

Macroeconomic Variables and Share Price Movement in the Banking Sector in Nigeria

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Abstract

This study investigated empirically the relationship between macroeconomic variables and share price movement in the Nigerian Banking sector within the periods from 2007 to 2021. Three macroeconomic variables were chosen as the independent indices; including the exchange rate, inflation rate, and interest rate. The dependent variable was actual closing share prices of Nigerian banks on the 17th day of February, May, August and November of each year. Information from the annual time series covering the period between 2007 and 2021 was used. The analysis started with examining the characteristics of each time series by testing their normality and correlation. Analysis from the study using Random Effects Model of Panel Least Squares regression on e-views 10 showed that only inflation rate was significant in determining the movement of share prices of the deposit money banks in Nigeria during the period studied. On the other hand, interest rate and exchange rate returned insignificant result that implied that they cannot be used to explain variations in share price movement in the banking sector of Nigeria. Based on these findings, the study recommended that there is need to promote domestic production and diversification of the economy so as to control inflation, while further studies may focus on finding out more relevant macroeconomic variables that affect share price movement of Nigerian banks.

Keywords: Interest Rate, Inflation Rate, Exchange Rate, Banking Sector and Share Price.

JEL Classification: E44, G11, G12

1. Introduction

Share price movement is a significant part of every stock market, and is an indication of the extent to which the market is active. Share prices can move either downwards or upwards depending on the forces driving the shift at any point in point. With an active market, investors can either gain or loose substantial proportions of their investment within a couple of minutes due to sudden price movements. These movements

in share prices are determined by a number of factors ranging from market sentiments to macroeconomic variables. Adegbite (2007) stated that these factors transmit into share prices through the mechanism of price discovery which is based on the economic theory of demand and supply.

Macroeconomic variables are aggregate indices and figures reflecting the outlook of the entire economy.. These variables are collated, summarized and stored by the relevant authorities. The variables are veritable pictures of the volume and characteristic of the business transactions in the system and how they emanate. Macroeconomic variables comprise interest rate, exchange rates, inflation rates, money supply and gross domestic product. This study was based on the apriori expectation that macroeconomic variables affect the share price movement in the Nigerian banking sector. The variables of interest in this work are exchange rate, interest rate and inflation rate.

Exchange rate is the value (worth) of one currency in terms of a unit of another currency. It is the purchasing power of a nation's currency when compared with the currency of another nation. Interest rates are the direct costs of borrowing money, otherwise known as the cost of capital and they impact on the solvency of individuals. An increase in interest rates means higher loan instalments amounts to be paid by borrowers. Olofin (2001) stated that interest rates become higher during a period of high inflation, high demand for business/consumable loans, strict monetary policy, or due to higher reserve requirements for deposit money banks. Inflation is an indicator of price stability and it affects the solvency of individuals and the corporate entities. High inflation rates affects the real value of money thereby diminishing the purchasing power. In periods of rising prices, people find it difficult to meet their daily consumption needs as a result of the decline in the purchasing power of money in their hands (Akwe, Garba & Dang, 2018).

The relationship between macroeconomic variables and stock market behavior have drawn substantial research attention. Fama (1965); Chen, Roll and Ross (1986); Binswanga (2000) and Acikalin, Aktas and Unal (2008) were among the early works. Musa and Ibrahim (2014); Asekome and Agbonkhese (2015); Lawal, Somoye, Babajide and Nwanji (2018) all concluded that the stock market volatility is sensitive to changes in the selected macroeconomic variables. On the contrary, Inyiama and Nwoha (2014); Okoro (2017) including Udoka, Nya and Basseyy (2018) discovered that macroeconomic variables cannot be used to determine share price movement. The divergence in research findings call for further examination on this subject as was recommended by Okoro (2017).

The objective of this study is to investigate if interest rate, inflation rate and exchange rate affect movement in the prices of banks listed on the Nigerian Exchange, between 2007 and 2021. The rest of this paper is arranged as follows: section 2 contains the review of literature and the methodology is explained in section 3. Results are presented in section 4 while section 5 discusses the conclusions and recommendations.

