

Reconciling Macroeconomic Determinants with Stock Market Performance in Selected Sub-Saharan African Countries: an ARDL Approach

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ABSTRACT

Prior studies have adduced unstable macroeconomic factors to stock price movement overtime but the relationship between the duo remained unsettled. Autoregressive Distributed Lag (ARDL) technique was used to reconcile the macroeconomic determinants with performance of stock markets in selected Sub-Saharan Africa (SSA) covering the period of 1999:1–2017:4. It was found that macroeconomic indicators were essential in determining stock market performance in Nigeria while South African stock market did not show any predictable linkage but the contemporaneous

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effect of oil price changes on stock market performance in selected SSA. The study, therefore, recommended that countries in SSA should reduce overdependence on oil to minimize external influence in order to promote stability of the stock markets.

JEL Classification: E6, G1, R5

Keywords: Macroeconomic Determinants, Stock Market Performance, External Shock, Sub-Saharan Africa

1. INTRODUCTION

Stock market is one of the cardinals which is expected to propel any economy but the prosperity of this market may be retarded by the conduct of key macroeconomic factors as this would affect behaviour of economic agents, hence economic growth. The ability of the market to allocate funds into productive sector, the more the economy grows as it mirrors the strength of the productive capacity and projects the stability of the financial system. This submission by Onwe (2013 as cited in Arikewuyo & Akingunola, 2019) led credence to the fact that financial system is driven by its economic size and any economy's developmental process is dependent on efficient repackaging of funds between surplus economic providers and deficit economic demanders.

The stock market was designed to provide long-term funds to business organisations but the decisions of providers of funds and trading activities in the market are vulnerable to a lot of macroeconomic factors which are undiversifiable in nature which led to unimpressive stock market performance thereby resulted into loss of confidence and reduced consumer savings habit as well as rise in risk of equity investment and these had greatly affected business environment (Arestis, Demetriades & Luintel, 2001; Mala & Reddy, 2007).

It was the opinion of scholars such as Levine (1991); Bencivenga and Smith (1991) that the best avenue through which surplus economic units deferred their consumption for future – yielding financial claims and easy convertibility of such claims at will without altering the available capital of firms is stock market. That is why Singh (1997 as cited in Olweny & Kimani, 2011) established that some factors such as instability in macroeconomic variables, volatility and pricing process may not provide good haven for long run economic growth to be achieved through stock market. Unstable macroeconomic environment as corroborated by Akingunola and Arikewuyo (2016) was one of the contributory factors to low savings in developing nations as this had led to resource gap which has contributed to stock market retardation in sub-Saharan African (SSA).

Macroeconomics determinants (MED) are derived from macroeconomics covers the conduct of the economy as a whole which bothers on core economic-based performance indicators, such as gross domestic product (GDP); interest rate, exchange rates as well as inflation and the interrelationship among diverse economic sectors (Karl, Ray & Shannon, 2009). It includes economic growth captured by gross domestic product (GDP), interest rates, exchange rates and inflation rates. Chen, Roll and Ross (1986) viewed these macroeconomic indicators as significant in determining firm performance and gains to investors. Macroeconomic factors influencing stock prices are those characteristics of the macro-economy that affect pricing of shares in the market through stock market activities within such economy. These macroeconomic determinants vary in their respective levels of significance from one economy to another and cannot be directly controlled by any individuals, managerial decisions and activities.

In recent times, the inherent exposure of Sub-Saharan African (SSA) stock markets have been mirrored profoundly in the movement of stock prices on the floor of their respective stock exchanges. The Nigerian stock market, for instance, has displayed unpredictable movements that

have resulted into return diminutions and capital loss across all sectors (Abosedo & Oseni, 2011) but as activities in the Nigerian capital market continues to fall and selling pressures remain high, a section of market participants has attributed the trend to panic and unstable macroeconomic variables. In the same vein, Lettau and Ludvigson (2001) as reported in Charteris and Strydom (2016) from South Africa's study that the changing patterns of macroeconomic variables are likely to assist in forecasting future share returns.

Records showed that SSA has continued to experience decline in number of initial public offerings (IPOs) which signaled loss of confidence in the market in the last five years. Statistics revealed that total number of IPOs on Nigerian stock exchanges was three with total capital of 571 million (US dollars) while that of South Africa accounted for forty-three IPOs with total capital of 5,895 million (US dollars) over five-year period (2014–2018).

Next to Nigeria is the Bourse Régionale des Valeurs Mobilières (BRVM) housing eight countries (Benin, Burkina Faso, Guinea – Bissau, Côte d'Ivoire, Mali, Senegal, Niger & Togo) had nine IPOs with total capital of 400 million (US dollars) and the country with least IPOs is Zimbabwe which recorded one IPOs with 1 million (US dollars). In terms of IPOs outside African region (outbound IPOs), Nigeria and South Africa recorded 538 million (US dollars) and 35 million (US dollars) on oil & gas and basic materials respectively (Africa Capital Market Watch, 2019). This has further exposed financial markets in SSA to external shock.

