Influence of economic factors on fluctuations of share prices in Nigeria (2000 – 2020): VECM approach

[1.]Michael Rotimi SANNI (PhD)
Department of Accounting, Achievers University,
Owo, Ondo State, Nigeria

[2.]OJEDELE, MofoluwasoIyabode (PhD)
Faculty of Management Sciences, Department of Accounting,
Redeemer's University, Ede, Osun State, Nigeria.

[3.] AYODELE, Thomas Duro (PhD)
Faculty of Management Sciences, Department of Finance, Redeemer's University, Ede,
Osun State, Nigeria.

[4.] ADEYANJU, O. David
Faculty of Management Sciences, Department of Accounting,
Redeemer's University, Ede, Osun State, Nigeria

Abstract
Share prices fluctuate due to many micro and macroeconomic factors. This study investigated the extent to which economic factors influence the fluctuations of share prices in Nigeria from 2000 – 2020, using the VECM approach. Share price was proxy with All Share Index while the identified economic factors are GDP, Price of Crude Oil, Inflation rate and Interest rate. The data used were sourced from the Statistical Bulletins of Central Bank of Nigeria. Percentage increase in the variables over the research period was used and regressed with E-views. Findings, which confirmed some existing works and negated others showed that all the variables were stationary at first difference and that a long run relationship existed between them. All the economic factors influenced share prices though not significantly. Findings further revealed that the speed of adjustment of fluctuations of share prices from short-run to long run in Nigeria is 102%. Since the adjusted R-squared is 35%, the study concluded that other factors not considered in this study influenced the fluctuations more and therefore recommended a total overhaul of all micro and macro- economic factors for stable share prices and its attendant benefits.
Key Words: Share Price, Fluctuations,   GDP, Inflation Rate, Interest Rate

I.   Introduction

Stock market is a regulated and well-organized market that deals in securities like shares, bonds and notes that are transacted at prices determined by market forces. The market is a public entity and trades in company derivatives and shares registered in the stock exchange and those that are privately traded at mutually acceptable prices. Stocks are registered (listed), bought and sold on stock exchanges, the exchanges, serving as mediums where buyers and sellers are brought together (Nwude, 2012). A stock market is efficient if it is able to quickly and accurately reflect all information available on shares. Such information is reflected in stock prices. The price so determined, is for a specific period of time and will appreciate with increase in the financial performance of a company and depreciates with a decrease in financial performance (Zarah, 2017).

Share prices are influenced by the perceptions of the market which are determined by a number of factors such as the firm's financial performance, the economic situation of the country and a good record of the firm making adequate and regular returns to investors (Musah & Aryeetey, 2021; Enow&Brijlal, 2016; Sanju, Bhattarai, 2014; Ramachandran & Nirmala, 2011). Share prices and changes in them are considered important in finance related literature as they are regarded as the most relevant pointers to the performance of firms, performance being the only reliable instrument to measure the wealth of the shareholders (Singh, 2018).

Fluctuation of share prices occurs when many shares are brought into the market with few buyers, causing the price to fall. Fluctuations of stock indices and stock prices cause uncertainty, a common phenomenon in stock markets worldwide. The uncertainties in the market inform the need for accurate prediction of share prices both on the long-run as well as short run bases. These characteristics, though not desirable for investors, are unavoidable once investments are made in the market. Efficient Market Hypothesis (EMH) assumes that the present price of any stock is a reflection of all available information and as such it is not possible to predict any changes in the future based on previous historical trading information (Vincent &Bamiro, 2013; Shar, 2007).

Apart from financial performance, firms are influenced by factors that can be controlled by themselves (micro-economic factors) and others outside their control (macro-economic factors) which may invariably lead to fluctuations of share prices. Share price fluctuations affect investment and financing decisions (Lee, 2014) of the investor and the affected company and may lead to bankruptcy/liquidation. Fluctuations in share prices, have thus been researched on by many professionals and academics interested in capital market operations. Some of the studies focused on the micro-economic variables while others on macro-economic variables. Micro-economic variables considered include: social corporate responsibility (Lee, 2016), corporate tax avoidance (Kim, Li & Zhang, 2011), accounting conservatism (Kim & Zhang, 2016)], opaque financial reports (Hutton, Marcus &Tehranian, 2009; Khodarahmi, Foroughnejad, Sharifi&Telebi, 2016), corporate governance (Jeon, 2019), stock ownership (Li, Sun & Yu) and other factors.

