



Effect of Unstable Macroeconomic Indicators on Banking Sector Stock Price Behaviour in Nigerian Stock Market

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ABSTRACT

Stable macroeconomic environment is critical to an efficient stock market and economic growth. Banking sector plays important role in sustaining the growth in Nigerian stock market. However, the effect of unstable macroeconomic factors on the sector's stock returns over the years cannot be ignored. This study seeks to investigate banking sector's stock price behavior in response to unstable macroeconomic variables in Nigerian stock market. Autoregressive distributed lag model was employed to examine both short run and long run effects on the study variables between 2009 and 2018. Findings revealed negative significant effects of interest rate and foreign reserves on the stock price behavior of the banking sector both in the short run and long run with -0.21 and -9.004 respectively. Inflation rate has positive significant influence of 0.42 , while exchange rate is not statistically significant in influencing stock price behavior in Nigerian stock market, all at 1% level of significance. The study concludes that, banking sector stock price is being influenced by foreign external reserve, interest rate and inflation rate. The study recommends that monetary policy rate should be reduced in order to lower the cost of borrowings and enhance liquidity level in the stock market.

Keywords: Autoregressive Distributed Lag Co-integration, Banking Sector, Macroeconomic Indicators, Nigerian Stock Market, Stock Price Behavior

JEL Classifications: E02, G12

1. INTRODUCTION

Living in an ever changing world of globalization and increase in technological advancement, with uncertainties around the globe, investors and financial analysts have realized importance of understanding stock price response to unstable macroeconomic variables. This is as a result of increasing fluctuations in some of the macroeconomic variables that often affects investment and return and hence the uncontrollable risk and loss of assets.

Uncertainties in macroeconomic variables affect stock prices and other indices of the entire market at large. Therefore, an efficient and a stable stock market depend largely on the macroeconomic environment within its spheres of operation. According to (Ajayi, 2013; Omankhanlen et al., 2016; Gilbert et al., 2017; Zhou and Haung, 2018; Celebi and Honig, 2019; Pal and Garg, 2019;

Asamoah et al., 2019 among others), the stock markets often react to macroeconomic environment such as; political and socio-economic climates (i.e. foreign exchange rate, interest rate, gross domestic product [GDP] and so on) owing to the interactions between the surplus unit and the prolific sectors of the economy. It is no doubt that, a stable macroeconomic environment is a catalyst to stock market growth and economic growth.

Macroeconomic indicators in Nigeria have affected different sectors on the Nigerian stock market owing to the heterogeneity of the market. The banking sector is the spine of the Nigerian stock market, as it constitutes the largest percentage of the total market capitalization and the highest traded stock on the Nigerian Stock Market (Ajayi, 2013). The banking sector stock performance has been over the years a catalyst and a pivot to the growth and development of the Nigerian stock market. However, the global

financial crisis of 2008 impacted negatively on the banking sector stock's returns as result of the international credit crunch that geared up panic within the banking industry. The banking sector experienced continuous decline in stock prices owing to instability in the key macroeconomic variables such as foreign exchange rate, inflation rate and foreign external reserves. Notably, previous studies (Ouma and Muriu, 2014; Mbulawa, 2015; Omankhanlen et al., 2016; Ray and Saha, 2016; Khalid and Khan, 2017) examined macroeconomic variables and stock market returns on aggregate basis. But studies on macroeconomic variables and specific sector such as banking sector are scarce in literature. Hence, the novelty of this study is to empirically investigate the banking sector stock price response to unstable macroeconomic variables in Nigeria, with a major focus on the foreign external reserves, foreign exchange rate, interest rate and inflation rate.

Empirically, Ouma and Muriu (2014) examined stock market returns and macroeconomic variables in Kenya. The study employed OLS to examine the influence of interest rates, exchange rate, inflation rate and GDP on the stock market return. Findings showed significant negative effects of exchange rate on stock market return, while inflation rate and GDP were significant and impacted positively on the stock return. However the study concluded that interest rate is not a determining factor of the stock market return in Kenya.