Previous studies have established evidence that macroeconomic factors influenced stock prices – short-term interest rate (Rigobon & Sack, 2004); inflation rate (Engle & Rangel, 2005; Saryal, 2007; Bekaert & Engstrom, 2010). Findings of different researchers affirmed that macroeconomic factors are some of the predictive powers of stock prices. This was further corroborated by Singh (1997) that macroeconomic variables have great deal in the interaction of both stock market and economic growth.

There are numerous ways through which macroeconomic determinants do influence financial system performance. As Levine (1996) posited that economic growth of any economy can be influenced by the efficiency of intermediation role of financial system. This is well documented in the demand – following or supply – leading hypothesis, although empirical findings established stock market as a prima-facie to achieving macroeconomic objectives (Aduda, Chogii & Maina, 2014). What can be deduced from this is that macroeconomic variables contribute to oscillating stock prices as this is expected to influence the behaviour of investors.

This study contributes to the existing stock market performance literature in the following ways: First, empirical evidence is based on decomposition of the exchange rate into official and parallel market exchange rates in Nigeria context. Second, the inclusion of financial deepening in the study is to ascertain the interrelatedness between credit creation habit of deposit money banks (DMBs) and stock market performance. Third, it was observed that majority of the previous studies was bedeviled with variable measurement fraught as there were indiscriminate measurements of oscillating and fluctuating variables. To the best of our knowledge in this regard, a crucial gap is the consideration of the characteristic nature of variables as espoused by theories and reality as interest rate and inflation do fluctuate while stock prices and oil prices are volatile. In finance perspective, variable nomenclature matters in measurement. This is one of the major uniqueness of this paper compared to previous studies.

This study examines the short and long – run relationships of macroeconomic indicators on stock prices in some selected SSA economies. Hence, this study examines the effect of macroeconomic determinants on stock market performance in emerging economies with particular reference to Nigeria and South Africa. The choice for South Africa and Nigeria was because the two countries were adjudged to have the largest stock exchanges, in terms of number of listed companies and market capitalisation, in SSA (Dirk *et al*, 2018). The remaining part of this paper includes section two which reviews literature, section three delves into methodology as section four centres on results while section five concludes the paper.

2. LITERATURE REVIEW

The emergence of stock market in Nigeria was to accelerate the pace of economic development (Arikewuyo, 2018) but the change in equity prices informed investor's decision on the kind of available investment opportunities and shape the behaviour of corporate financial policy (Gordon, 1959 as cited in Inyama, 2015) and an investor's objective of maximising returns on investment is not jeopardized (Ebrahimi & Chadegani, 2011 as cited in Inyama, 2015). Maku and Atanda (2009) posited that macroeconomic fundamentals do shape prices of stock and it was generally believed that monetary policy as well as macroeconomic events has a large influence on the stock prices and its behaviour in relation to macroeconomic indicators has great implication as unimpressive stock market performance may weaken confidence in the market.

In a study of Asaolu and Ogunmuyiwa (2010) on the impact of macroeconomic variables on average share price in Nigeria between 1986–2007 in which the study adopted co integration and Error Correction Method (ECM) for analysis. The study employs data on twenty-five (25) quoted companies and macroeconomic variables to determine how changes in macroeconomic variables explained stock prices movements in Nigeria. From the model of the study, average stock prices (ASP) was captured as explained variable while external debt, inflation rate, fiscal deficit, exchange rate, foreign capital inflow, industrial output and inflation rate were the explanatory variables adopted. Finding from the co-integration and ECM framework showed a long-run relationship between ASP macroeconomic variables during the period while a weak relationship between ASP and macroeconomic variables in Nigeria.

Adaramola (2011) investigated how macroeconomic variables impacted on stock prices in Nigeria covering the period of 1985–2009 based quarterly data. The study employed panel model and the variables used include stock price, money supply, interest rate, exchange rate, inflation rate, oil price and gross domestic product. The finding revealed that all macroeconomic variables used in this study have significant impacts on stock prices in Nigeria except inflation rate and money supply.

In another study by Kuwornu and Owusu-Nantwi (2011) examining the relationship between macroeconomic variables and stock market returns in Ghana covering 1992–2008 on monthly basis. The study employed full information maximum likelihood estimation procedure to estimate the variables of interest. The variables used include All-Share index, inflation rate, crude oil price, exchange rate and 91-day Treasury bill rate. The outcome revealed that consumer price index had a positive significant effect while exchange rate and T-bill rate have negative significant influence on stock market returns. It was further discovered that crude oil prices did not have any significant effect on stock returns in Ghana.

Gupta and Modise (2013) employed predictive regression model comprising MSE-F and ENC-NEW test statistics to investigate in – sample and out – of – sample predictability of South African stock return using macroeconomic variables. The study which covered the period of 1990:01–2010:06 found that macroeconomic and financial variables have no predicting linkage with South African stock return in a linear predictive regression framework.

Zubair (2013) used Johansen's cointegration and Granger-causality estimations covering before and during the global financial crisis for Nigeria for the period 2001:1–2011:12. Findings revealed no long-run relationship before and during the crisis while Granger-causality test shows a unidirectional causal relationship running from M2 to ASI before the crisis while during the period of the crisis there is no causal relationship between the variables. This implies that ASI responds to M₂.