Other studies used factors like political connections (Harymawan, Lam, Nasih, &Rumayya, (2019), religion (Callen & Fang, 2015; Li & Cai, 2016), individualism (An, Chen, Li, & Xing, 2018), media sentiment and mawkishness (Zhu, Wu, Zhang & Yu, 2017), social trust [Cao, Xia & Chan, 2016), product market competition (Li, & Luo, 2020) and others to measure macro-economic factors. Other economic factors that affect share price fluctuations include GDP (Gunu&Ishiak, 2009), money supply (Malaolu, Ogbuabor& Orji, 2013), total deficit ((Gunu&Ishiak, 2009).

Some of the works on share prices in Nigeria focused on determinants. They include Adebisi &Lawal (2015); Uwalomwa, Olowe&Agu (2012), Malaolu, *et al.* (2013).

Gunu and Ishiak (2009) researched on environmental (macro-economic) factors that affect share price fluctuations in Nigeria using inflation rate, total deficits, index of industrial production and money supply to proxy the factors. Olokoyo, Ibhagni and Babajide (2020) also researched on the same issue but used exchange rates, GDP, foreign capital flows, interest rates, inflation and trade barriers to proxy macro-economic variables. The present work is different in that it adopts the Vector Error Correction Model, uses All Share Index to proxy share prices, starts from 2000, covering 2008 when the global financial crisis commenced and uses percentage changes in economic factors as against the absolute figures used in previous works in Nigeria.

II.   Literature Review

Mahdi, Andrea, Grzegorz, Hossein, and Maede, (2021) investigated the causes of share price crash in Iran from 2014 to 2019 using data from 152 listed companies. The result from the fixed effect model used showed that the association between unemployment rate, inflation rate and the crash in share price is positive. That of exchange rate and GDP is negative with the crash.

Olokoyo *et al* (2020) used VECM to examine the impact which macroeconomic factors have on the performance of market capitalization, using mainly data from 1981 to 2018 sourced from Central Bank of Nigeria and World Development Indicators. Findings revealed a cointegration between the variables used (inflation, exchange rate, GDP growth rate, foreign capital flows and interest rate). Inflation and interest rate do not have positive relationship with the performance of stock market.

Nguyen, Giang, Duong, Le., and Nguyen (2019) analysed factors that affect prices of shares in Vietnam between 2015 and 2018. The researchers used linear regression and found that while exchange rate and interest rate impacted share prices positively, gold price and inflation (CPI) impacted negatively. This conformed with the work of Garefalakis (2011).

Udoka, Nya and Bassey (2018) researched on macroeconomic factors that affect the movement of share prices in Nigeria using rate of interest, rate of exchange, GDP and inflation to proxy the factors. Findings from regression analysis revealed no joint co-integration between the variables. There was also no long run relationship between them and share prices.

Hesty, Wedi and Gusni (2017) identified factors that influence share prices in Indonesia. Data collected from 18 consumer goods companies between 2008 and 2015 were regressed, with findings showing that inflation negatively affect share prices while oil prices have positive influence. Interest rate, it was further revealed has no effect.

Alam, Miah & Karim (2016)used seven quoted Bangladesh cement companies to investigate major factors that influence share prices in the country. The researchers used variables such as GDP, Interest rates

spread and Consumer Price Index (CPI) among other variables. Findings from Ordinary Least Square revealed that CPI exerts significant influence on share prices.

Somoye, Akintoye and Oseni (2009 in Alam*et al* 2016))using regression analysis on data collected from 130 quoted Nigerian companies from 2001 to 2007 found that GDP, oil price and lending rate positively correlate with stock prices while interest rates and foreign exchange rates do not. The researches worked on how macro-economic factors affect share prices in Nigeria.

Vincent and Bamiro (2013) investigated the implications of fluctuations of share prices on Nigerian economy. Findings among other things showed that it is possible to prevent fluctuations of share prices from past historical reports.