2. Literature Review

2.1 Conceptual Framework

Share Price: Share price is simply the value or worth of a unit of shares of an entity on a particular date. Determination of Share price for listed entities is simply obtained from the Daily Official List of the relevant Exchange where the Company is listed. Share price refers to the present value of shares rather than the nominal book value at which the shares are registered at the Corporate Affairs Commission. Therefore the concept being explained here is that of the Current Market Price of shares. According to Udenwa and Uwaleke (2015), the current market price is the price at which the last deal was done at the Stock Exchange on a particular trading day, while the public quotation price is the nominal value per share into which the company have divided its total shares and is useful mainly for accounting balance sheet purposes. The work by Chen, Roll and Ross (1986) conceptualized on impact of macroeconomic indices on the stock market behavior by testing the effect of movement in selected variables on expected dividends, discount rates and stock prices.

Interest Rate: Interest rates are the direct costs of borrowing money, otherwise known as the cost of capital. Put in a simple way, interest rate is an amount charged or paid for the use of money and is always expressed in annual percentage terms. It is calculated by dividing the amount of interest by the amount of principal. Lawal et al (2018) argued that one of the transmission mechanisms of the government's monetary policy to the capital market is through the 'interest rate channel'. This means that increase in interest rate will lead to increase in a Company's cost of capital thereby altering its present value of future cash flows and transmit into lower stock prices. They added that upward shifts in interest rate limits the level of a Company's investment which in turn reduces the present value of its future cash flows, reduce its wealth and capital formation, thereby transmitting to a fall in its share price.

Inflation Rate: Inflation is an indicator of price stability. Inflation rate affects the purchasing power of individuals, families, companies and economies. In periods of high prices of goods and services, people find it difficult to meet their daily consumption needs as a result of the decline

in the purchasing power of money in their hands. Olofin (2001) stated that inflation means a persistent rise in the general level of prices of goods and services. Chen et al. (1986) argued that the relevant macroeconomic variables that affect transactions in the stock market are aggregate production, inflation, short-term interest rates, the maturity risk premium and default risk premium. Two basic causes of inflation exist in economic literature viz: Demand-Pull inflation and Cost-Push Inflation. Chen et al (1986) listed inflation among the determinants of stock market transaction levels.

Exchange rate is known as the worth of one currency in terms of a unit of another currency. It can also be explained to mean the real purchasing power of one country's currency when compared with the currency of another nation. Adegbite (2007) defined exchange rates as a means of effecting trade and capital flows across international borders.

2.2 Empirical Review

Hasanzadeh and Kianvand (2012) examined the effects of some macroeconomic variables on the stock market index in Iran. The study used secondary data from 1996 – 2008, co-integration and vector error correction method analyses. Tehran Stock Exchange Index was regressed on five variables which are gross domestic product, nominal effective exchange rate, money supply, gold coin price and investment in housing sector. The result showed that the five variables are co-integrated while stock prices showed significantly negative relationship with nominal effective exchange rate. This was interpreted to imply that depreciation of domestic currency has a positive effect on export –oriented firms because it leads to increase returns to the firm's stock prices. Money supply showed a significantly positive relationship with Tehran Stock Exchange.

Inyiama and Nwoha (2014) examined the relationship between macroeconomic variables and the movement of share prices in Nigeria brewery industry, with emphasis on Nigeria Breweries Plc. Between 2000-2012, Nigerian Breweries Plc share price was the dependent variable while the explanatory variables are exchange rate, interest rate and inflation rate. The ordinary least squares result indicated an insignificant relationship for all the variables. The test was not robust enough because based on the R-Squared, only 13% of the variations in share price could be explained by the independent variables. The paper recommends that macroeconomic variables should be seriously considered in setting monetary and fiscal policies because of its multiplier effect on the economy.