Hunjra, Chani, Shahzad, Farooq and Khan (2014) investigated how macroeconomic variables impacts on stock prices in Pakistan. The estimation techniques employed include Granger-causality and cointegration tests covering 2001:1–2011:12. The variables considered include interest rate, exchange rate, GDP, inflation and stock prices. Findings revealed a significant relationship

between GDP and stock prices; an insignificant relationship between/among exchange rate, inflation rate and interest rate on stock prices. Furthermore, no relationship between dependent and explanatory variables in the short-run and strong relationship in the long-run was established.

Omorokunwa and Ikponmwosa (2014) examined the relations between stock price volatility and few macroeconomic variables in Nigeria using an annual data from 1980–2011. The tool of estimation was Generalized Autoregressive Conditional Heteroskedasticity (GARCH) and the variables included were stock prices, inflation, exchange rate, GDP and interest rate. Findings showed an indirect and significant relationship. It was further discovered that stock prices in Nigeria were volatile and that previous market information influences current volatility of the stock price. It established weak influence of interest rate and exchange rate on stock price volatility while inflation is key in stock price volatility in Nigeria.

Kirui, Wawire and Onono (2014) evaluated the influence of macroeconomic variables on stock market returns in Kenya. Threshold Generalized Autoregressive Conditional Heteroskedasticity (TGARCH) statistical technique was used covering 2001:1–2012:4. The variables considered include GDP, T-bill, exchange rate, inflation and stock market return and findings revealed negative relations between stock return and exchange rate while other macroeconomic variables were not significant in explaining stock returns.

In the study of Balcilar, Gupta and Kyei (2015) which analysed whether prediction of South African stock returns is based on a measure of economic policy uncertainty (EPU) of South Africa and twenty-one developed and emerging markets. It employed nonparametric causality – in – quartiles test covering 1990:01–2012:03 found that economic policy uncertainty of twenty-one countries including that of South Africa is significant in predicting South African stock market and it was concluded that South African stock market is inefficient.

Ligočká, Pražák and Stavárek (2016) examined the relationship between macroeconomic fundamentals and selected Swiss real estate companies' stock prices. Vector Error Correction and Granger causality techniques were employed covering the period of 2005–2014 with GDP, interest rate, price level and stock prices as variables of interest. It was found that macroeconomic variables and the interest rate in particular have a long-run relationship with behaviour of stock prices in Switzerland.

In the study of Ntshangase, Mingiri and Palesa (2016) on South Africa examined how stock market was influenced by macroeconomic policy variables based on Johansen cointegration test and the restricted VAR model for estimation covering 1994–2012 annualised data. The variables considered include stock market index, government expenditure, money supply, domestic real interest rate, exchange rate and inflation rate. It was revealed that all monetary variables considered transmitted into the stock market.

Charteris and Strydom (2016) carried out a study to ascertain whether consumption aggregate wealth ratio can predict share returns in South Africa. The study covered the period of 1990:03 – 2013:01 and used cointegration single equation method and it was found that consumption aggregate ratio predicts returns in short-run within a year but cannot be applicable in the long-run.

Jareño and Negrut (2016) analysed the association between US stock market and some relevant macroeconomic factors with correlation covering 2008–2014 on quarterly basis. The variables included were GDP, the consumer price index (CPI), the industrial production index, the unemployment rate, long-term interest rates and Dow Jones market index. Findings revealed positive and significant relationship among US stock market, GDP and industrial production index while negative and significant relationship existed among stock market, unemployment as well as US interest rate.

Marshal (2017) investigated how macroeconomic dynamics influenced Nigerian bank lending behaviour between 1976 and 2016. The study employed ordinary least square (OLS), Johansen multivariate co integration and granger causality techniques. Findings revealed that bank

capitalization ratio and money supply are the most potent variables influencing lending behavior of Nigerian banks.

Chandrashekar, Sakthivel, Sampath and Chittedi (2018) explored the significance of macroeconomic variables on stock prices for emerging economies. Dynamic ordinary least squares (DOLS) and short run panel causality covering 2001:1–2016:8 were used. Findings of this study revealed long-run equilibrating relationships among stock prices, inflation, industrial production, real exchange rates and interest rate in India and Brazil. More so, industrial production and exchange rate have positive effect on stock prices while inflation and interest rates have no significant impact on prices of stock in the selected countries namely India and Brazil.

3. METHODOLOGY AND DATA

In considering the effect of macroeconomic determinants on stock market performance, this section delves into the sources and process of data collection as well as the analytical technique for achieving the purpose of this study. It employed *ex-post facto* case study design type and being secondary in nature, it covered the period of 1999–2017 on quarterly basis having its sources of information from Central Bank of Nigeria statistical bulletin, Federal Reserve Bank of St. Louis and Nigerian Stock Exchange (NSE) databank. This period was considered necessary in emerging markets because it was after Asian financial crisis through global financial crisis which affected stock market. The study employed Autoregressive Distributed Lag (ARDL) technique for analysis at 5% level of significance. The data needed include All-Share Index (asi), inflation (ifl), rate of interest (itr), growth in money supply (gms), real exchange rate (rex), parallel market exchange rate (pex), prices of international oil (opr) and financial deepening (fdp).