Malaolu*et al.* (2013)conducted a research on what determine share prices in Nigeria between 1985 and 2010 by using Engle – Ganger cointegration test (two – step) on data on macroeconomic variables such as share price, exchange rates, money supply, interest rates, inflation and political stability. Findings established no cointegration between the variables and that they are not influential (with the exception of inflation) in determining share price movement in Nigeria.

Kehinde (2012) considered the white noise hypothesis simultaneously with the EMH (Efficient Market Hypothesis) to examine stock price fluctuations. According to him, stock prices can be reviewed adopting macro-economic variables-interest rate, inflation rate, exchange rate and the intrinsic values considering earnings per share and dividend yield. The white noise hypothesis declared that stock price fluctuates not only due to information available in the environment but also due to shocks to the stock market/ prices captured as the white noise.

Gunu and Ishiak (2009)examined macroeconomic variables affecting share prices in Nigeria, using data sourced from Nigerian Stock Exchange over a period of twenty – six years from 1980 to 2006.Results from multiple analysis showed that money supply, interest rate, total deficit index of production and GDP positively affect share prices.

The literature reviewed showed an increased interest on factors that cause share price fluctuations though findings showed conflicting results. Not very much has been done in Nigeria. The present work intends to contribute to existing body of knowledge but differs in that it uses All Share Index to proxy share prices, uses percentage changes in all the variables used as against absolute figures used in previous works and adopts Vector Error Correction Model.

III.   Methodology

The literature reviewed (Nguyen *et al,* 2019; Hesty *et al,* 2017; Gunu and Ishiak, 2009) shows that fluctuations in share prices are influenced by certain factors like GDP, interest rate, price of crude oil, inflation rate, unemployment rate, money supply, industrial production index and others. This study uses All Share Index to proxy Share Price and GDP, Inflation rate, price of crude oil and interest rate as those factors that influence share price fluctuations.

Model specification

The model used by the study in line with the literature reviewed is:

SP = f(Interest rate, Inflation rate, GDP, Crude oil price)……………………………Eq. 1

This can be restated thus:

$\Delta SP = \alpha_0 + \beta_1(\Delta Interest\ rate) + \beta_2(\Delta Inflation\ rate) + \beta_3 (\Delta GDP) + \beta_4 (\Delta Crude\ oil\ price) + \mu$……………………………………………………………………………………………… Eq 2

Where:

ΔSP = % change in share price. All Share Index was used to proxy share price.

α_0 = Constant

$\Delta Interestrate$ =% change in interest rate

$\Delta Inflation\ rate$ = % change in inflation rate

ΔGDP = % change in GDP

$\Delta Crude\ oil\ price$ = % change in the price of crude oil

μ = Error term

$\beta_1\ \beta_2\ \beta_3\ \beta_4$ = Coefficients of the variables

The model is a modification of those used by Mahdi (2021), Nguyen *et al.* (2019), Hesty*et al.* (2017) and Gunu&Ishiak, (2009). The basis for the use of percentage change in all the variables was based on the fact that all the variables changed and not static during the period under review and would be technically wrong to assume that only share prices changed.

All the data used were sourced from the Central Bank of Nigeria Statistical Bulletin. The period under investigation is from 2000, covering 2008 when the global financial crisis occurred to 2020.

IV. Findings And Discussion

Findings

Table 1: DESCRIPTIVE STATISTICS

	SHARE_PRICE	CRUDE_OIL_PRICE	GDP	INFLATION	INTEREST_RATE
Mean	11.53095	11.51857	17.67048	14.02381	7.427619
Median	12.23000	7.400000	15.32000	12.50000	-0.220000
Maximum	65.81000	61.92000	39.32000	25.60000	74.92000
Minimum	-45.77000	-40.69000	3.960000	8.000000	-55.88000
Std. Dev.	30.12863	27.06277	9.958870	5.167098	33.95206
Skewness	-0.048173	-0.133352	0.488966	1.139106	0.413593
Kurtosis	2.124694	2.473199	2.188879	3.405664	2.415074
Jarque-Bera	0.678513	0.305069	1.412484	4.685457	0.898079
Probability	0.712300	0.858529	0.493495	0.096065	0.638241
Sum	242.1500	241.8900	371.0800	294.5000	155.9800
Sum Sq. Dev.	18154.69	14647.87	1983.582	533.9781	23054.85
Observations	21	21	21	21	21

Source: Computations by the Authors (2021) with the use of E-Views

The descriptive statistics in Table 1 show that the probability values of Jarque-Bera of all the variables are not statistically significant at 5% significant level, indicating that the assumption of normal distribution has not been violated.