Asekome and Agbonkhese (2015) conducted a study aimed at examining the variables that contributed to the Nigerian stock market

bubble, its consequent melt-down and gradual recovery during the period between 2007 – 2013. The work relied on Ordinary Least Square ((OLS) regression technique adopting five different variables: gross domestic product, broad money supply, exchange rate, capacity utilization and inflation as proxy for the independent variables; while the dependent variable is represented by All Share Index as proxy. Based on the results, only gross domestic product and broad money supply were significant, hence exchange rate, capacity utilization and inflation rate were insignificant. The paper observed that some government policies contributed to the gradual recovery witnessed in the stock market after the melt-down.

Okoro (2017) conducted an ex-post facto work in investigating the effect of selected macroeconomic proxies on Nigeria all-share index using the ordinary least squares and spanning the years 1986-2015. Non of the variables (gross domestic product, money supply, interest rate, inflation rate and exchange rate) proved to exert any effect on the dependent variable as they all returned as insignificant coefficients.

John (2018) modelled the effect of money supply, interest rate, exchange rate and inflation rate on Nigerian stock market capitalization using annual time series data from 1981 to 2016. The ex-post facto research design was conducted by Augmented Dickey-Fuller (ADF) and Ordinary Least Squares (OLS) tests and found that money supply has a significant positive effect; interest rate has a significant negative effect; whereas, exchange rate and inflation rate have no statistically significant effect on stock market performance in Nigeria. The study suggested that further researches should capture other factors which may be determining factor in this linkage.

Udoka, Nya and Bassey (2018) examined the influence of gross domestic product, exchange rate, interest rate and inflation rate on average stock price using the augmented dickey fuller unit root test and autoregressive distributed lag models in testing secondary data covering between 1986 – 2014. The study model revealed no long run relationship between the explanatory and explained variables, and therefore suggested policies that will promote capital market investment in the country.

Omodero and Mlanga (2019) investigated the macroeconomic determinants of Nigeria stock market performance using annual time series data in an ex-post facto study covering a period from 2009 to 2018. The results from the Ordinary Least Squares (OLS) regression analysis indicated that exchange rate and interest rate do not have significant effect on all share price index. On the other hand, inflation (negative) and gross domestic product (positive) were found to be the determining factors in this circumstance.

Akinmulegun (2018) measured the impact of capital market development(indexed by market capitalization, all share index, gross domestic product, exchange rate and interest rate) on foreign portfolio investment(FPI) in Nigeria between and including the years 1985 and 2016. The study methodology was ex post-facto while the estimation method was the Vector Error Correction Mechanism (VECM) and Granger Causality tests. Though the Granger causality test revealed the absence of causality between the variables, the study concluded that capital market significantly determines FPI inflow in Nigeria because the VECM produced significant coefficients for market capitalization and all share index.

Assagaf, Murwaningsari, Gunawan and Mayangsari (2019) tested the effect of macroeconomic variables on the Indonesian stock market returns over the period November 2016 – June 2018. The study regressed inflation rates, interest rates, money supply, and foreign exchange rates on the Indonesian composite stock price index being the proxy for the stock market returns through the method of Ordinary Least Squares (OLS). All the explanatory indices returned significant coefficients and this made the authors to recommend that similar research should be done with an extended period of time of up to 5 to 10 years timeframe to make the test more robust.

Mahmah and Kandil (2019) explored the impact of oil price variations on fiscal consolidation in the United Arab Emirates (UAE) between 1980 – 2015 adopting Ordinary Least Squares technique. The dependent variables comprised bank's liquidity, domestic credit, foreign direct investment and non-oil GDP growth. The work proved that oil price movements significantly affect bank's liquidity, domestic credit and foreign direct investment. However, its effect on non-oil GDP growth was insignificant.

Agu, Ogu and Ezeanyeji (2019) modelled an Ordinary Least Squares (OLS) and Autoregressive Distributed Lag (ARDL) to measure implications of movement in Foreign Portfolio Investment (FPI), exchange rate and interest rates on Stock Market Returns (proxied by market capitalization) in Nigeria between 1986 and 2017. Based on the test output, exchange rate and FPI were significantly positive while the coefficient of interest rate was insignificant.