This study adapted models of Asaolu and Ogunmuyiwa (2010), Adaramola (2011), Omorokunwa and Ikponmwoosa (2014) as well as Chandrashekar, Sampath and Chittedi (2018) with modifications where appropriate to suit the objectives of this study. For clarity, this study modified the models using economy-wide data as against firm-specificity in the studies of Asaolu and Ogunmuyiwa (2010) as well as Adaramola (2011) and quarterly data as against Omorokunwa and Ikponmwoosa (2014) as well as Chandrashekar *et al* (2018) that bother on the nature of data (annual and monthly respectively).

The model employed was specified in equation (3.1), thus:

$$skp_t = f(med_t, nof_t) \quad (3.1)$$

where:

skp_t = stock price at period t ;

med_t = macroeconomic determinants at period t ; and

nof_t = notable factors at period t .

The components of macroeconomic determinants (med_t) were shown in equation (3.2):

$$med_t = f(ifl_t, itr_t, gms_t) \quad (3.2)$$

where:

ifl_t = inflation rate at period t ;

itr_t = interest rate at period t ;

gms_t = growth in money supply at period t .

Furthermore, the components of other notable factors (nof_t) were depicted in equation (3.3):

$$nof_t = f(rex_t, pex_t, opr_t, fdp_t) \quad (3.3)$$

where:

rex_t = real exchange rate at period t ;

pex_t = parallel market exchange rate at period t ;

opr_t = change in international oil price at period t ; and

fdp_t = financial deepening at period t .

In furtherance to the equations (3.1)–(3.3), the linear relationship was specified in equation (3.4) as follows:

$$skp_t = \alpha_0 + \alpha_1 ifl_t + \alpha_2 itr_t + \alpha_3 gms_t + \alpha_4 rex_t + \alpha_5 pex_t + \alpha_6 opr_t + \alpha_7 fdp_t + \varepsilon_t \quad (3.4)$$

Thus, the ARDL model for equation (3.4) is given, thus

$$\begin{aligned} \Delta skp_t = & \alpha_0 + \sum_{i=1}^n \alpha_1 \Delta skp_{t-1} + \sum \alpha_2 ifl'_{t-1} + \sum \alpha_3 itr'_{t-1} + \sum \alpha_4 gms'_{t-1} + \\ & \sum \alpha_5 rex'_{t-1} + \sum \alpha_6 pex'_{t-1} + \sum \alpha_7 opr'_{t-1} + \sum \alpha_8 fdp'_{t-1} + \alpha_9 skp_{t-1} + \alpha_{10} ifl'_{t-1} + \\ & \alpha_{11} itr'_{t-1} + \alpha_{12} gms'_{t-1} + \alpha_{13} rex'_{t-1} + \alpha_{14} pex'_{t-1} + \alpha_{15} opr'_{t-1} + \alpha_{16} fdp'_{t-1} + \varepsilon_t \end{aligned} \quad (3.5)$$

3.1. Justification of Variables

The inclusion of variables was based on literature of previous studies and the importance of such variables in economic activities

skp = Stock Price reflects the expectation of future performance of firms and can be used as a measure of economic performance (Nasseh & Strauss, 2000; Adjasi & Biekpe, 2006; Maysami et al., 2004; Kuwornu & Owusu-Nantwi, Victor, 2011). This was captured by All-Share Index (ASI) and represents the explained variable;

ifl = Inflation Rate depicts strength of consumption rate over time (Akingunola & Arikewuyo, 2016). It will affect stock prices as swings in inflation rate influences economic activities in Nigeria (Obasan & Arikewuyo, 2012). However, fluctuation of inflation rate was considered because this is usually reported on periodic basis. This is one of the explanatory variables representing macroeconomic factors;

itr = Interest Rate plays an important role and it is price for waiting and consumption postponement (Omorokunwa & Ikponmwosa, 2014). Its fluctuation also influences the investors' behaviour in the stock market thereby affecting stock market performance. This is another explanatory variable representing macroeconomic factor;

gms = Growth in Money Supply measured with broad money, M_2 (Ntshangase, Mingiri & Palesa, 2016). This is expected to influence the savings habit of investors. However, the direction of its influence depends largely on policy embarked by the government, which may either expansionary or contractionary. This is another explanatory variable representing macroeconomic factor;

rex = Real Exchange Rate; this becomes necessary because the countries operate open economies and exchange rate behaviour (real) has impact on any economic activities. This is another explanatory variable representing macroeconomic factor;

pex = Parallel Exchange Rate; this is expected to have effect on the economy, most especially an economy where the apex bank could not meet up the demand for foreign currency (Arikewuyo, 2018). This is another explanatory variable representing macroeconomic factor but peculiar to Nigeria as data on this could not be obtained for South Africa;

opr = change in Oil Prices; this is expected to influence the stock performance (Adebiyi *et al*, 2009; Asaolu & Ilo, 2012). This represents foreign factor that influences stock market performance and an inverse relationship is expected based on extant literature; and

FDP = Financial Deepening measured as credit to private sector as a ratio to GDP; this is expected to influence behaviour of bankable public whose savings habit depend largely on economic activities.

