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Stock Market Returns and Macroeconomic Variables in Nigeria: Testing for Dynamic Linkages with a Structural Break

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Abstract: The paper analysed the dynamic interactions between two macroeconomic variables and stock market returns in Nigeria from 1970-2013, using F-Bound Cointegration and Todayamamoto Causality tests that are robust to structural breaks. The result of Zivot Andrew unit root test indicated that all the variables were non stationary at level but stationary at first difference. The result of ARDL F-Bound Test to cointegration also indicated that cointegration exist among the variables. In the sense of Causality Test, there is a strong evidence of uni-directional causality from per capita income tostock market returns and from inflation to stock market returns.It is also indicated that gross domestic per capita income and inflation jointly cauesd the stock market returns. In the context of policy implications, this study suggests that government should formulate appropriate policy to encourage investment in financial markets which in resulting stimulate economic growth.
Keywords: Stock Market Returns; Gross domestic per capita income; inflation; Zivot Andrew; F-bound Cointegration; Todayamamoto Causality

INTRODUCTION

Even though there are various empirical studies that investigated the shock of macroeconomic fundamentals on stock market indices, most of these studies typically focused on industrialised economies and the shock of these macroeconomic indicators on the stock market indices in less developed countries is less obvious. Specifically, how do these less-industrialised markets react to changes in its fundamental macroeconomic indicators for example money supply, inflation rate, industrial production, and crude oil price, is still a virgin area [1].

The analysis between macroeconomics variables and stock performance is of significant interest to several of researchers, including: [2-16]. All these studies endeavored to discover the link between stock market returns and macroeconomic indicators. It is frequently believed that the stock market performance is established by a various fundamental macroeconomic indicators for example industrial production, the inflation rate and interest rate.

Furthermore, an excellent number of studies have captured the impacts of macroeconomic indicators on the stock market returns for diverse nations. Existing theories offer various models that make available framework for examining the relationship between stock performance and macroeconomic variables [17,13].

The objectives of this study are to examine the relationship and causality between stock market returns and macroeconomic variables in Nigeria. The approach this paper adopts is a hypothetical expansion of the reviewed literature, which acknowledges that there are essential dynamic associations among macroeconomic variables and stock returns. In view of these, the present study is intended to use gross domestic per capita income, consumer price index, structural breaks, and cover a periods of 1970-2013 in order to more accurately measure the actual behaviour of the stock market in Nigeria, by including periods of different economic programmes in Nigeria to capture the impact of structural shocks, such as the Structural Adjustment Programme (SAP), guided deregulation as well as the current problem of insecurity and political instabilty that resulted in the withdrawal of foreign investors from the market. This paper is organized in the following sections. First-section introduction of the study; Second-section empirical reviews of some selected literature; third section, the source of data and sample,

and methodology used in the study are discussed. In The fourth section, the empirical results and discussion will be reported. In the last section, the summary, conclusion and recommendation of the study is provided.

Empirical Review

This section reviewed relevant empirical studies by examining their objectives, methodology and findings as well as critically examining each of the studies reviewed so as to identify the gaps to be filled by this research.The various empirical studies reviewed shows mixed results and conclusions. In some studies, strong positive relationships are found to exist between stock market returns and Macroeconomic Variables and in some the relationship is weak. Other researches report different results. This mixture of findings and conclusions emanates from differences in methodology, variables used and period of study. There is also disparity of study area that fundamentally affects the behaviour of the macroeconomic variables.

The major studies have been reviewed over the past 2-4 years, commencing with[18] which examined the effect of macroeconomic fundamentals on the Ghanaian stock market returns using monthly data from January 1992 to December, 2008. Macroeconomic variables used in this study are 91 days Treasury bill rate (a proxy for interest rate), crude oil price, consumer price index (a proxy for inflation) and the exchange rate. The study used the Johansen Multivariate Cointegration Procedure.Also, he found that cointegration exists between them and indicating long run relationship [19].

Examined the relationship between the stock market development and economic growth. They employed VECM Approach and analysed annual time series data on stock return, gross domestic product and rate of investment from the period of 1980-2010. They found that in the long-run, economic growth Granger causes both the stock market development and banking activity in Nigeria [20].

Examined the empirical relationship between macroeconomic variables and the stock market using Panel Data Approach for the period of 1988-2011. Their independent variables were external debt, money supply, and foreign direct investment. Their results showed that in the long-run FDI and EXdebt have positive impacts on the African stock markets while negative impact was found to exist on money supply [21].

Applied multivariate cointegration and variance decomposition analysis to examine the effect of macroeconomic factors on the stock market development in Jordan. They used monthly data between 1990 and 2011. Their result revealed that Total Value Traded relative to GDP_t, Money Supply relative to GDP_t, and Credit to Private Sector relative to GDP, and Gross Capital Formation relative to GDP, and Consumer Price Index (CPI) have positive and significant influences on stock market development, while Nominal Gross Domestic Product and Net Remittances relative to GDP_t have a negative impact [22].

