Moreover, while real interest rate and exchange rate were negatively related to stock market development, they were found to be positively associated with the banking system liquidity during the sample period. We recommend that sound monetary policy action is crucial to the growth of the Nigerian stock market as well is the liquidity of the Nigerian banking system. The estimation results further revealed that divergence from long-run equilibrium was being corrected at the speed of 68.34% annually. The results of Johansen indicators cointegration test showed that long-run relationships exist between stock market development, banking system liquidity and the selected macroeconomic variables.**

Keywords: **Stock market development; Banking sector development; Macroeconomic variables**

I. INTRODUCTION

The relationships between stock market movements, the banking system liquidity and macroeconomic indices have been a subject of intense debate in finance and economic literatures over the years. The crux of the ongoing discourse has been on whether movements in stock prices are subject to changes in macroeconomic variables. The stock markets are understood to drive growths in industry and commerce by enhancing the mobilization of capital in developing and industrialized economies which leads to economic growth and development. Khodaparasti (2014) argues that stock market appears to be more efficient and more dynamic in the allocation of resources compared to banks. Issahaku, Ustarzand Domanban (2013) posit that a well-organized capital market is critical in the mobilization of domestic and foreign capital, and the stock exchange market plays major role in the mobilization of long-term funds for firms. Stock prices move randomly, fluctuates and adjusts rapidly in response to domestic and international shocks (Forson and Janrattanagul, 2013).

When investing in stock, there are a number of factors that inform participants to expect higher or lower return. Macroeconomic variables are one of such factors. Changes in the macroeconomic variables can exert significant influence on stock market return (Talla, 2013).Going by economic theory, stock prices should be Stock market is also essential in channeling funds from surplus economic unit (savers) to the deficit unit (or investors). In other words, domestic funds can be mobilized and channeled for productive investments hence stimulating economic activities. A stock exchange market provided that platform for interaction among diverse investors or participants – buyers and sellers of securities who initiate transactions and make deals at an agreed price. Stock market plays a crucial role of enhancing the efficiency of capital formation and allocation. Growth and development of the economy is therefore a function of a well-performing stock market. Stock returns are dependent on some fundamental macroeconomic variables such as interest rates, money supply, inflation, exchange rate, and Gross domestic Product (Kirui, Wawire and Onono, 2014). It is therefore argued that if macroeconomic fundamentals precisely predict movements in stock price then, stock prices can be considered key indicators that signal future economic activities.

II. REVIEW OF RELATED LITERATURE

Stable financial market has been strongly linked to the growth in an economy because a well-developed stock market is widely acknowledged to be an indicator of complete macroeconomic performance of a country (Azam, *et. al.*, 2016). Generally, a functioning stock market promotes intermediated financing, encourages liquidity and mobilization of domestic savings, and promotes the quantity and quality of investment. Developments in the financial systems of advanced economies have led them to pursue liberalisation in the international trade and exchange of services in world trade negotiations. The establishment of stock markets in African countries and the liberalisation of capital accounts can be viewed as parts of this global liberalization trend (Yartey and Adjasi, 2007). Recent

empirical literatures have beamed some light on the stock market and macroeconomic indicators debate but still fall short of a consensus on the nature of the relationship among the variables. Adewale (2012) for instance suggests that low and predictable rates of inflation are more likely to influence stock market development and economic growth. Pradhan, *et. al.*, (2013) investigated the link between the development of stock markets, economic growth, and inflation using a sample of 16 Asian countries over 1988-2012. The panel vector autoregressive (VAR) model results reveal that these variables are cointegrated, evidencing presence of a long-run equilibrium relationship among them. Azam, *et. al.*, (2016) used a sample of four Asian countries and arrived at the same conclusion that stock market development, economic growth and inflation are cointegrated (see Hoque and Yakob, 2016; Abdelbaki, 2013).