α_0 = intercept term

$\alpha_1 - \alpha_7$ = parameters to be estimated

ε = stochastic error term (used to represent the Gaussian white noise).

4. RESULTS

This paper considered the need for correlation matrix to determine whether collinearity exists between/among variables or not; stationarity test, using Augmented Dickey Fuller (ADF), of all the variables used in this study to understand the properties of the data from the two (2) countries (Nigeria and South Africa) so as to provide a guide for technique appropriateness and the data include volatility of share price indexes, fluctuation of inflation rates based on consumer price index (cpi), fluctuation of interest rate of the two countries, growth in money supply (gms), volatility of international oil prices (opr), financial deepening (fdp), real exchange rate (rex) based on CPI as well as parallel exchange rates (pex) for only Nigeria. Due to country-specificity, the exchange rate for Nigeria was decomposed into real and parallel market exchange rates due to the pressure of foreign currency demand in Nigeria, being an import-dependent country but this could not be so in South Africa context as a result of inaccessibility of such data.

Table 1 shows the extent of association between variables of the model and exhibits where there is problem of multicollinearity. Pairwise correlation matrix revealed positive association between/among all variables except among inflation/money supply/financial deepening/real exchange rate and real exchange rate/prices of international oil for Nigeria; negative association only exists between inflation/real exchange rate as well as prices of international oil/real exchange rate for South Africa. Thus, the associations between/among variables did not suggest any ‘strong’ relationship as correlation coefficient of all the variables is below 0.7 (Schober, Boer & Schwarte, 2018).

Table 2 showed the outcome of the Augmented Dickey Fuller (ADF) unit root test for Nigeria and South Africa showed differed and similar order of integration. For instance, the ADF test showed that Nigeria and South Africa have similar order of integration, I(0) and I(1) for fluctuations of inflation rates, interest rates, international oil volatility and growth in money supply, stock market financial deepening respectively while differed order of integration was witnessed in volatility of share price indexes and real exchange rates.

Table 1
Correlation Matrix

	ifl	itr	gms	opr	fdp	rex	pex
ifl:							
Nigeria	1						
South Africa	1						
itr:							
Nigeria	0.0029	1					
South Africa	0.5989	1					
gms:							
Nigeria	-0.0008	0.1436	1				
South Africa	0.0998	0.2069	1				
opr:							
Nigeria	-0.0834	-0.2803	0.2126	1			
South Africa	0.1446	-0.2846	0.2261	1			
fdp:							
Nigeria	-0.0158	0.1211	0.6813	0.4412	1		
South Africa	0.0063	0.2192	0.6247	0.1362	1		
rex:							
Nigeria	-0.4937	0.0948	0.0355	-0.0704	-0.0422	1	
South Africa	-0.0087	0.0484	0.4162	-0.0360	0.4971	1	
pex:							
Nigeria	0.0047	0.1303	0.4669	0.0184	0.3151	0.4235	1

Source: Authors' Computation, 2019.

Table 2
Unit Root Test

Variable	ADF		Order of Integration	
	Nigeria	South Africa	Nigeria	South Africa
skp	-6.3779	-3.2781	I(1)	I(0)
ifl	-10.0701	-4.5615	I(0)	I(0)
itr	-5.1968	-4.5946	I(0)	I(0)
gms	-8.5426	-5.3225	I(1)	I(1)
opr		-3.6315	I(0)	I(0)
fdp	-6.7256	-4.0443	I(1)	I(1)
rex	-5.9160	-5.9800	I(0)	I(1)
pex	-3.6270	-	I(1)	-

Source: Authors' Computation, 2019.

With such mixture of different orders of integration, we applied the Autoregressive Distributed Lag (ARDL) following Pesaran, Shin and Smith (2001) as this technique combines both short-run and long-run coefficients. The Vector Autoregression (VAR) lag order selection criteria for Nigeria was six (6) and eight (8) for South Africa. The ARDL bound F-tests were displayed in Table 3 which showed a long-run equilibrating relation between macroeconomic indicators and stock market performance in Nigeria while South Africa displayed no long-run equilibrating relation given their respective F-statistic of 4.5705 and 2.2586 at 5% level of significance. Different diagnostic statistic for the two economies revealed the absence of serial correlation and heteroscedasticity ($p > 0.05$) which implied that the model was reliable. Findings showed that explanatory variables included were of good fit and explained about 73% for Nigeria and 78% for South Africa, using Adj. R^2 measure.