Investigated the impact of macroeconomic variables on theshare price behaviour of Karachi stock exchange from July 2001 to June 2010 using correlation and regression technique. The macroeconomic variables were Treasury bill rate, consumer price index (proxy for inflation), wholesale price index, consumer price index. Their analysis showed that there was a significant relationship between macroeconomic variables and KSE 100 price index. However, the study excluded CPI as a measure of inflation. As a result, this study will include CPI in the method of analysis [23].

Investigate the nature of causality between macroeconomic variables and stock market return in Ghana. The study employed a monthly time series data from January 1995 to December 2010. To establish the long-run and short-run relationship, a vector autocorrection model (VECM) was adopted. Also to establish the existence of causality a Granger causality test was performed. The result of the study revealed that there is asignificant long-run relationship between stock return and macroeconomic variables such as money supply, inflation, and foreign direct investment. Only foreign direct investment and stock return have a significant relationship in the short-run. Also, the direction of causality runs from exchange rate and inflation to stock returns. The study also indicated the causal relationship running from astockreturn to the money supply, foreign direct investment and interest rate respectively [14].

Investigates the relationship between macroeconomic factors on the stock market behaviour considering Indian data. The five macroeconomic variables used were industrial production index, inflation, money supply, short-term interest rates and the stock market index over the period 1994:Q4-2011:Q4.Vector error correction model and Johansen cointegration were applied to discover the long-run equilibrium relationship between the stock market index and macroeconomic variables. He revealed that macroeconomic variables and the stock market index are cointegrated, and, therefore,long-run relationship exists between them. It also shows that the stock price is positively related to the money supply and industrial production index, but negatively related to inflation.

The interest rate and exchange rate were found to be insignificant [13].

Examined the effect of macroeconomic variables on the Nigerian stock market using a generalized autoregressive conditional heteroskedasticity model from 1985-2009. Based on selected macroeconomic variables, their findings revealed that out of six macroeconomic variables used, only inflation, government expenditure, index of manufacturing output, and interest rate have strong and significant influence on stock returns. Also, inflation and government spending exhibit a positive sign whereas the index of manufacturing output and interest rate have a negativeimpact. However, foreign exchange and money supply have no significant effect on stock return in Nigeria.

Employed Autoregressive Distributive Lag (ARDL) and Granger causality to investigate the nexus between inflation and stock market returns in Ghana. He used monthly time series data from January 1992 to December, 2010. His findings found that there is negative relationship between inflation and stock returns in the short run and positive relationship in the long run. However, the Granger causality showed a unidirectional causality running from inflation to stock market returns [25].

Examined the impact of interest rate, gold, exchange rate and crude oil on stock returns of ten U.S industries, using monthly data from January 1997 to September 2014. He used Ordinary least square (OLS) approach. The findings suggested that the impact of the macroeconomic variables varies between the industries. Crude oil has negative impact on only stock returns for four industries, but interest rate has no effect on stock returns. Conversely, the exchange rate has a mixed effect on the industries that depend on exports or imports of goods. The remaining industries were found insignificant results for the exchange rate [26].

Studied the effects of macroeconomic variables on stock market returns in Ghana from September 2000 to September 2010. They applied Vector error correction model (VECM) and Johansen Multivariate Techniques for the analysis. The found that cointegration exist between Macroeconomic variables and Stock market returns. Granger Causality results showed no causality from any direction between stock market returns and macroeconomic variables. However, the results of both variance decomposition and impulse response function showed that the shock of money supply, inflation and exchange rate do not explain any significance proportion of the stock returns, but their impact persist over a long period [27].

Studied the relationships between KSE-100 and the macroeconomic factors namely; gross domestic product, exchange rate, interest rate and inflation in Pakistan over the sampling period from 1992 to 2011. They used Multiple Regression and Pearson's correlation and found that gross domestic product, exchange rate, and inflation were positively relatedto the stock prices. While negative impact was found on the stock prices index of the interest rate. They also showed that 80% variations in the independent variables were explained the stock prices in Pakistan [28].

Examined the impact of Macroeconomic variables such as GDP per capita, inflation, GDP savings, exchange rate, and money supply on the stock market returns in Pakistan. They used Ordinary Least Square Regression analysis and Granger causality Test for the period of 1991 to 2013. They revealed that the exchange rate and gross domestic savings were having unidirectional causality with the Money supply. On the other hand, there is unidirectional causality running from gross domestic savings to the stock market returns. The findings also revealed that exchange rate, inflation, gross domestic savings, money supply, and GDP per capita have a significant positive impact on the stock market returns

[29] investigated the stock prices and macroeconomic forces such as industrial output, exchange rate, money supply, oil prices, and consumer price index in Saudi Arabia, using monthly data from January 1994 to June 2013. They applied Johansen cointegration test and Vector error correction model for the analysis. The cointegration test indicated the existence of a long-run relationship between the stock prices and the macroeconomic variables. Vector error correction model indicated the long-run causality from the independent variables to the dependent variables. Impulse response functions showed that industrial output shockspush up stock prices while consumer price index shocks pull it down [30].