Exploring the evidence from the Sub-Saharan African region, some studies suggest that there is significant relationship between stock market development and macroeconomic variables (see Owusu-Nantwi and Kuwornu, 2011; Issahaku, *et. al.*, 2013; Ho, 2017; Kirui, Wawire and Onono, 2014). While some studies established that macroeconomic variables influence stock market development (see Pilinkus, 2009; Osamwonyi and Evbayiro-Osagie, 2012). On the other hand, Talla (2013) contends that causality runs from stock market to macroeconomic variables. In some instances, it has been found that the macroeconomic variables are split and maintain individual causal link vis-à-vis stock market index (see Ahmad, Abdullah and Sulong, 2015; Elly and Oriwo, 2012). Nkechukwu, Onyeagba and Okoh (2013) found a unidirectional causality running from stock prices to GDP, whereas there was no causal link between stock prices and money supply. In a related study, Oseni and Nwosa (2011) discovered that there is no causality between stock prices and macroeconomic variables, and stock index may not be a leading indicator for macroeconomic performance (Asaolu and Ogunmuyiwa, 2015). The differing empirical answers on this intensely debated subject may well linger on. The reasons for the lack of consensus have been attributed to criteria for variable selection, technique of analysis, data transformations and sample size. However, a number of studies have used panel series and divers methodologies to fill the existing gap.

Garonfolo (2011) examined the link between macroeconomic variables and growth in the region. The study sampled six sub-Saharan countries over the period 1988-2008. The results support the findings in the Asian region that a long-run equilibrium association exists between stock market development and economic growth. The Granger causality result reveals a unidirectional causality running from stock market capitalization to gross domestic product (GDP). Babayemi, *et. al.*, (2013) examined the panel data of seven major African stock markets with a view to investigate the long-run relationship between these markets and some key macroeconomic variables between 1988 and 2011. Panel residual based test established the fact that there is evidence of cointegration between the stock markets and the variables under investigation.

Cointegrating relationship between these variables also entails that shocks in one are more likely to have effects in another (see Omorokunwa and Ikponmwosa, 2014; Kalu and Okwuchukwu, 2014). Anyamele (2013) uses a panel data, to study the contribution of stock markets in economic growth in six selected countries of sub-Saharan Africa from 1991-2009. These results indicated a positive correlation between market liberalization, economic reforms and increase in stock market capitalization as well as the liquidity measured by stock traded turnover ratio. Notably, the negative correlation between financial crisis and growth in per capita GDP was established, and shows that sub-Saharan African economies are not immune to global market disturbances. Basci and Karaka (2013) contend that the collapse of stock market has always led to financial crisis and economic contraction. And once the stock market stabilises, other macroeconomic indices tend towards rebounds on growth path.

III. DATA AND METHOD

The annual time series data over 1986-2018 is employed for Nigeria. Data are obtained from the Central Bank of Nigeria Statistical bulletin, 2018. The real interest rate data was obtained from the World Bank Database. The choice of our starting year was determined by the year data were available for the series. Our dependent variables include stock market size and the banking sector liquidity. Our indicator for stock market size is market capitalization of listed companies. However, we expressed this in relative terms to the gross domestic product (GDP). Banking sector liquidity is proxied by the ratio of total banking sector loans and advances to total deposit. We selected annual inflation rate and broad money supply (ratio of broad money supply to GDP), real interest rate and exchange rate. Inflation is calculated in terms of the consumer price index (CPI) (i.e. percentage change in CPI).

Our baseline regression models depicting the link between our selected variables can be expressed thus;

$$MCAP_t = \beta_o + \beta_1 INFR + \beta_2 BMS_t + \beta_3 RIR_t + \beta_4 EXR_t + \varepsilon_t, \quad (1)$$

$$BSLQ_t = \beta_o + \beta_1 INFR + \beta_2 BMS_t + \beta_3 RIR_t + \beta_4 EXR_t + \varepsilon_t, \quad (2)$$