Mbulawa (2015) analyze the interdependence between interest rates, exchange rates and stock market performance using vector error correction model on monthly data within two inflationary periods (the pre-hyper inflationary and hyper inflationary period). The study revealed that interest rate had mixed impact on performance of stock market in the pre-hyper inflationary phase. Also bidirectional causality was found between stock market and exchange rates. However, a positive impact of exchange rate was found on stock market performance amidst hyper inflationary period.

Ray and Saha (2016) examined stock returns and macroeconomic variables of Bombay stock exchange (BSE) such as inflation rate (INFLA), gross GDP, exchange rate (EX), gold price (GLD), oil price (OIL). Johansen co-integration test was used to investigate the long-run relationship among the variables, the study also examined stock returns volatility in response to changes in macroeconomic variables using GARCH (1,1) model. Study found negative significant impact of exchange rate on stock returns while other variables were negative and insignificant to BSE stock return.

Omankhanlen et al. (2016) examined macroeconomic indicators and stock price movement in Nigeria between 1985 and 2014 using co-integration and vector error correction model. The study concluded that inflation rate and exchange rate have significant influence on stock price movement in Nigeria. In addition, Mugambi and Okech (2016) examined the impact of macroeconomic variables such as exchange rate, interest rate, inflation rate and GDP on stock returns of listed banks in the Nairobi securities exchange. The study employed ordinary least square regression between 2000 and 2015 using quarterly data. The study concluded that, exchange rate, interest rate and inflation

have significant impact on the banking sector stock returns in Nairobi. However, an insignificant influence was found between GDP and stock returns of the banking sector in Nairobi, in Kenya.

Khalid and Khan (2017) empirically examined the link between stock market return interest rate, inflation rate and exchange rate in Pakistan. Study used autoregressive distributed lag (ARDL) to investigate the long run co-integrating relationship between the variables and found an existence of long-run relationship between exchange rate, inflation rate, interest rate and stock market returns. The results also showed that exchange rate was insignificant but impacted positively on PSX index while inflation rate was positively significant to stock market return. However, interest rates have negative significant impact in the long run on the PSX market returns.

Kurotamunobaraomi and Ebiware (2017) examined inflation rates and stock prices of quoted firms in Nigeria using ordinary least square regression, Johansen co-integration and Granger causality test to investigate the influence of exchange rate, money supply, interest rate and inflation rate on stock price. The study found no long run relationship among the variables and concluded that exchange rate, money supply and inflation rate portray statistically significant impact on stock prices in the short run. However, interest rate showed negative impact on stock prices, furthermore, study found unidirectional causal relationships from stock price to interest rate and exchange rate. Rjoub et al. (2017) investigated micro and macroeconomic determinants of stock price of Turkish Banking sector using both panel data analysis and Dumitrescu and Hurlin panel Granger causality for 10 years between 1995 and 2015. Their study found that asset quality, management quality, earning, size, money supply and interest rate are significantly related to stock price in the Turkish banking sector. Also, bidirectional causality found between bank size, asset quality, money supply and bank stock price.

From the review of empirical studies, there is no doubt that, the effects of unstable macroeconomic variables on stock price behaviour have received considerable attention in literatures across the globe. It is however important to note that, unstable macroeconomic variables affect sectors of economy differently due to the heterogeneity of the market. Most of these studies in literature focused on effects of unstable macroeconomic variables on stock market price behaviour at aggregate level. Therefore, this study focuses on specific sector (banking sector) which is considered to be the most capitalized and traded stock sector in Nigerian stock market. Also, previous studies on unstable macroeconomic variables and stock return focused more on interest rate, inflation rate and exchange rate as the major macroeconomic variables, neglecting foreign external reserve. However, Wooldridge (2006) was of the opinion that the impact of one variable on the other variables cannot be established unless other relevant variables are held constant. Therefore, this study identified foreign external reserve as a macroeconomic variable gap, hence this study includes foreign external reserve among other macroeconomic variables in examining the effect of unstable macroeconomic variables on stock price behavior in the Nigerian banking sector.