Examined the shock of macroeconomic factors on the behaviour of Indian stock market. Monthly data for six macroeconomic factors, that is, money supply, Call Money Rate, Foreign Institutional Investment, Exchange rate between Indian Rupees and US dollar, Industrial productivity, wholesale price index and BSE Sensex over the period 2006:04 to 2013:07 were taken for the study. Unit root test, Pearson's correlation matrix, and Granger Causality tests were applied to test the relationships. The analysis disclosed that Indian stock market is positively related to the money supply, wholesale price index, and industrial productivity. The inflow of foreign institutional investment and exchange rate are found to be insignificant to Indian Stock

market. In the Granger Causality tests, industrial productivity and wholesale price index influence the stock market to a large extent [31].

Applied cointegration and vector autoregressive model and examined the dynamic relationship between four macroeconomic variables and stock prices in Kenya using annual time series data from 1997 to 2010. His variables were nominal gross domestic product, nominal exchange rate, and treasury bond rate. The analysis revealed that cointegration existed between the selected variables and stock prices. He also found that inflation has negative impact on the stock prices [32].

Investigated the effects of interest rate, inflation rate and output growth on stock market returns in Nigeria. He employed Ordinary least squares (OLS), Granger causality and cointegration over the period of 1986 to 2012. The analysis showed the existence of long run association among the variables. In the sense of the causality test, the inflation rate and real gross domestic product have unidirectional causal relation with stock market returns [33].

Used an Autoregressive Distributive Lag and analyzed the impact of macroeconomic variables on stock market returns in Nigeria from 1984 to 2013. Their Macroeconomic Variables were broad money supply, foreign direct investment, nominal effective exchange rate, gross domestic savings, gross domestic per capita income, and short-term treasury bills. They found that all the selected macroeconomic variables and Stock market returns were cointegrated and, thus, a long-run equilibrium relationship exists between them. They also revealed that some of the macroeconomicvariables were having bidirectional causality with the stock market returns; while others have unidirectional causality [34] investigated the dynamic relationship between macroeconomic variables and the stock prices in Kenya using quarterly data ranging from 1997Q1 to 2010Q4. They used Vector Autoregressive Model and Vector Error Correction Model.The variables used were consumer price index, nominal gross domestic product, nominal exchange rate and Treasury bond rate. They found positive relationships between the stock price and the nominal gross domestic product, nominal exchange rate, and the Treasury bill rate. However, negative relationships were found in the study of the stock prices and consumer price index.

METHODOLOGY

This study uses annual time series data for the period of 1970-2013 to examine the impact of Per capita income, inflation on stock market returns with the structural breaks. The data sourced from World Bank Development Database. All the series were transformed into the natural log form to reduce sharpness in data. The log-linear modeling directly provides elasticities and reliable results. This help policy making authorities to understand the impact of macroeconomic variables on Stock Market Returns, which lead to formulating a comprehensive economic policy to improve the performance of stock market.

Zivot-Andrews Unit Root Test

Various unit root are offered on applied economics to test the stationarity properties of the variables. The different unit root tests are Augmented Dickey-Fuller (ADF) tests developed by [35], Philips-Perron (PP) tests developed by [36], Kwiatkowski–Phillips–Schmidt–Shin (KPSS) tests developed by [37], Dickey-Fuller GLS (DF-GLS) tests developed by [38] and Ng-perron developed by [39]. All the tests have their share of inadequacy due to not having information about structural breakpoints occurred in the series they provide spuriously and biased results. As a result of that, [40] developed three models to test the stationarity properties of the variables in the existence of a structural break point in the series. The models are(i) this model permits a one-time change in the function of the trend component, which is the slope. (ii) The model has one-time change both in trend and intercepts functions of the variables to be used for empirical propose and (iii) this model allows a one-time change in variables at the level form. [40] pursued three models to check the hypothesis of a one-time structural break in the series. The models can be expressed as follows:

$$\Delta z_t = q + qz_{t-1} + v_t + w\Delta Q_t + \sum_{j=i}^{k} d_j\, \Delta z_{t-j} + \mu_t \dots\dots\dots\dots\dots\dots\dots (1)$$

$$\Delta z_t = v + vz_{t-1} + w_t + v\Delta T + \sum_{j=i}^{k} d_j\, \Delta z_{t-j} + \mu_t \dots\dots\dots\dots\dots\dots\dots (2)$$

$$\Delta z_t = w + wz_{t-1} + w_t + d\Delta Q_t + d\Delta T_t + \sum_{j=i}^{k} d_j\, \Delta z_{t-j} + \mu_t \dots\dots\dots\dots (3)$$