Table 2: UNIT ROOT TEST

PP – Fisher Chi - sq

Variables	At First Difference	Order of Integration
Crude oil price	0.0000*	I(1)
GDP	0.0000*	I(1)
Inflation rate	0.0007*	I(1)
Interest rate	0.0027*	I(1)
Share price	0.0002*	I(1)

Source: Computations by the Authors (2021) with the use of E-Views

Table 2 shows that all the variables became stationary at first difference.

Table 3: REGRESSION RESULT

Dependent Variable: SHARE_PRICE
Method: Least Squares
Date: 06/02/21 Time: 12:33
Sample: 2000 2020
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-6.821795	27.20421	-0.250763	0.8052
CRUDE_OIL_PRICE	0.019669	0.348174	0.056492	0.9556
GDP	0.948268	0.793606	1.194885	0.2495
INFLATION	0.085595	1.774621	0.048233	0.9621
INTEREST_RATE	0.022817	0.225573	0.101153	0.9207

R-squared	0.100102	Mean dependent var	11.53095
Adjusted R-squared	-0.124872	S.D. dependent var	30.12863
S.E. of regression	31.95442	Akaike info criterion	9.970755
Sum squared resid	16337.36	Schwarz criterion	10.21945
Log likelihood	-99.69293	Hannan-Quinn criter.	10.02473
F-statistic	0.444950	Durbin-Watson stat	1.948703
Prob(F-statistic)	0.774488		

Source: Computations by the Authors (2021) with the use of E-Views

Table 3 shows the results of least square. All the coefficients of the variables positively influence share prices and none of them is statistically significant.

Table 4: TEST FOR AUTO CORRELATION OR SERIAL CORRELATION

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.258237	Prob. F (2,14)	0.7760
Obs*R-squared	0.747149	Prob. Chi-Square (2)	0.6883

Source: Computations by the Authors (2021) with the use of E-Views

The result of serial correlation conducted (Table 4) confirms the absence of serial correlation (P=0.7760 > 0.05). This affirms the 1.948 (close to 2.000) of Durbin – Watson (Table 3).

Table 5: TEST FOR HETEROSKEDASTICITY

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.684032	Prob. F(4,16)	0.2027
Obs*R-squared	6.221758	Prob. Chi-Square(4)	0.1832
Scaled explained SS	2.787420	Prob. Chi-Square(4)	0.5940

Source: Computations by the Authors (2021) with the use of E-Views

The result of test for heteroskedasticity (Table 5) confirms the absence of heteroskedasticity (p = 0.2027 > 0.05). It is necessary to know if a long-run relationship or cointegration exists among the variables. To achieve this, the two-step method advocated by Engle and Granger (1987) was adopted for this work. The same method was used by Malaolu*et al* (2013).
The result of the unit root test on Error Correction Model (ECM) introduced into the variables is presented in Table 6.

Table 6: Result of unit root test of ECM

Null Hypothesis: ECM has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.397065	0.0028
Test critical values:	1% level	-3.808546	
	5% level	-3.020686	
	10% level	-2.650413	

*MacKinnon (1996) one-sided p-values.

Source: Computations by the Authors (2021) with the use of E-Views

The result of the unit root test for ECM (Table 6) shows that ECM is stationary at level (p = 0.0028 < 0.05), that is I(0).
The accepted rule is that if all the variables are I(1) (Stationary at first difference) and ECM is I(0) (Stationary at level), then a co-integration or long-run relationship exists among the variables. All the variables are I(1) (Table 2) and ECM is I(0) (Table 6) confirming the existence of co-integration.

Finally, it is necessary to ascertain if adjustment to observed error can be made and also the speed of recovery.