Table 3
ARDL Bound Test

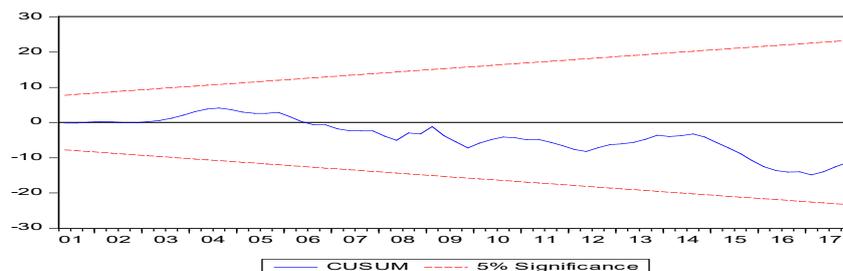
Estimated Equation: $SPI_N = f(IFL\ ITR\ GMS\ REX\ PEX\ FDP\ OPR)$ $SPI_S = f(IFL\ ITR\ GMS\ REX\ FDP\ OPR)$			
F-statistic:	Nigeria (N) South Africa (S)	4.5705 2.2586	
Optimal lag length	(2, 1, 2, 2, 2, 2, 1)		
Significance level	Critical values		
		Lower bound	Upper bound
1%:	Nigeria	2.96	4.26
	South Africa	3.15	4.43
5%:	Nigeria	2.32	3.5
	South Africa	2.45	3.61
10%:	Nigeria	2.03	3.13
	South Africa	2.12	3.23
Diagnostic Tests	Statistics		
R ² :	Nigeria	0.8481	
	South Africa	0.9731	
Adjusted R ² :	Nigeria	0.7282	
	South Africa	0.7787	
F-statistics:	Nigeria	7.0736 (0.0000)	
	South Africa	5.0029 (0.0102)	
Breusch-Godfrey Serial Correlation LM Test:	Nigeria	1.1808 (0.3411)	
	South Africa	1.0528 (0.4719)	
ARCH LM Heteroscedasticity Test:	Nigeria	0.2671 (0.9500)	
	South Africa	0.3575 (0.9378)	
Specification Error – Ramsey RESET Test:	Nigeria	17.3598 (0.0008)	
	South Africa	15.0026 (0.0029)	

Source: Authors' Computation, 2019.

Furthermore, the CUSUM and CUSUM-SQ statistic for the two countries was within the acceptable bound of 5% significant level which implied that the CUSUM stability test of the model is stable while CUSUM of squares were conducted to establish the constancy of short-run dynamics of long-run parameters except for Nigerian case that revealed unstable situation between 2005:Q1 and 2008:Q4 which coincided with financial reform period (recapitalisation and rationalisation of Deposit Money Banks) to the global period of financial crisis. It is, therefore, imperative to state that this model is structurally stable and an indication that the model will produce a reliable result for policy implication.

Figure 1

a. Cumulative Sum (CUSUM) Plot for Nigeria



b. Cumulative Sum (CUSUM) of Recursive Residuals Plot for Nigeria

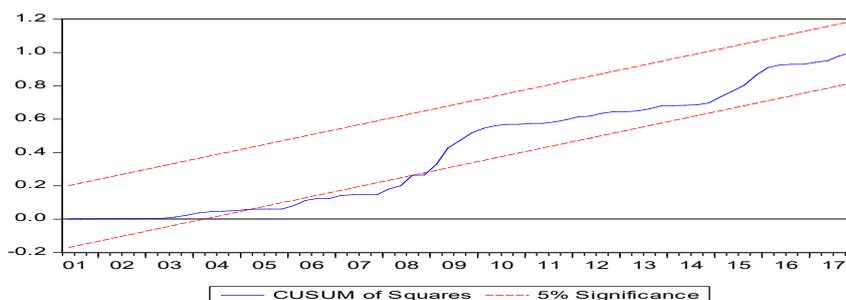
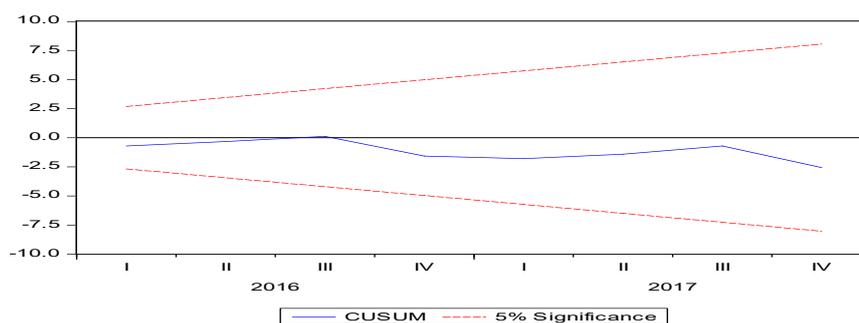
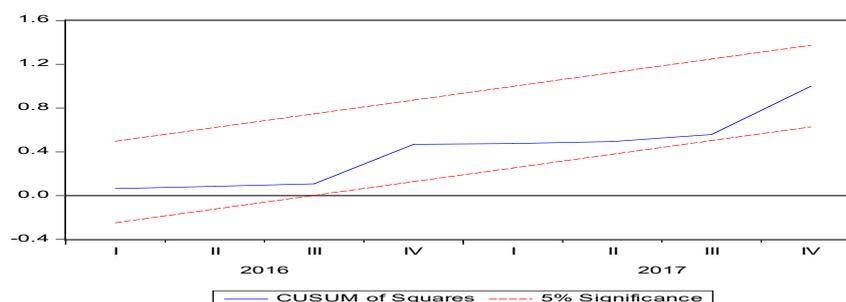