Where the dummy variables are indicated byΔQ_t showing mean shift occurred at each point with time break while trend shift variables is show by $\Delta T_t{}^3$. so,

$$\Delta Q_t = f(x) = \begin{cases} 1. \ldots if \ \ t > TB \\ 0. \ldots . if \ \ t < TB \end{cases} \text{and} \Delta Q_t = \begin{cases} t - TB. \ldots if \ \ t > TB \\ 0 \ldots \ldots \ldots . . \ \ if \ \ t < TB \end{cases} \ldots \ldots \ldots \ldots \ldots \ldots . (4)$$

The null hypothesis of unit roots break date is w=0 which shows that the series is not stationary with a drift not having information about structural break point while $w < 0$ hypothesis means that the variables are found to be trend-stationary with one unknown time break. Zivot-Andrews unit root test mends all points as possible for possible time break and does inference through regression for all possible break points consecutively. Afterwards, this unit root test chooses that time break that decreases one-sided t-statistic to test $\breve{w}(= w - 1) = 1$. Zivot-Andrews intimates that in the presence of end points, asymptotic distribution of the statistics is deviated to infinity point. It is required to select a region where the end points of sample period are excluded. Further, Zivot-Andrews suggested the trimming regions i.e. (0.15T, 0.85T) are followed.

F-BOUND TEST TO COINTEGRATION

The ARDL bounds test technique to cointegration is used to test a long-run relationship between the variables developed by [41]. This Method has various advantages more than traditional Methods such as [42,43, and 44] and so on. The Traditional techniques to cointegration entail that the variables must be integrated at the same level of integration. The ARDL bounds testing method is flexible in examining the order of integration. This procedure is relevant if variables have a different order of integration that is variables integrated at I(1) or I(0) [45]. [46] pointed that as compared to traditional cointegration techniques such as [42,43 and 44]. The ARDL is useful for small sample data sets by providing better results. The ARDL bounds testing Techniques uses linear specification for dynamic error correction model without losing information about the long-run relationship [47]. The unrestricted error correction method (UECM) of the ARDL version is used to calculate the F - statistic and empirical equations are as follows:

$$\Delta LNSMR_t = \alpha_1 + \varphi T_{1996} + \sum_{i=1}^{n} \beta_1 \Delta LNSMR_{t-i} + \sum_{i=0}^{n} \beta_2 \Delta LNGDPI_{t-i} + \sum_{i=0}^{n} \beta_3 \Delta LNCPI_{t-i} + \theta_1 LNSMR_{t-1} + \theta_2 LNGDPI_{t-1} + \theta_3 LNCPI_{t-1} + \varepsilon_{1t} \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots . (5)$$

$$\Delta LNGDPI_t = \alpha_1 + \varphi T_{1994} + \sum_{i=0}^{n} \beta_2 \Delta LNGDPI_{t-i} + \sum_{i=1}^{n} \beta_1 \Delta LNSMR_{t-i} + \sum_{i=0}^{n} \beta_3 \Delta LNCPI_{t-i} + \theta_2 LNGDPI_{t-1} + \theta_1 LNSMR_{t-1} + \theta_3 LNCPI_{t-1} + \varepsilon_{2t} \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (6)$$

$$\Delta LNCPI_t = \alpha_1 + \varphi T_{1993} + \sum_{i=0}^{n} \beta_3 \Delta LNCPI_{t-i} + \sum_{i=0}^{n} \beta_2 \Delta LNGDPI_{t-i} + \sum_{i=1}^{n} \beta_1 \Delta LNSMR_{t-i} + \theta_3 LNCPI_{t-1} + \theta_2 LNGDPI_{t-1} + \theta_1 LNSMR_{t-1} + \varepsilon_{2t} \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (7)$$

The following step is to compare our calculated F-statistics with critical bounds tabulated by Pesaran et al. (2001) to test either cointegration between the variables exists or not. In doing so, the hypothesis of cointegration is is $\beta_1 \neq \beta_2 \neq \beta_3 = 0$, against the hypothesis of no cointegration is, $\beta_1 = \beta_2 = \beta_3 =$

0. Cointegration exist if the lower and upper critical Bound is less than calculated F-statistic or else decision is in favor of no cointegration if the calculated F-statistic is lower than both the lower and upper critical bound. The decision about inconclusive that is cointegration is questionable if the calculated F-statistic lies between upper and lower critical bounds. The stability of ARDL model estimates is tested by applying CUSUM and CUSUMsq tests.