We can modify the above model (Equation 1 and 2) in the context of the ECM model as follows:

$$MCAP_{t,j} = \beta_0 + \sum_{i=1}^{k1} \beta_{1i,j} \Delta MCAP_{t-1,j} + \sum_{i=0}^{k2} \beta_{2i,j} \Delta INFR_{t-1,j} + \sum_{i=0}^{k3} \beta_{3i,j} \Delta BMS_{t-1,j} + \sum_{i=0}^{k4} \beta_{4i,j} \Delta RIR_{t-1,j} + \sum_{i=0}^{k5} \beta_{5i,j} \Delta EXR_{t-1,j} + ECT_{t-1,j} + \mu_t (3)$$

$$BSLQ_{t,j} = \beta_0 + \sum_{i=1}^{k1} \beta_{1i,j} \Delta BSLQ_{t-1,j} + \sum_{i=0}^{k2} \beta_{2i,j} \Delta INFR_{t-1,j} + \sum_{i=0}^{k3} \beta_{3i,j} \Delta BMS_{t-1,j} + \sum_{i=0}^{k4} \beta_{4i,j} \Delta RIR_{t-1,j} + \sum_{i=0}^{k5} \beta_{5i,j} \Delta EXR_{t-1,j} + ECT_{t-1,j} + \mu_t (4)$$

Where:

MCAP = Ratio of market capitalisation to GDP

BSLQ = Banking sector liquidity (ratio of total loans and advances to total deposit)

INFR = Inflation rate

BMS = Broad money supply as a ratio of GDP

RIR = Real interest rate

EXR = Excahange rates

ECT = Error Correction Term

IV. RESULTS AND DISCUSSION

4.1 Unit Root Test

Table1. Unit Root Test Results

Variables	ADF-Stat	5% critical value	P value	Inference
MCAP	-6.983650	-2.276383	0.0000	1(1)
BSLQ	-7.028735	-2.276383	0.0000	1(1)
INFR	-5.883672	-2.276383	0.0000	1(1)
BMSA	-5.954836	-2.276383	0.0000	1(1)
RIR	-7.665402	-2.276383	0.0000	1(1)
EXR	-6.277499	-2.276383	0.0006	1(1)

Results of unit root test are presented in Table 1 indicate that all the variables are stationary, at first difference. This entails that the series are integrated of order one. Based on this outcome, we can estimate our short-run dynamics as modeled in Equ. (2) using the error correction model.

4.2 Test for Long-run Relationship

Table 2. Johansen Cointegration Test Results: Stock market and macroeconomic variables

Sample (adjusted): 1988 2018				
Series: MCAP INF BMS RIR EXR				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.744805	88.23092	69.81889	0.0009
At most 1 *	0.530587	48.62484	47.85613	0.0423
At most 2	0.465023	26.69291	29.79707	0.1094
At most 3	0.247477	8.552479	15.49471	0.4084
At most 4	0.010533	0.307089	3.841466	0.5795
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.744805	39.60608	33.87687	0.0093
At most 1	0.530587	21.93193	27.58434	0.2239
At most 2	0.465023	18.14043	21.13162	0.1247
At most 3	0.247477	8.245390	14.26460	0.3543
At most 4	0.010533	0.307089	3.841466	0.5795

Table 3. Johansen Cointegration Test Results: Banking sector liquidity and macroeconomic variables

Sample (adjusted): 1994 2018				
Series: BSLQ INF BMS RIR EXR				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.857920	79.25437	69.81889	0.0073
At most 1	0.567988	34.37294	47.85613	0.4815
At most 2	0.349496	15.06897	29.79707	0.7756
At most 3	0.187213	5.178806	15.49471	0.7896
At most 4	0.017720	0.411217	3.841466	0.5214
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.857920	44.88144	33.87687	0.0017
At most 1	0.567988	19.30396	27.58434	0.3914
At most 2	0.349496	9.890166	21.13162	0.7549
At most 3	0.187213	4.767589	14.26460	0.7708
At most 4	0.017720	0.411217	3.841466	0.5214

The results reported in Tables 2 and 3shows that our independent variables have cointegrating relationships with stock market development as measured by MCAP as well as the banking sector liquidity. The indication was shown by the

trace statistic and the Max Eingen statistic, both revealing 2 cointegrating equations for Equation (1) and 1 cointegrating equations for Equation (2). It can therefore be said that long-run relationships exist between stock market development, banking sector liquidity and the selected macroeconomic variables.