Figure 2

a. Cumulative Sum (CUSUM) Plot for South Africa



b. Cumulative Sum (CUSUM) of Recursive Residuals Plot for South Africa



Bound test in Table 3 necessitated the estimations of long-run and short-run dynamics through ECM to establish adjustment speed despite absence of long-run relationship in the case of South Africa. Empirical findings from ARDL result as depicted in Table 4 showed that error – correction term (ect) coefficient is in line with theoretical postulation as it is correctly signed. This indicates that about 83% and 99% departure from long-run equilibrium is due for adjustment in each quarter and it is significant and insignificant at 5% level for Nigeria and South Africa respectively. Thus, the magnitude of the adjustment mechanism (ect) shows that the adjustable speed toward long-run equilibrium is low as about 83% and 99% disequilibrium, despite non-significance of the latter, from the preceding quarter's shock converged to long-run in the current quarter for Nigeria and South Africa respectively.

Table 4

Short-run and Long-run Elasticities of ARDL Results for Nigeria and South Africa

Short-run Elasticities			Long-run Elasticities		
Variables	Coefficients		Variables	Coefficients	
	Nigeria (5,0,0,2,4,6,6,0)	South Africa (8, 6, 7, 8, 8, 7, 8)		Nigeria	South Africa
D(skp(-1))	0.3722** (0.0178)	0.2608 (0.5762)	ifl	-842387.32 (0.6422)	-673.2945 (0.2698)
D(skp(-2))	0.3989* (0.0085)	0.1568 (0.7808)	itr	-15085913.5 (0.3415)	-90.0871 (0.5607)
D(skp(-3))	0.1354 (0.3177)	0.9544 (0.0917)	gms	-1034.5761* (0.0002)	0.0000 (0.5479)
D(skp(-4))	-03355* (0.0080)	0.5600 (0.2212)	opr	53021.274* (0.0000)	0.0544* (0.0020)
D(skp(-5))	-	-0.1543 (0.6889)	fdp	59920158.4* (0.0000)	-0.3325 (0.1483)
D(skp(-6))	-	-0.7247 (0.0851)	rex	-2870.2941 (0.3233)	-0.1032 (0.3857)
D(skp(-7))	-	0.4979 (0.1775)	pex	2709.8398* (0.0002)	-
D(ifl)	-697024.6* (0.0000)	-298.3507 (0.1807)	c	-20728017.6* (0.0000)	39.9404 (0.1286)
D(ifl(-1))	-	-112.8331 (0.6745)			
D(ifl(-2))	-	-401.3083 (0.1912)			
D(ifl(-3))	-	-406.6712 (0.1993)			
D(ifl(-4))	-	461.4451 (0.1307)			
D(ifl(-5))	-	327.0439 (0.3432)			
D(itr)	-1248268.2* (0.0000)	58.7196 (0.1347)			
D(itr(-1))	-	52.2475 (0.3000)			

Short-run Elasticities			Long-run Elasticities		
Variables	Coefficients		Variables	Coefficients	
	Nigeria (5,0,0,2,4,6,6,0)	South Africa (8, 6, 7, 8, 8, 7, 8)		Nigeria	South Africa
D(itr(-2))	-	68.6897 (0.1408)			
D(itr(-3))	-	63.4332 (0.1674)			
D(itr(-4))	-	-41.3698 (0.2523)			
D(itr(-5))	-	-26.9970 (0.4883)			
D(itr(-6))	-	59.5630 (0.0575)			
D(gms)	-3507.31 (0.1563)	-0.0000 (0.7359)			
D(gms(-1))	3464.41 (0.1740)	-0.0000** (0.0193)			
D(gms(-2))	-	0.0000 (0.9688)			
D(gms(-3))	-	0.0000** (0.0313)			
D(gms(-4))	-	-0.0000 (0.5582)			
D(gms(-5))	-	0.0000 (0.9169)			
D(gms(-6))	-	-0.0000** (0.0366)			
D(gms(-7))	-	0.0000** (0.0113)			
D(opr)	10541.16** (0.0342)	0.0087 (0.0542)			
D(opr(-1))	2473.85 (0.6120)	-0.0085 (0.2152)			
D(opr(-2))	-18551.89* (0.0007)	0.0205** (0.0367)			
D(opr(-3))	7017.14 (0.1556)	0.0012 (0.8659)			
D(opr(-4))	-10235.67** (0.0479)	-0.0326* (0.0085)			
D(opr(-5))	-6793.38 (0.1850)	-0.0001 (0.9958)			
D(opr(-6))	-	0.0020 (0.7754)			
D(opr(-7))	-	-0.0180 (0.0268)			