TODA YAMAMOTO NON GRANGER CAUSALITY

Toda and Yamamoto [48] causality technique is applied in the level of Vector Autoregressive irrespective of whether the variables are cointegrated, integrated or not. Toda and Yamamoto disagreed that the F-statistic test used for traditional Granger causality may not be valid as the test does not have a yardstick allocation when the time-series data integrated or cointegrated. Toda-Yamamoto technique is fundamentally engaged the evaluation of an augmented VAR (k +dmax) model. Where k is the best lag criteria in the original VAR system and dmax is the maximum order of integrations of the variables in the Vector Autoregressive system. Toda-Yamamoto causality test applies an adapted Wald test (MWALD) statistic to test zero restrictions on the parameters of the original VAR (k) model. The test has an asymptotic (chi-square) distribution with k degrees of freedom. The test is involves two steps. The first step is to determine the best lag (k) and the maximum order of integration (Q) of the variables in the system. The lag criteria, k, is acquired in the process of the VAR in levels between the variables in the system by using diverse lag length criteria such as AIC or SBC.For this reason, this study uses the Augmented Dickey-Fuller (ADF), Phillips-Perron (PP), Dickey-Fuller GLS (DF GLS) tests. This is done to discover the maximum order of integration assigned a symbol (dmx). (dmx) Is equal to Q if all the variables in the time-series found I(Q) or one of the variables were found I(Q) and the other one is found I(Q-1). This study runs ADF, PP, DF, and Zivot Andrew tests by taking the lag length suggested by AIC (Akaike Information Criterion). The second steps use the modified Wald procedure to test the VAR (k) model for causality. The best lag length is equal to p= (k+dmax). In the case of a bivariate relationship, Toda and Yamamoto causality test can be represented as follows:

$$LNSMR_t = \propto_0 + \sum_{i=i}^{k} \theta_1 LNSMR_{t-i} + \sum_{i=k+1}^{k+dmx} \theta_2 LNSMR_{t-i} + \sum_{i=i}^{k} \pi_1 LNGDPI_{t-i} + \sum_{i=k+1}^{k+dmx} \pi_2 LNGDPI_{t-i} + \sum_{i=i}^{k} \sigma_1 LNCPI_{t-i} + \sum_{i=k+1}^{k+dmx} \sigma_2 LNCPI_{t-i} + \varepsilon_{1t} \dots\dots\dots (8)$$

$$LNGDPI_t = \propto_0 + \sum_{i=i}^{k} \pi_1 LNGDPI_{t-i} + \sum_{i=k+1}^{k+dmx} \pi_2 LNGDPI_{t-i} + \sum_{i=i}^{k} \theta_1 LNSMR_{t-i} + \sum_{i=k+1}^{k+dmx} \theta_2 LNSMR_{t-i} + \sum_{i=i}^{k} \sigma_1 LNCPI_{t-i} + \sum_{i=k+1}^{k+dmx} \sigma_2 LNCPI_{t-i} + \varepsilon_{2t} \dots\dots\dots (9)$$

$$LNCPI_t = \propto_0 + \sum_{i=i}^{k} \sigma_1 LNCPI_{t-i} + \sum_{i=k+1}^{k+dmx} \sigma_2 CPI_{t-i} + \sum_{i=i}^{k} \pi_1 LNGDPI_{t-i} + \sum_{i=k+1}^{k+dmx} \pi_2 LNGDPI_{t-i} + \sum_{i=i}^{k} \theta_1 LNSMR_{t-i} + \sum_{i=k+1}^{k+dmx} \theta_2 LNSMR_{t-i} + \varepsilon_{3t} \dots\dots\dots (10)$$

Where LNSMR is the natural logarisms of Stock Market Returns; LNGDPI is the natural logarisms of Gross Domestic Per Capita Income; LNCPI is the natural logarisms of Consumer Price Index. $\propto_0, \theta_1, \theta_2, \pi_1, \pi_2, \sigma_1, and\ \sigma_2$ are the model's parameters; k is the Lag length, dmx is the maximum order of integration, $\varepsilon_{1t}, \varepsilon_{2t}, \varepsilon_{3t}, \sim N(0, \sum \varepsilon_{1t}, \sum \varepsilon_{2t}, \sum \varepsilon_{3t},)$ are the residual of the model. The null hypothesis (Ho) of non Causality among the variables is expressed as: Ho: $\theta_1 and\ \theta_2 = 0\ \forall i = 1,2,3 \dots\dots\dots k$, $\pi_1 and\ \pi_2 = 0\ \forall i = 1,2,3 \dots\dots\dots k$, $\sigma_1 and\ \sigma_2 = 0\ \forall i = 1,2,3 \dots\dots\dots k$,are tested using modified wald test (MWALD).