4.3 Regression Estimates

Table 4. Error Correction Model Results (Equation 3)

Dependent Variable: D(MCAP)				
Method: Least Squares				
Sample (adjusted): 1987 2018				
Included observations: 30 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.047523	1.051700	0.996029	0.3292
D(INF)	-0.110236	0.068184	-1.616732	0.1190
D(BMS)	1.266270	0.893826	1.416684	0.1694
D(RIR)	-0.009038	0.040151	-0.225112	0.8238
D(EXR)	-0.100568	0.057674	-1.743727	0.0940
ECT(-1)	-0.683399	0.224644	-3.042148	0.0056
R-squared	0.711348	Mean dependent var		0.419637
Adjusted R-squared	0.687879	S.D. dependent var		5.627974
S.E. of regression	5.133874	Akaike info criterion		6.286455
Sum squared resid	632.5600	Schwarz criterion		6.566694
Log likelihood	-88.29682	Hannan-Quinn criter.		6.376106
F-statistic	22.170142	Durbin-Watson stat		2.052130
Prob(F-statistic)	0.000000			

The regression estimate in Table 4 reveals that INF, RIR, EXR have negative impact on MCAP in Nigeria whereas BMS has positive impact on MCAP. It can also be observed that relative impacts of the regressors on stock market development were not significant. The error correction coefficient, which is the speed of adjustment is negatively signed and is significant. This shows that disequilibrium in the long-run path is corrected as the speed of68.34% annually.

Table 5. Error Correction Model Results (Equation 4)

Dependent Variable: D(BSLQ)				
Method: Least Squares				
Sample (adjusted): 1993 2018				
Included observations: 24 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.261146	2.795628	0.451114	0.6573
D(INF)	-0.132639	0.232673	-0.570067	0.5757
D(BMS)	0.560915	1.655483	0.338823	0.7387
D(RIR)	0.089236	0.095744	0.932032	0.3637
D(EXR)	0.256957	0.136449	1.883169	0.0759
ECT(-1)	-0.728038	0.196208	-1.366089	0.0007
R-squared	0.706579	Mean dependent var		4.572529
Adjusted R-squared	0.713816	S.D. dependent var		10.96200
S.E. of regression	11.03746	Akaike info criterion		7.852785
Sum squared resid	2192.860	Schwarz criterion		8.147299
Log likelihood	-88.23342	Hannan-Quinn criter.		7.930920
F-statistic	18.937314	Durbin-Watson stat		1.766302
Prob(F-statistic)	0.000000			

The regression estimate in Table 5 reveals that INF has negative impact on banking system liquidity (BSLQ) in Nigeria whereas BMS, RIR and EXR have positive impact on BSLQ. The results show that relative impacts of the regressors on banking system liquidity were not significant. The error correction coefficient, which is the speed of adjustment is negatively signed and is significant. This shows that disequilibrium in the long-run path is corrected as the speed of 72.80%on annual basis.

4.4 Diagnostic Tests

Table 6 Test for Autocorrelation, and Heteroskedasticity (Equation 3)

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	1.097043	Prob. F(2,22)	0.3514
Obs*R-squared	2.720606	Prob. Chi-Square(2)	0.2566
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.714810	Prob. F(5,24)	0.6184
Obs*R-squared	3.888494	Prob. Chi-Square(5)	0.5656

Table 7 Test for Autocorrelation, and Heteroskedasticity (Equation 4)

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.225599	Prob. F(2,16)	0.8005
Obs*R-squared	0.658235	Prob. Chi-Square(2)	0.7196
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.725469	Prob. F(5,18)	0.6132
Obs*R-squared	4.025289	Prob. Chi-Square(5)	0.5458

From Tables6 and 7, Breusch-Godfrey LM test for autocorrelation indicates that there is no serial correlation problem in our model. This is supported by the Durbin-Watson result in table 3 and 4. The Heteroskedasticity results in the second panel show that our model is homoskedastic.

These diagnostic findings entails that our results are not spurious.