Short-run Elasticities			Long-run Elasticities		
Variables	Coefficients		Variables	Coefficients	
	Nigeria (5,0,0,2,4,6,6,0)	South Africa (8, 6, 7, 8, 8, 7, 8)		Nigeria	South Africa
D(fdp)	-7408135.7* (0.0000)	-0.6472 (0.1040)			
D(fdp(-1))	13569504.6* (0.0000)	-0.4995 (0.3007)			
D(fdp(-2))	-21741560.7* (0.0000)	0.8134 (0.2952)			
D(fdp(-3))	-16867926.9* (0.0000)	-0.3211 (0.7048)			
D(fdp(-4))	36211571.7* (0.0000)	0.2499 (0.6621)			
D(fdp(-5))	-42609762.1* (0.0000)	-0.4249 (0.3231)			
D(fdp(-6))	-	0.2357 (0.3734)			
D(rex)	-2374.99 (0.3308)	0.0198 (0.1293)			
D(rex(-1))	-	0.0048 (0.4161)			
D(rex(-2))	-	-0.0049 (0.2723)			
D(rex(-3))	-	0.0077 (0.2521)			
D(rex(-4))	-	-0.0662 (0.0246)			
D(rex(-5))	-	0.1489 (0.1074)			
D(rex(-6))	-	0.0977 (0.2224)			
D(rex(-7))	-	-0.0514 (0.2213)			
D(pex)	943.79 (0.0927)	-			
D(pex(-1))	-92.4873 (0.8670)	-			
D(pex(-2))	-1409.91* (0.0037)	-			
D(pex(-3))	-788.70 (0.1707)	-			
CointEq(-1)	-0.8274* (0.0000)	-0.9856 (0.0941)			

Note: *, ** are significant at 1% and 5% levels respectively.

Source: Authors' Computation, 2019.

In Nigerian case, the significance of ‘ect’ was further supported by majority of the macroeconomic variables considered which include one-period, two-period and four-period lagged of stock price volatility, current period oil price volatility as well as one-previous and four-period lagged of financial deepening were positively significant in the short-run at various 1% and 5% level. Also, current inflation and interest rates, two-period and four-period lagged of oil price volatility, financial deepening at different lagged period of one, three and five as well as two-period parallel market exchange rate volatility were negatively significant at 1% and 5% levels. What we deduced from this result is that of all the variables considered; only growth in money supply and real exchange rate volatility were insignificant, in the short-run.

Furthermore, long-run result revealed that out of seven macroeconomic variables considered in Nigerian case, only three were insignificant (ifl, itr and rex) and those that were significant include oil price volatility, financial deepening, parallel market exchange rate and growth in money supply which only exerted negative impact on volatility of stock price. It is intuitive that certain macroeconomic variables have incursion into Nigerian stock market behaviour. This suggests that stock market activity is greatly influenced by macroeconomic behaviour and this may have far-reaching implication on investor confidence in Nigeria.

Unlike Nigeria, the non-significance of ect for South Africa suggested no causal relations between monetary variables and volatility of stock prices in the country. Thus, empirical finding revealed that all domestic monetary variables were not significant except growth in money supply (gms) whose influence can only be felt by the market three (3) months after its manipulation and this suggests that the manipulation of monetary policies by the monetary authority may not influence the behaviour of South African stock market.

It is crystal clear that stock markets of sampled economies are influenced by external factor (that is change in international oil price). The effect of changes in prices of oil exerted positive influence, in the short-run (precisely 6 months), on the volatility of the stock price in South Africa and this may be as a result of non-importation of refined crude oil by South Africa. More so, only oil price volatility affected South African stock price volatility, in the long-run. This implication of this is that stock market is contemporaneously affected by external factor and not domestic macroeconomic variables of the country.

5. CONCLUSIONS

This paper sets out to investigate the relationship between macroeconomic determinants and stock market performance of the two largest nations in the sub-Saharan Africa (South Africa and Nigeria) over the period of 1999:1–2017:4. The use of ARDL technique was based on the outcome of stationarity test and GARCH series was generated for oil prices and stock prices before estimation of short and long run effect (ARDL).

Following the empirical findings, macroeconomic variables were found to be significant in Nigerian stock market. Intuitively, any monetary or government policy changes will have a far reaching implication on the stock market. The implication which may either have negative or positive feedback as espoused by Summer (1988) in Edo (2009) thereby affecting confidence in the market. In furtherance to this, Nigerian government in conjunction with her South African counterpart, being the two largest economies in SSA, should pursue a paradigm shift through intra – African integration and cooperation to stem the tide of unstable macroeconomic environment that would culminate into stability of stock market in SSA continent.

Unlike Nigeria, South African stock market did not show any undoubtedly predictable linkage between macroeconomic variables and performance of stock market but showed contemporaneous effect of changes in oil price on performance of stock market which is also applicable to Nigerian

situation. The inference from this is that sub-Saharan Africa economies are exposed to external shocks (i. e. foreign shocks)

Based on these, it is our candid opinion that Nigeria embarks on policies that can drive the stock market to enviable position that will promote stock market participation and engender growth of the economy. More so, both South Africa and Nigeria should reduce overdependence on oil through diversification of economy as additional source of revenue as well as generation of energy through other viable means to checkmate high rate of demand for foreign currencies thereby reducing external influence so as to promote stability of the stock market, hence economic growth.

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