ANALYSIS OF FINDINGS

Introduction

This section discusses the empirical results of the impact of per capita income and inflation on the stock market returns in Nigeria. The discussions are divided into steps beginning with the descriptive statistics, correlation analysis, and analysis of empirical result of unit root tests using ZivotAndrews structural break unit root test and three traditional unit root tests such as Augmented Dickey-Fuller and Phillips-perron. This is followed by cointegration tests using ARDL bounding testing approach which initially introduced by [41]. Short run and the Long-run relationship between the mentioned variables and stock market returns through the Autoregressive Distributive Lag (ARDL). The next stage is the determination of causality between per capita income, inflation and stock market returns through Toda-Yamamoto non-granger causality tests.

DESCRIBTIVE STATISTICS AND CORRELATION ANALYSIS

The descriptive statistics for the logs of SMR, PI, and CPI. A comparison of means and median shows that the disparity of the trend of the data during the sample period. An assessment of skewness indicated that the CPI is negatively skewed, which means it has been on the increase during the sample period. Kurtosis figures showed that the data are leptokurtic where skewness is thereby showing normal distributions for the variables used in this study. It supported by the insignificance of the Jarque-Bera statistic reported in the table-1.

The correlation coefficient of the two independent variables is presented in Table -2. It markedthat the coefficient was less than 0.5 signifying less multicollinear problems.

Table-1: Descriptive Statistics

	LNSMR	LNGDPI	LNCPI
Mean	8.106629	5.385656	1.429779
Median	6.552024	5.381298	1.196918
Maximum	14.67030	5.566204	4.904716
Minimum	2.809403	5.236544	-2.301766
Std. Dev.	3.589900	0.099007	2.442764
Skewness	0.480243	0.208324	-0.050968
Kurtosis	1.808513	1.635365	1.474409
Jarque-Bera	4.293990	3.732347	4.285999
Probability	0.116835	0.154715	0.117302
Sum	356.6917	236.9689	62.91028
Sum Sq. Dev	554.1576	0.421504	256.5851

Table-2: Serial correlation analysis

Variables	LNPI	LNCPI
LNGDPI	1	
LNCPI	0.076	1

UNIT ROOT TEST

In the initial stage of any time series analysis, the properties of the time series must be examined for the presence of stationarity. In doing so, the study used three traditional unit root tests such ADF, DF-GLS, and PP.The results reported in Table 3. It revealed that all the variables were non-stationary at a level that is I(0) and were stationary at the first difference at 1%, 5%, and 10% respectively.This indicated that the variables selected for the empirical estimation in the model integrated with thefirst order of integration. The main problem with this traditional unit root test is that this does not have information about the structural break occurred in the series and may provide spurious results through OLS regression.

For this reasons, the study used Zivot-Andrews unit root test to avoid the problem of the spuriousness of results due to a structural break in the data. The results are reported in Table 3 and 4. The results indicated that all the variables integrated at I(1). These findings are consistent with the results provided by ADF, DF-GLS, and PP.

Table-3: Unit root Test

Variables	ADF TEST		PP TEST		DLF TEST	
	Level	1st Diff	Level	1st Diff	Level	1st Diff
LNSMR	-1.55	-6.72***	-1.51	-6.72***	-1.59	-6.46***
LNGDPI	-0.28	-6.06***	-0.48	-6.07***	-0.57	-5.23***
LNCPI	-1.94	-3.95**	-1.37	-3.40*	-2.04	-4.01***

*, ** and *** Denotes rejection of the null hypothesis at 10% and 5% and 1% significance level.

Table-3: Zivot-Andrew Unit Root Test

Variables	Levels		First Difference	
	Z-statistics	TB(Year)	Z-statistics	TB(Year)
LNSMR	-3.8119	1996	7.9278***	1992
LNGDPI	-3.5601	1994	-7.2920***	1988
LNCPI	-3.9289	1993	-5.5606**	1988

*, ** and *** Denotes rejection of the null hypothesis at 10% and 5% and 1% significance level.

LAG LENGTH CRITERION

This similarity of the order of integration of the variables lends support to apply the ARDL bounds test approach to investigate the long-run relationship between the variables. The appropriate lag length of variables is needed to precede the ARDL bound testing approach to cointegration in the existence of structural breaks in the series. The selection of optimal lag length is based on the minimum values of both AIC and SBC criterion. The optimal lag length is reported in row-3 of Table, and it is 1 if we follow LR, SBC, and HQ and otherwise 2 following AIC and FPE.

Lag Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-97.35169	NA	0.030318	5.017585	5.144250	5.063383
1	95.12639	346.4606*	3.15e-06	-4.156320	-3.649656*	-3.973126*
2	104.7613	15.89764	3.08e-06*	-4.188066*	-3.301405	-3.867477
3	113.4851	13.08564	3.19e-06	-4.174254	-2.907595	-3.716270
4	120.9661	10.09944	3.59e-06	-4.098307	-2.451650	-3.502928

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

F-BOUND TEST TO COINTEGRATION

As reflected in the table-4 above the relevant critical value bounds are taken from [41] [case II with a restricted intercept and no trend and some regressors = 3from]. * denotes that F-statistics falls above the 5% upper bound, respectively. These results suggested that cointegration exists between per capitaincome, Inflation and stock market returns in Nigeria. The diagnostic tests showed that the estimates are free from serial correlation and heteroskedasticity. Thus, the distributions are normally distributed.