Based on the empirical review, all the works reviewed are different in terms of their methodology, nature of data, location, timeframe and findings. Inyama and Nwoha (2015) studied the effect of macroeconomic variables on share price movement in the Nigerian brewery industry. Udoka, Nya and Basse (2018) used average share price as dependent variable for a study on the effect of macroeconomic variables on share price movement of the entire listed stocks. Agu, Ogu

and Ezeanyeji (2019) modeled an Autoregressive Distributed Lag (ARDL) to measure the implications of movement in selected variables on Stock Market Returns (proxied by market capitalization) in Nigeria between 1986 and 2017. This study is peculiar because: it focused on the banking sector; it used quarterly data for a period of 15 years, it used actual share prices of Nigerian Banks and macroeconomic variable figures on the 17th day of February, May, August and November in each year, it used Panel regression, the work is very current as it captured data up to the first quarter of the year 2021.

2.3 Theoretical Framework

The Arbitrage Pricing Theory (APT) has been proved empirically as an effective way of linking macroeconomic variables and stock market behavior. Under the APT, multiple risk factors can be used to describe the features of stock values (Ross, 1976). The emergence of APT in finance literature was necessitated as result of the fact that the Capital Asset Pricing Model (CAPM) which preceded it assumes the existence of only one risk factor which is not realistic.

Nkechukwu, Onyeagba and Oko (2015) used APT model and explained that the model is premised on a multi-factor assumption where investors are likely to leverage on arbitrage opportunities in the stock market. Therefore, the return on an asset is measured as the opportunity cost of return on other assets while giving due consideration to several other risk elements. The Arbitrage Price Theory (APT) have been adopted for this study. The justification of the choice is because the APT can conveniently be used to examine the study conceptual framework. In this study, the several risk factors of the APT are indexed by the **three** macroeconomic variables (exchange rate, interest rate, **and** inflation rate) which are theorized to impact the stock market movement in Nigeria. Many studies have been based on the APT, including those of Kuwornu and Owusu-Nantwi (2011); Adu (2012); Carino, Ong and Orbeta (2013); Tripathy and Kumar (2015); Islam and Habib (2016); Worlu and Omodero (2017); Ditimi, Sunday and Emma-Ebere (2018); Adesanmi (2018) and John (2019).

3. Methodology

This study adopted ex-post facto research design which fits well to address the study objective. The population comprised all the eleven deposit money banks listed on the floor of Nigerian Exchange Limited. Sampling was not needed because the required data was extracted with ease on aggregate basis from the reliable database, covering the 15 years period from 2006 – 2020. The sources of macroeconomic variable data were the Central Bank of Nigeria [CBN], (2021) Statistical Bulletin, and

the Nigerian Exchange (NGX) database and Fact-books from where share price information was obtained. The data was subjected to tests for normality, descriptive statistics and correlation. After the preliminary tests followed the Random Effects Model of Panel regression test to determine the relationships between the variables. E-views 10 software was used to run the analysis.

The model for this study was stated as follows:

$$SP \approx f\langle EXR, INT, INF \rangle \dots\dots\dots(1)$$

The model is stated econometrically as;

$$SP_t \approx \beta_0 + \beta_1 EXR_t + \beta_2 INT_t + \beta_3 INF_t + \ell_t \dots\dots\dots(2)$$

Where;

SP_t = Share Price of Nigerian Banks listed on the Nigerian Exchange at time t

EXR_t = Exchange Rate of Naira to the United States Dollar at time t

INT_t = Interest Rate at time t

INF_t = Inflation Rate at time t

ε = error term

β₀ = Intercept of the regression line

β₁-β₃= Coefficient of the independent variables

Table 1: Variable Measurement

Variable	Notation	Nature of Data	Measurement
Share Price	SP	Dependent Variable	The Closing Share Price of Banks that are traded on the floor of the Nigerian Exchange on the 17 th February/May/August/November each year.
Interest Rate	INT	Independent Variable	Cost of borrowing money proxied by the weighted average lending(Prime) rate of deposit money banks in February/May/August/November each year.
Inflation Rate	INF	Independent Variable	Consumer Price Index Inflation represented by the 12-month average inflation rate as at the months February/May/August/November in each year.
Exchange Rate	EXR	Independent Variable	Exchange rate of Nigerian Naira to the United States Dollars on the 17 th of February/May/August/November of each year.