Theoretically, this study is built upon arbitrage pricing theory (APT). The theory was propounded by Ross (1976), and has globally been accepted as the theory that bond macroeconomic variables and stock price as multi-risk factors pricing model as against the capital asset pricing model. This is evidenced by its unrealistic assumptions, difficulty of its empirical testing, holding that a security expected rate of return is a function of one factor (i.e. the general stock market). Whereas the APT is based on the assumption that equilibrium market prices should be perfect, in such a way that, prices will move to eliminate buying and selling without arbitrage opportunities. Hence APT is concerned with a multi-factor model. The theory argues that risk factors arise from changes in some fundamental economic and financial variables such as interest rates, inflation, money supply, oil prices, exchange rate among others could also influence the price of an asset (Uwubanmwun and Eghosa, 2015). The theory holds that the expected return of a financial asset can be modeled as a linear function of several macro-economic factors or theoretical market indices.

2. DATA AND METHODOLOGY

This study adopts ex-post facto research design by relying on a secondary data sourced from the Central Bank of Nigeria (CBN) statistical Bulletin and the Nigerian stock exchange fact books on monthly basis between 2008 and 2018. The year 2008 represents the year when the global financial meltdown was felt across the globe, it also represent the year in which the Nigerian stock exchange came up with sectoral index to meet up with international market standard index for measuring global and local economic and sectoral performance sequel to the global financial crises. Banking sector is the main focus of this study due to the fact that, it constitutes the largest traded stock on the Nigerian stock market, and also the sector with the highest market capitalization on the Nigerian stock market. This study adapted the functional model of Adaramola (2011) on the impact of macroeconomic indicators on stock prices in different quoted firms in Nigerian stock exchange. The model was stated as;

$$STK = f(BRDM, INTR, ECHR, INF, OILP, GDP) \quad (1)$$

$$STK = \beta_0 + \beta_1 BRDM + \beta_2 INTR + \beta_3 ECHR + \beta_4 INF + \beta_5 OILP + \beta_6 GDP + \varepsilon_i \quad (2)$$

Where; M2 or broad money supply = (BRDM), interest rate = (INTR), exchange rate = (ECHR), inflation rate = (INF), international price of crude oil = (OILP) and gross domestic product = (GDP). The individual stock price (STK) was used to measure stock performance at the micro level i.e., the firm's level. The individual firm's stock prices (STK) was used in this study as barometer for monitoring upswings and downswings in the capital market. Furthermore, this study modified the adapted econometric model of Adaramola (2011) to suit this study by including foreign reserves and excluding broad money supply, international oil price and GDP. The inclusion of foreign external reserves was in line with the functional model; as literature has established that foreign reserves determine the banking sector stock price response especially in the developing stock exchange market. The adapted functional model is stated as;

$$BNKASI = f(FER, FR, INF, INT) \quad (3)$$

$$BNKASI = \beta_0 + \beta_1 FER + \beta_2 FR + \beta_3 INF + \beta_4 INT + \varepsilon_i \quad (4)$$

Where; BNKASI = Banking sector all share index (ASI) is proxied for banking sector stock price behaviour, FER = Foreign exchange rate, FR = Foreign reserves, INF = Inflation rate and INT = Interest rate.

The study employed ADF unit root test to verify the order of stationarity of the data, bond test was also conducted to assess whether there is long-run co-integration among the variables of concern. The study finally employed ARDL model proposed by Pesaran et al. (2001) to examine the long run and short run effects of unstable macroeconomic variables on stock price behavior of the banking sector in Nigeria. The ARDL model is applicable for both non-stationary time series as well as for times series with mixed order of integration which is capable of assessing the short run dynamic effects without losing information on the long run relationship among financial time series data (Shrestha and Bhatta, 2018). Therefore, the study ARDL model was stated in equation 1 below;

$$\begin{aligned} \Delta BNKASI_t = & \alpha_{0t} + \sum_{i=0}^n \beta_i \Delta BNKASI_{t-i} + \sum_{i=0}^n \gamma_i \Delta FER_{t-i} + \\ & \sum_{i=0}^n \delta_i \Delta FR_{t-i} + \sum_{i=0}^n \theta_i \Delta INT_{t-i} + \\ & \sum_{i=0}^n \vartheta_i \Delta INF_{t-i} + \varnothing_1 BNKASI_{t-1} + \varnothing_2 FER_{t-1} + \\ & \varnothing_3 FR_{t-1} + \varnothing_4 INT_{t-1} + \varnothing_5 INF_{t-1} + \varepsilon_t \end{aligned} \quad (5)$$

Where: Δ = Denotes the first difference operator; ect = Error correction term; BNKASI = Banking sector all share price index proxied for banking sector stock price behaviour; FER = Foreign exchange rate; FR = Foreign reserve; INT = Interest rate; INF = Inflation rate; and ε_t = disturbance term. Subscript t indicates that the variables are observed over time.