Table 7: LONG- TERM ADJUSTMENT AND SPEED OF RECOVERY

Dependent Variable: D(SHARE_PRICE)
Method: Least Squares
Date: 06/03/21   Time: 14:37
Sample (adjusted): 2001 2020
Included observations: 20 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.928307	7.289840	-0.264520	0.7952
D(CRUDE_OIL_PRICE)	0.123343	0.291552	0.423057	0.6787
D(INFLATION)	0.068663	1.764143	0.038922	0.9695
D(INTEREST_RATE)	0.083194	0.145988	0.569870	0.5778
D(GDP)	0.550129	0.922366	0.596433	0.5604
ECM(-1)	-1.020317	0.261955	-3.895009	0.0016
R-squared	0.522098	Mean dependent var		-2.840000
Adjusted R-squared	0.351418	S.D. dependent var		40.05914
S.E. of regression	32.26146	Akaike info criterion		10.02895
Sum squared resid	14571.23	Schwarz criterion		10.32767
Log likelihood	-94.28949	Hannan-Quinn criter.		10.08726
F-statistic	3.058936	Durbin-Watson stat		1.972572
Prob(F-statistic)	0.045126			

Source: Computations by the Authors (2021) with the use of E-Views

Table 7 shows the result of long-run adjustment and speed of recovery of fluctuations in share prices. The ECM (-1) must be negative and must not be significant. This was confirmed by Table 7. The coefficient value of ECM (-1) is 1.020317 in absolute term indicates the speed of adjustment towards equilibrium. The speed in this case is 102% per unit time, meaning that the whole adjustment can be done within a year since annual data had been used for this work. The Adjusted R-squared, which is the coefficient of determination is 0.351418 meaning that all the independent variables collectively account for 35% of the variations in the fluctuations of share prices in Nigeria while other factors not considered by this study account for 65%.

Table 8: Graphical presentation of the variables used
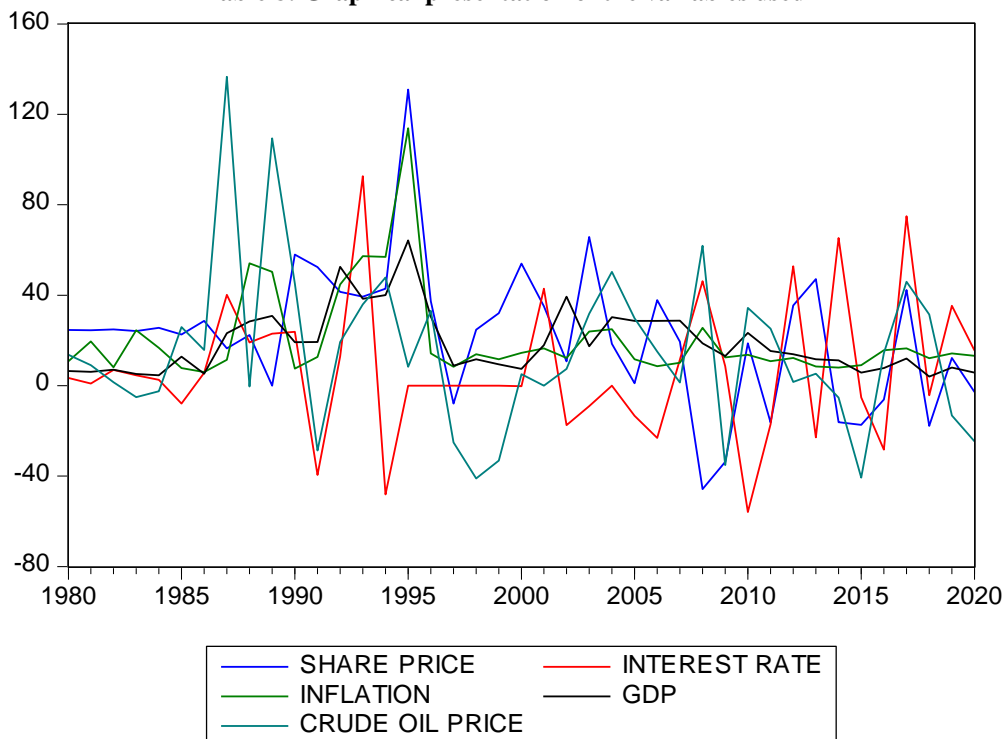
Source: Output from E-views (2021)

V. Discussion

The result in Table 7 shows that all the variables cointegrate in the long-run with the speed of adjustment of 102% and that none of them has a significant influence on share price fluctuations. The none significant influence is due to the same pattern of movements in the percentage change in all the variables as exhibited in Table 8.