Table-4: Multivariate F-bound Cointegration

Variables	LNSMR	LNPI	LNCPI
Optimum-lags	(1,0,0)	(1,0,0)	(1,0,0)
F-statistics	4.04**	1.87	0.82
Structural Break	1996	1994	1993
Critical values	1%	5%	10%
Upper bound	4.37	3.67	3.20
Lower bound	3.29	2.79	2.37
Diagnostic Test:			
Serial correlation	0.092[0.889]	0.025[0.876]	1.860[0.181]
Normality	1.954[0.376]	15.10[0.001]	2.762[0.251]
Heteroscedasticity	0.162[0.690]	0.015[0.905]	10.27[0.003]

*, ** and *** Denotes rejection of the null hypothesis at 10% and 5% and 1% significance level.

ARDL LONG-RUN COINTEGRATION

The t-statistics and p-values are given in brackets and square brackets respectively. The coefficients for lnpi, lncpi, lntb are positive and statistically significant. The intercept term is negative.

The result also shows that, in the long run, the stock returns are significantly influenced by Per capita income, inflation, and the structural breaks with elasticities of 7.38, 1.03, and 2.15 respectively.

The result shows that stock returns are positively and significantly related to the gross domestic per capita income. This positive relationship indicated that 1% increase in per capita income will lead stock market returns by 7.38%. This is consistent with [28 and 33]who's found a similar result for Pakistan and Nigeria respectively. The positive relationship also indicates that increase in disposable income and standard of living of people in Nigeria will increase the corporate earning which enhances the present value of the firm and, therefore, the stock prices increase.

Inflation and stock market returns are positively related. This positive relationship indicated that 1% increase in inflation will lead stock market returns by 1.03%, by keeping other things constant. The result also revealed that Stocks act as a good hedge against inflation in NigeriaThis finding is consistent with [49]and inconsistent with [34].

Table-5: ARDL Long-run Cointegration

Dependent variable is LNSMR 44 observations used for estimation from 1970 to 2013			
Regressor	Coefficient	Standard error	T-Ratio[Prob]
CONSTANT	-33.49***	11.092	-3.020[0.005]
LNGDPI	7.38***	2.0638	3.574[0.001]
LNCPI	1.03***	0.1784	5.754[0.000]
TB(1996)	2.15**	0.9132	2.351[0.024]

*, ** and *** Denotes rejection of the null hypothesis at 10% and 5% and 1% significance level.

ARDL SHORT-RUN COINTEGRATION

From the table 6 above, ARDL result shows the short-run relationship between the stock market returns and macroeconomics variables in Nigeria. In theory, the ECM (-1) must have a negative value and significant that is exactly the case in the current study. The higher the coefficient, the more stable the long-run relationship. The estimated coefficient of the ECM (1) is -0.36 (at 1% significant) indicating that in the absence of deviations in the independent variables, deviation of the model from the long-run path is corrected by 36% per year, which is very fast. The implication is that; it will take a little time to return entirely to the long-run equilibrium if there is a shock to the macroeconomic indicators. This showed that the market is efficient and, therefore, the existence of arbitrage activities on the stock market. The results of the estimation showed that the explanatory variables account for about 83.38% variation in the stock market returns in Nigeria. Nevertheless, the highly significant F-statistics recommends the general significance of the model.

Table-6: ARDL Short-run Cointegration

Dependent variable is ΔLNSMR 44 observations used for estimation from 1970 to 2013			
Regressor	Coefficient	Standard error	T-Ratio[Prob]
ΔLNGDPI	2.67**	1.105	2.420[0.020]
ΔLNCPI	0.37***	0.124	2.995[0.005]
ΔTB	0.78**	0.327	2.375[0.023]
CONSTANT	-12.14**	5.545	-2.187[0.035]
ECM(-1)	-0.36***	0.093	-3.883[0.000]
Diagnostic Test:			
Serial correlation	0.109[0.743]		
Normality	0.276[0.871]		
Heteroscedasticity	0.617[0.805]		
R^2	0.32		
R^2- Adjusted	0.25		
DW-Statistics	2.03		

*, ** and *** Denotes rejection of the null hypothesis at 10% and 5% and 1% significance level.