Source: Author’s Generation, 2021.

4. Results and Discussion

Table 2: Descriptive Statistics

	EXR	INF	INT	SP
Mean	211.2421	11.38308	16.38462	11.91324
Median	155.3	11.56	16.64	6.5
Maximum	379.5	17.63	19.66	234.17
Minimum	116.07	5.53	11.21	0.37
Std. Dev.	84.37357	2.956447	1.685355	21.43436

Source: E-views Output, 2021

Table 2 above shows the summary descriptive statistics of the variables included in the model. The table shows the average value of Share Price (SP) to be 11.91. The minimum value of SP is 6.50 with maximum value of 234.17 and standard deviation of 21.43. The table contains the statistics for the exchange rate, interest rate and inflation as well and it shows the picture of the data used for the analysis.

Table 3: Correlation Matrix

Variable s	EXR	INF	INT	SP
EXR	1.0000			
INF	0.5702	1.0000		
INT	-0.4574	0.1256	1.0000	
SP	-0.1859	-0.2845	-0.0141	1.0000

Source: E-views Output, 2021

The above matrix depicts the degree and direction of the association between each pair of variables being analyzed. A correlation coefficient with negative sign reveals that there is an opposite relationship between the two variables. The correlation result indicates that all the three external factors are negatively correlated to share price. These correlations are given by the respective coefficients of -0.1859, -0.2845 and -0.0141 for EXR, INF and INT respectively.

Table 4: Summary of Hausman Specification Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	3	1.0000

Source: E-views Output, 2021.

The Hausman Specification Test in Table 4 above reveals that Random Effect Model is most appropriate compared to Fixed Effect Model in view of the Chi-Square value of 0.0000 and its corresponding P-value of 1.0000 which is more than the critical value of 0.0500.

Table 5: Panel Regression (Random Effect Model) Result

Variable	Coefficient	Std. Error	t-Statistic	Probability
C	33.94168	9.751272	3.480743	0.0005
Exchange_Rate	-0.005139	0.014153	-0.363126	0.7166
Inflation_Rate	-1.935276	0.358623	-5.396402	0.0000
Interest_Rate	0.066321	0.581120	0.114126	0.9092
R-squared	0.318846			
Adjusted R-squared	0.303393			
Durbin-Watson Statistic	1.215158			

Source: E-Views Output, 2021

The analysis shows that a one Naira increase in exchange rate leads to reduction of share prices by 0.005 kobo, an increase of 1% in inflation rate results to a decline N1.93 in share prices, while an increase of 1% in interest rate leads to an increase of 0.07 kobo in the share prices of Nigerian banks during the period under study from January 2007 to March 2021. The constant term in the regression equation returned a value of 33.94. With this result, the line of best fit for predicting the future share prices of banks in Nigeria is stated as follows:

$$\text{Share Price} = 33.94 - 0.01EXR - 1.94INF + 0.07INT.$$

The analysis shows that the R-squared measured as the coefficient of determination is 0.3188 which implies that 31.88% of the total variations in Nigeria banks share price is represented by the explanatory variables which are EXR, INF, and INT, while the remaining 68.12% accounts for the changes in the dependent variables, which were not included in the equation.

Table 6: Summary of Post Diagnostic Test

Test	Statistics	P-Values
Breusch-Pagan LM	1083.135	0.1381
Pesaran scaled LM	96.98006	0.1325

Source: E-views Output, 2021

These diagnostic checks are hinged on the null hypotheses that: there is no heteroscedasticity for the Breusch-Pagan LM test and there is no multicollinearity between the variables for the Pesaran Scaled LM test. The test from table 6 implies that the problem of heteroscedasticity is absent, with the statistic value of 1,083.13 and the p-value of 0.1318. Thus the p-value of 13% is greater than 5% level of significance, gives the study proof to accept the hypothesis that the residuals are homokedsdastic and the model is good.