Price of crude oil exerts a positive but not significant influence (p = 0.7952) on fluctuations in share prices in Nigeria (Table 7). Oil is an essential commodity as it serves as raw material for industrial production, petroleum being one of the sources of renewable energy in the world. The price of petroleum is therefore a force to reckon with in determining economic performances globally. An increase in demand for oil globally is seen by participants in capital market as a sign of economic recovery while a loss in demand is regarded as a reduction in economic recovery. Expectations of an increase in financial performance of companies increase with an increase in oil prices worldwide (Syarofi, 2014 in Hesty*et al*, 2017), leading to increase in share prices. Handiani (2014), Syarofi (2014 in Hesty *et al,* 2017) and Witjaksono (2010) found that oil price does not affect share prices in contrast to Hanafiah, Sudjana&Sulasmiyati (2015) that established an effect.

Findings further show that inflation has a positive but not significant influence (p = 0.6787) on fluctuations of share prices (Table 7). Inflation rises with both risk-free and discount rate though Defina (1991) was of the opinion that cash flows and inflation do not increase similarly and that an increase in the discount rate makes stock prices to fall. The real income reduces with high inflation with investors selling their property including shares for survival. The opposite is the situation with low inflation when more assets are acquired by investors. What this means in essence is that share prices are negatively affected when inflation is high while share prices are boosted by low inflation.

Previous works that investigated how inflation affects share prices were done by Agustina and Sumartio (2014); Amin (2012); Kewal (2012); Maryanne and Menina (2009); Zulkarnaen, Syamsun and Maulana (2016), the results of which found no effect of inflation on share prices in contrast to Krisna and Wirawati (2013) that found an effect. Malaolu*et al* (2013) established no long-run relationship between inflation and fluctuations of share prices in Nigeria.

Interest rates have a positive but not significant influence (p = 0.9695) on fluctuations of share prices in Nigeria (Table 7). An increase in interest rate is likely to make investors move to money market from stock market. When interest rate is reduced, demand for cash is encouraged so that investors can speculate, thereby boosting activities in the stock market. A high interest rate offered by banks makes savings more preferrable than investment in shares. The high interest to depositors leads to interests on loans to be high. This will invariably affect earnings and dividends, thus making shares in the affected companies less attractive with fluctuating prices. Previous works that concluded that stock prices are not affected by interest rates include Agustina&Sumartio (2014); Amin (2012); Kewal (2012); Maryanne &Menina (2009); Zulkarnaen, Syamsun&Maulana (2016). Al-Quenae, Li & Wearing (2002) found a positive relationship between GNP and fluctuations in share prices in Kuwait while Malaolu*et al* (2013) established no long-run relationship between interest rates and fluctuations of share prices in Nigeria.

GDP exerts a positive but not significant influence (p = 0.5778) on fluctuations of share prices in Nigeria (Table 7). An improvement in the GDP can lead to an increase in share prices due to the possibility of more profits that can accrue from favourable business environment. Conversely, a decline in GDP is likely to negatively affect share prices. Chaudhuri and Smiles (2004) established that a long-run relationship exists between share prices and real economic activities. Al-Quenae, Li and Wearing (2002) found a positive relationship between GNP and fluctuations in share prices in Kuwait.

VI.   Conclusion

This study concludes from findings that all the variables used for this study have a long run relationship in influencing fluctuations in share prices in Nigeria. Each of them has a positive but not significant influence on the fluctuations.

VII.   Recommendations

As each of the variables used in this study has a positive influence on fluctuations in share prices in Nigeria, this study recommends that government and other stake holders in capital market should pay more attention to them. Since all the variables account for 35% of the variations in the fluctuations of share prices in Nigeria, it is further being recommended that the whole economy should be overhauled by government and other stakeholder in order to ensure stable share prices with its attendant benefits.

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