The impact of gross domestic per capita income is found to be positive on stock market returns that imply that investment stimulates the development of stock markets in Nigeria. Our analysis indicates that investment has dominated effect and a good predictor of stock market returns. It is found that a 1% increase in investment activities will raise stock markets returns by 2.67%, and it is statically significant at 5% level of significance. The positive short-run relationship between inflation and stock performance is in sync with the work of Kuwornu [12]. The positive relationship suggests that investors are reimbursed for inflation and that the NSE cannot be used as a hedge against inflation since investors will require higher returns to compensate for high inflation [18]. The relationship can justified by the active role played by government in curbing inflation. The stability of the ARDL parameters is observed by applying the CUSUM and CUSUMSQ tests developed by [50]. Figures 8 and Figures 9 illustrate that the plot of the statistics from the CUSUM and CUSUMSQ remain within the critical bounds at 5% significance level. This entails that all coefficients in the error correction model are stable over time. These selected models adopted in the study seem to be good adequate and strong in estimating the long-run and short-run relationships between macroeconomic variables and Stock market returns in Nigeria.

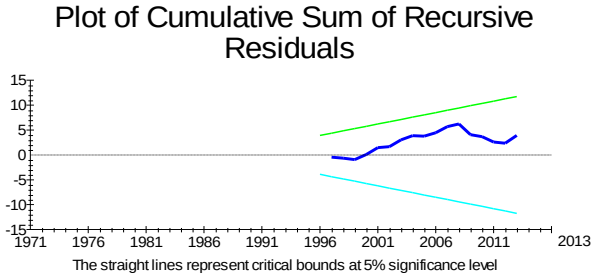

Fig-1: Plot of cumulative sum of recursive residuals

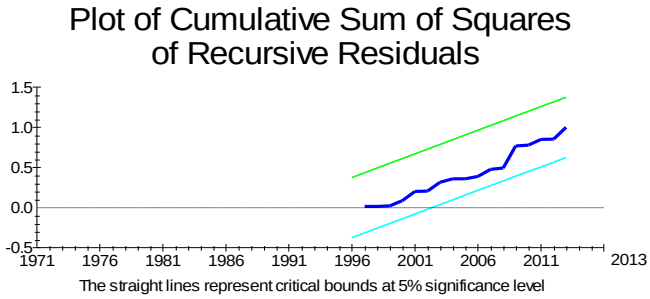

Fig-2: **Plot of cumulative sum of squares recursive residuals**

TODA YAMAMOTO GRANGER CAUSALITY

According to the Toda-Yamamoto causality test results shown in Table 7, there is strong evidence of causality running from gross domestic per capita income to stock market returns and from inflation to stock market returns at the 1% and 10% level of significance respectively. But jointly both per capita income and inflation cause stock market returns at 5% level of significance. The results do not reveal causality from stock market returns to per capita income, stock market returns to inflation, per capita income to inflation and inflation to per capita income. Both stock market returns and inflation cause per capita income jointly at 10%. Therefore, we can conclude that there is a uni-directional direction of causality that runs from per capita income to stock market returns and from inflation to stock market returns for the case of Nigeria.

Table-7: Non-Granger Causality (Toda Yamamoto Granger Causality)

Variables	ΔLNSMR	ΔLNPI	ΔLNCPI	Joint
ΔLNSMR	-	11.74* [0.003]	4.78* [0.09]	12.64** [0.013]
ΔLNPI	3.07 [0.21]	-	2.67 [0.26]	7.88* [0.09]
ΔLNCPI	0.84 [0.66]	0.66 [0.89]	-	02.48 [0.65]

*, ** and *** Denotes rejection of the null hypothesis at 10% and 5% and 1% significance level.

CONCLUSION

The study has investigated the impact of per capita income and inflation on stock market returns with unknown structural breaks in Nigeria for the period from 1970 to 2913. To analyze the impact of macroeconomic variables on stock market returns, the ARDL bounds testing approach to cointegration and Toda-Yamamoto non-granger causality have been applied while ZivotAndrews structural break unit root test and three traditional unit root tests is used to test the order of integration of the variables. Our results identified that the variables were non-stationary at levels but were stationary after first differencing. The results of the cointegration confirmed the existent of cointegration amongst the variables. However, our main concern from this analysis is the potential break that may occur during the period under investigation. The Structural break (1996) showed a significant positive impact on the Nigerian stock market returns in both short-run and the long-run. This indicated that the Nigerian Stock Market Returns respond on the policy of Guided deregulation (dual exchange rate regime)led by the General Sani Abachain 1995. This policy was introduced after the structural Adjustment Programme brought a number of problems in to the Nigerian economy. This result showed that guided deregulation plolicy is more sufficient and effective into the Nigerian economy in general and stock market returns in particular.Gross domestic per capita income and inflation have a positive effect on stock market returns. Gross domestic per capita income is a major contributor to increasing stock market returns in Nigeria. The Toda-Yamamoto non-granger causality analysis confirmed the unidirectional causality from gross domestic per capita income and stock market returns, inflation and stock market returns. In the context of policy implications, this study suggests that government should formulate appropriate policy to encourage investment in financial markets which in resulting stimulate economic growth.

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