Statistical Test of Hypothesis

Hypothesis One (H_{01}): The empirical result shows that there is an insignificant positive effect of interest rate on banking sector share price movement in Nigeria. The result in table 5 above clearly showed that the p-value of 0.9092 fell outside the acceptable region of 5% level of significance. Hence the null hypothesis of “no significant relationship” was not rejected. The interpretation of this result is that whatever impact which interest rate exerts on Nigerian Banks share price is inconsequential and does not really matter. Focus should therefore be on other important variables instead of interest rate. This finding is in agreement with the works of Okoro (2017) and of Akwe et al (2018) where interest rate was found to be insignificant in affecting share prices in Nigeria. It however disagrees with John (2018) which interest rate has a significant negative effect on share price behaviours.

Hypothesis Two (H_{02}): The empirical result shows that there is a significant negative effect of inflation rate on banking sector share price movement in Nigeria. Considering the result output in table 5, the p-value of 0.0000 is comfortably sitting within the rejoin of acceptable error of 5% level of significance and shows the level of importance of the effect of inflation rate on banking sector shares movement in Nigeria. Hence, this study rejected the null hypothesis of no significance. This implies that share prices of banks in Nigeria decreases with increase in inflation rate. The explanation for this is that a rise in inflation rate raises the living cost and shifts productive resources from investments to consumption. This gives rise to a reduction in demand for financial instruments (particularly, ordinary shares), which in turn brings about decrease in the share prices due to the interplay of demand-supply forces. The result is in agreement with theoretical prediction and empirical findings of Akwe et al (2018), and Udoka et al (2018). However, the result disagrees with Inyiama and Nwoha (2014) where the ordinary least squares result indicated an insignificant relationship for inflation rate.

Hypothesis Three (H_{03}): The empirical result shows that there is an insignificant negative effect of exchange rate on banking sector

share price movement in Nigeria. The result output in table 5 indicates that p-value of 0.7166 is outside the acceptable 5% level of significance. Hence, this study could not reject the null hypothesis. This result implies that the effect of exchange rate on Nigerian Banks share price is not important in this study. Focus should therefore be on other important variables instead of exchange rate. This disagrees with Hasanzadeh and Kianvand (2012) in which stock prices showed significantly negative relationship with nominal effective exchange rate. It however aligns with the result of Okoro (2017).

5. Conclusion and Recommendations

Many studies have been conducted to explore the effect of macroeconomic variables on the stock market. However, few of the studies have been focused on specific sectors as most studies examined the entire stock market. The results of these studies vary greatly regarding the effect of changes in macroeconomic variables on share price behaviour. For this study, the findings showed that inflation rate have significant effect on the Nigerian banking sector share price movement, while exchange rate and interest rate returned insignificant coefficients. The panel regression showed that 31.88% of the total variations in Nigeria banking sector share prices is represented by the explanatory variables which are INT, INF and EXR, while the remaining 68.12% accounts for the changes in the dependent variable which were not included in the equation.

On the basis of the findings above, the study made the following recommendations:

- i. The Investment advisers and investors in the Nigeria stock market may consider to take note of the systematic risks revealed by inflation when structuring portfolios and diversification strategies.
- ii. The Government regulatory authorities may consider focussing more on encouraging domestic production of goods and services. This has the capacity to reduce inflation rate, stimulate growth and economic activities, particularly in the capital market.
- iii. The Central Bank of Nigeria should try as much as possible to reduce the anchor rate (Monetary Policy Rate) thereby reducing the cost of borrowing by quoted companies in Nigeria. The reduction in the domestic interest rate can increase corporate profitability and enhance share prices.
- iv. The policy makers may consider actions aimed at diversification of the nation's sources of foreign revenue as this will strengthen the value of the Naira leading to better performance of share price movement.

Future empirical investigations by other researchers may consider models aimed at finding out other macroeconomic variables

apart from inflation rate that impact significantly on share price movement in the banking sector in Nigeria.

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