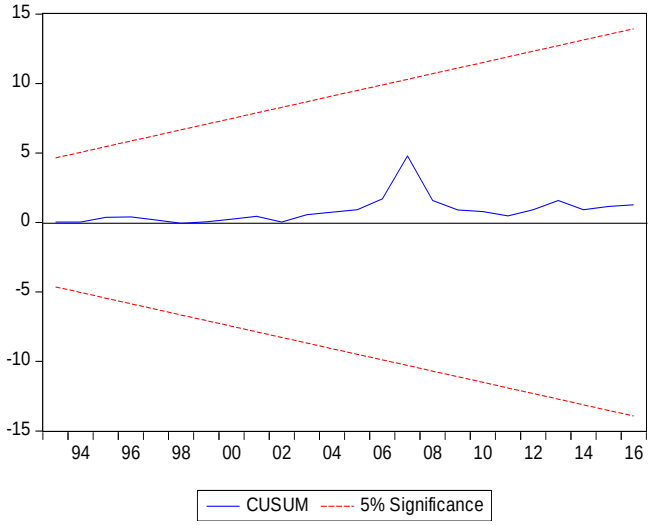

Figure 1. Recursive Estimate (Equation 3)

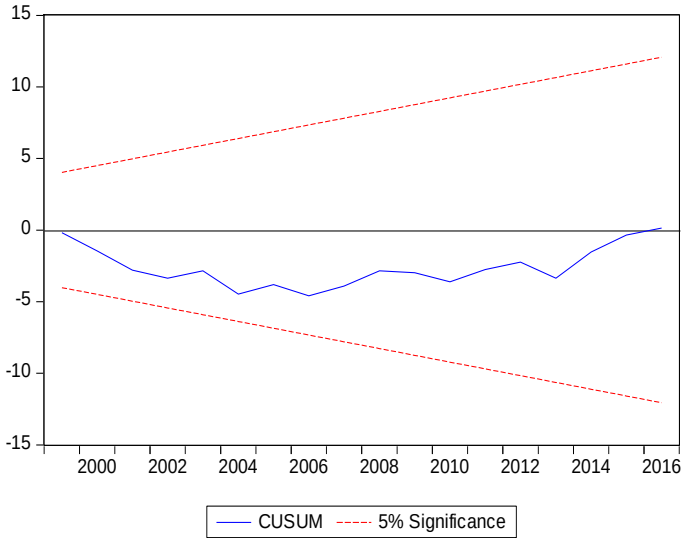

Figure 2. Recursive Estimate (Equation 4)

Figures 1 and 2 present the recursive estimates and cumulative sum (CUSUM) stability tests for our model Equations (3) and (4), respectively. With the blue lines between the upper and lower red bounds, we confirm that our models are stable. Hence, the null hypothesis that the models are correctly specified cannot be rejected.

V. CONCLUSIONS

Stock markets and the banking system play critical roles in channeling funds from surplus economic unit to the deficit unit. Thus, domestic funds can be mobilized and channeled for productive investments hence stimulating economic activities. A stock exchange market provided that platform for interaction among diverse investors or participants – buyers and sellers of securities who initiate transactions and make deals at an agreed price. It has been extensively argue, without consensus, how stock markets are affected by key macroeconomic indicators. In view of this, we examined the impacts of selected macro economic variables on stock market development and the banking system liquidity in Nigeria, between 1986 and 2018. We found that inflation, real interest rate and exchange rate had negative impact on stock market development while broad money supply was positively related to stock market development. On the other hand, inflation was found to negative impact on banking system liquidity whereas broad money supply, real interest rate and exchange rate had positive impact on banking system liquidity. The error correction coefficient, which is the speed of adjustment is negatively signed and is significant. We therefore conclude that inflation hinders both stock market development and the liquidity of the banking system. Moreover, while real interest rate and exchange rate were negatively related to stock market development, they were found to be positively associated with the banking system liquidity during the sample period. We recommend that sound monetary policy action is crucial to the growth of the Nigerian stock market as well is the liquidity of the Nigerian banking system.

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