3. RESULTS AND DISCUSSION

3.1. Pairwise Correlation Test

Table 1 presents the result of pairwise correlation analysis which was used to examine the relationships that exist among the variables of the model. Most importantly, to check if any relationships have correlation coefficient as high as 0.8, which is commonly used as a benchmark to signal problematic multicollinearity? Results showed that all the correlation coefficients are

Table 1: Pairwise correlation matrix

	Banking	Ex. Rates	Inflation	Ext. Res.	Int. Rate
Banking	1.0				
Ex. Rates	-0.10	1.0			
Inflation	-0.18	0.64	1.0		
Ex. Res.	0.62	-0.39	-0.29	1.0	
Int. Rate	-0.04	0.63	0.04	-0.19	1.0

Source: Author's computations (2019)

well below 0.8 which is an indication of absence of problematic multi-collinearity in the model.

The ADF unit root results presented in Table 2 revealed that at 5% significant level, inflation rate is stationary at levels, (i.e. integrated-of-order-zero series, i.e. I(0) series). All other variables such as ASI of banking sector, foreign exchange rate, external reserves and interest rate are not stationary series at level but are integrated-of-order-one series I(1). This is evident from their respective P-values being >0.05 and their respective test statistics less than their critical values, at levels, while at first difference, their respective $P < 0.05$ and their respective test statistics are greater than their critical values. The outcome of the unit root test necessitate the need for ARDL bounds test approach to co-integration developed by Pesaran et al. (2001) to verify if a long run equilibrating relationship exists among the variables.

3.2. Bounds Tests Approach to Co-integration

The ARDL bounds test procedure states a null hypothesis of no long-run relationships among the variables of a model.

If the F-statistic value is greater than I(1) bound, the null hypothesis should be rejected and accept null hypothesis if the value is less than I(0) bound. On the other hand, the test is inconclusive if the F-statistic value falls in between the bounds. The F-statistic value of the test is 4.69, with four independent variables included in the model. The I(0) and I(1) bounds at 5% significance level for the model are 3.12 and 4.25 respectively. This shows that the F-statistic is greater than I(1) bound of the models, an indication of a long run co-integrating relationship between the variables Table 3.

4. INFERENCE ANALYSIS: THE ARDL CO-INTEGRATION ESTIMATES

The result presented in Table 4 seeks to examine the impact of macroeconomic variables on stock price behavior of the banking sector is the selected model out of 12,500 evaluated models through the automatic model selection method of Akaike information criterion.

The short-run model indicates that external reserves, interest rate and inflation rate are major short-run determinants of banking sector stock prices. These are evident from each of their P-values which are lower than the conventional levels of significance making them to be statistically significant in influencing banking sector stock prices. Foreign exchange rate is not short-run determinants of stock prices of banking sector. External reserves and interest rate showed negative signs, indicating they influence banking sector

stock prices negatively while inflation rate showed a positive sign, indicating it influences banking sector stock prices positively. The error correction term (cointeq) in one period lag is negative and statistically significant, a condition to achieve convergence of the model, which measures the speed of adjustment to long-run equilibrium, its significant negative coefficient indicates that about 67.5% of disequilibrium is adjusted in each period (i.e. month), and it will take less than two periods for equilibrium to be achieved.

The long run estimates revealed that, external reserves and interest rate show negative signs, indicating they influence banking sector stock prices negatively while inflation rate shows a positive sign, indicating it influences banking sector stock prices positively. On the other hand, the p-values of exchange rate is higher than the conventional levels of significance (even 10%) making it to be statistically insignificant in influencing banking sector stock prices in the long-run. The reported R-squared for this model shows a value of 0.848, indicating that the model explains about 84.8% of variations in banking sector stock prices. F-statistic has a value of 74.0 and P-value of 0.000, indicating that the overall model is statistically significant. These jointly imply the model is in good fit. Durbin-Watson statistic indicates that the model is free from the problem of serial correlation as its reported value can be approximated to 2.

The findings revealed that foreign external reserves have negative significant effects on banking sector stock price behavior, this may be due to sudden and persistent withdrawal of foreign investors from the market for safety of investment to other countries, which the banking sector are mostly affected by the volume of withdrawal (CBN, 2017). The study also revealed that interest rate have significant negative effects on stock price of the banking sector this could perhaps due to the fact that the CBN in a bit to control inflation and also to preserve the foreign reserve increases the monetary policy rate (MPR) by 8%. However, increased cost of borrowing result to liquidity challenges; reduces corporate earnings, firms profitability and curtail investment. This view is supported by Khalid and Khan (2017) and Giri and Pooja (2017) who stated that an economy faced with liquidity problem translate to negative effect on investment both from the local and foreign investors and also have adverse effect on stock price behavior. Furthermore, against the findings of Omankhanlen et al. (2016) but in line with the evidence put forth by Charles and Richard (2018), inflation rate have positive significant impact on stock price of the banking sector, this might be ascribe to the fact that, stock market investment are good hedge against inflation in Nigeria. These assertions are in line with the APT which argues that, only systematic risk can determine the price or return of an asset, the theory supports that risk factors are associated with changes in

Table 2: Augmented Dickey-Fuller unit root test

Variables	At level			At first difference			Order of integration
	T-stat	Crit. Value	P-value	T-stat.	Crit. value	P-value	
Banking	-4.12	-5.17	0.45	-10.04	-5.17	0.00	I(1)
Exch. Rate	-4.65	-5.17	0.17	-10.60	-5.17	0.00	I(1)
Inflation	-5.64	-5.17	0.01				I(0)
Ext. Reserve	-3.46	-5.17	0.83	-8.22	-5.17	0.00	I(1)
Interest rate	-3.99	-5.17	0.53	-13.26	-5.17	0.00	I(1)

Source: Author's computation (2019)

Table 3: Autoregressive distributed lag bounds test approach

Banking all share index	Bound 1(0)	Bound 1(1)
	3.12	4.25
F-stat.	4.69	4.69
K	4	

Source: Author's computation, (2019)

Table 4: Autoregressive distributed lag short run error correction and long run estimates – banking sector

Variable	Coefficient	SE	T-statistic	Prob.
Short run error correction				
D(LOGBANKING(-1))	-0.119	0.101	-1.178	0.242
D(FEX)	-0.245	22.013	-0.011	0.991
D(LOGEXRES)	-6.083	0.073	-83.853	0.000
D(INTRATE)	-0.144	0.007	-21.713	0.000
D(INFLATION)	0.325	0.003	101.151	0.000
D(@TREND(-1))	-0.000	0.002	-0.186	0.852
CointEq(-1)	-0.676	0.067	-10.125	0.000
Long run coefficients				
FEX	-0.363	32.589	-0.011	0.991
LOGEXRES	-9.004	0.965	-9.327	0.000
INTRATE	-0.213	0.018	-11.502	0.000
INFLATION	0.482	0.049	9.793	0.000
C	-0.010	4.937	-0.002	0.998
@TREND	-0.001	0.003	-0.185	0.853
R-squared	0.848			
Adjusted R-squared	0.837			
F-statistic	74.001			
Prob. (F-statistic)	0.000			
Durbin-Watson statistic	1.952			

Source: Author's computation (2019)

fundamental economic and financial variables which can influence the price of an assets.

5. CONCLUSION AND RECOMMENDATION

Based on the findings, the study concluded that interest rate and foreign reserves have negative significant impact while inflation rate positively influence the banking sector stock price behavior both in the short and long runs in the Nigerian Stock market respectively.

Based on the findings and conclusion, the study suggested the following policy recommendations; first, the CBN should reduce the MPR further from current rate of 13.5% to a single digit in order to reduce the cost of borrowing in the country, this will increase liquidity and drive investor's appetite, thereby leading to better banking sector stock performance. Furthermore, the foreign reserve should be enhanced and well preserved in order to reduce capital flight which will enhanced banking sector's returns. Furthermore, studies in future should include other unstable macroeconomic variables that were not considered in this study such as money supply, GDP, and corruption perception index.

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