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Macroeconomic Policy and Returns on Equities: Empirical Evidence from the Nigerian Capital Market

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Abstract

This paper studies the influence of macroeconomic policy on the stock returns in the Nigerian Capital Market. The study adopted error correction modelling techniques that is based on estimation of both short run and long run dynamics in the endogenous model. Results from the estimated models reveal that macroeconomic policies relating to aggregate economic activity (measured by GDP),broad money supply (M2), interest rate (INT) and consumer price Index (CPI) are the most important macro factors explaining stock market returns in Nigeria. Therefore, the study concludes that macroeconomic policy variables cannot be ignored in accounting for the dynamics of stock returns in Nigeria.

Keywords: Macroeconomic Policy, Equities Returns, Nigeria

1. Introduction

The interaction between macroeconomic forces and the stock market is a recurring topic in macroeconomics. A fundamental issue for understanding the relationship between financial markets and the macroeconomy is assessing the importance of macroeconomic disturbances for stock market fluctuations (Araujo, 2009). Therefore, both macroeconomists and financial economists around the world are giving increasing attention to the relationship between stock market and the rest of the economy. Many authors have analysed the response of stock market to macroeconomic variables (Chen, Roll and Ross, 1986; Flannery and Protopapadakis, 2002; among others).

Two major hypotheses explain these linkages. The first hypothesis is the expected real interest rate, which claims that stock prices decrease because the real component of nominal interest rates is expected to increase. This affects stock prices directly because the real discount rate at which future cash flows are capitalised is expected to increase, and indirectly because real output is adversely affected by higher real interest rates and thus future cash flows are expected to decrease. The second hypothesis focuses on the expected inflation, this hypothesis asserts that stock prices decrease because the inflation premium in nominal interest rates increases, which decreases the after tax real dividends (Hardouvelis, 1987; Thorbecke, 1997; Araujo, 2009). These two hypotheses depend, among other things, on how markets perceive future macroeconomic policies and have, therefore, attracted a lot of attention in the literature.

The recent global financial turmoil has also highlighted the importance of understanding the linkages between stock price changes and the real economy, both domestically and globally. At the domestic level, stock price changes affect wealth, confidence, and the cost of capital, which have an effect on consumption and investment. Meanwhile, the global transmission of stock price shocks can have an impact on the real economy even in remote countries. Therefore, understanding the links between macroeconomic policy and asset prices is crucially important for understanding the policy transmission mechanism. This paper seeks to empirically study the relationship between macroeconomic policy and one of the most important financial markets, the market for equities. The paper, therefore, analyses the impact of changes in macroeconomic policy on equity prices, with the objectives of both measuring the average reaction of the stock market and understanding the economic sources of that reaction.

Despite the existence of growing literature on the effects of shocks in economic policies on the stock market, theoretical and empirical work on the subject is yet to produce a consensus. In Nigeria, for example, some empirical studies (Emenuga, 1994 and 1996; Nwokoma, 2002; Nwokoma and Olofin, 2004; among others) have found little or relatively insignificant relationship between macroeconomic variables and stock market. Other studies (e.g. Soyode, 1993; Yohannes, 1994) have found significant co-movement between macroeconomic variables and stock market. The divergence in results have been traced to different sets of econometrics methodologies adopted in such empirical models (such as single equation (OLS), Granger Causality, the Engle-Granger (1987) two step procedure and the standard VAR model). Recent econometrics techniques have shown the strong limitations to these techniques and revealed that most macroeconomic and stock market data require special econometrics techniques if the results generated from such studies are to be reliable and free from being spurious. Recent developments in the time series econometric literature also permitted more rigorous analysis which emphasises both the short and long-run co-movement among a number of time series, to be conducted compatibly (Johansen, 1991; Enders, 1995).

Therefore, this study improves on the previous studies by adopting the vector error correction model (VECM) that is based on the estimation of both short-run and long-run dynamics in the endogenous variables. The estimation of the cointegration will take into consideration the issue of spurious regression. The study would also conduct the impulse response functions (IRF) and variance decomposition (VD) based on a VECM specification.

The research questions this study seeks to address are: What are the linkages between macroeconomic policy and stock market returns in Nigeria? To what extent does macroeconomic policy drive stock market in Nigeria? Can the performances of the Nigerian stock market be justified by the various macroeconomic policy shocks as being argued in the literature? In this regards, the recently witnessed co-movement between the macroeconomic policies and stock market performance in Nigeria need to be addressed empirically. The primary purpose of this study is to re-examine this relationship by testing whether changes in macroeconomic policies really have statistical significant effects on stock market returns in Nigeria using a new methodology. It will also identify underlying structural shocks and gauge their importance for stock returns movements in Nigeria.

The remainder of this paper is organised as follows. First, we document the stylised facts relating to macroeconomic policies and stock market performance in Nigeria. In section 3, we present the theoretical background and briefly discuss the relevant literature. Section 4 provides the methodology for the study. In section 5, we examine the empirical findings and reports measures of the relative importance of each macroeconomic policy shock in explaining variations in stock returns and co-movement patterns. In addition, the main results are discussed and interpreted. Finally, section 6 offers some conclusions and policy implications.

2. Stylised Facts on Macroeconomic Policies and Stock Market Performance in Nigeria

The stock market is one of the most significant service institutions of crucial importance in any modern economy. It is one of the hallmarks and facilitators of entrepreneurial progress. With the development and progress of the economy, the sizes of industrial enterprises tend to grow. This means that it is no longer possible to confine the forms of business organisation to sole proprietorships or even partnerships. Large entrepreneurial enterprises require commensurately large magnitudes of capital. This requires participation of a large number of individuals. This is the basic reason for the establishment of stock exchanges worldwide (Pethe and Karnik, 2000).

The importance of stock markets in the economy can be appreciated by understanding the multiple functions that the markets perform. Traditionally, stock exchanges are required to perform two basic roles in any economy. One is that of the price discovery and second is that of providing liquidity. They provide a fillip to the primary issues market and make it possible for corporate bodies and government to undertake huge investments, which would lead to economic growth, provided such fund is well managed. The liquidity aspect provides incentive to the ultimate savers in the economy, so that a well regulated and efficient stock market does indeed serve as a useful conduit for linking savers (surplus units) to ultimate borrowers (deficit unit), usually corporate bodies and government.

If capital resources are not provided to those economic areas, especially industries where demand is growing and which are capable of increasing production and productivity, the rate of expansion of the economy often suffers. A unique benefit of the stock market to corporate entities is the provision of long-term, non-debt financial capital. Through the issuance of equity securities, companies acquire perpetual capital for development. Through the provision of equity capital, the market also enables companies to avoid over-reliance on debt financing, thus improving corporate debt-to-equity ratio.

Nigeria as a country has experienced several disconcerting macroeconomic policies in the past years, some of which can be observed as having important relationships with the stock market performance. Some of the noticeable macroeconomic policy shocks which has been witnessed and thus may be interpreted as to have an important impact on the stock market performance include high interest rates spread, exchange rate fluctuations, sharp swing in liquidity, uncertainty in economic environment, inflation spiral, low capacity utilisation, unstable economic growth rates and political instability among other factors which has resulted in thinness of trading, low market capitalization, low turnover, low and/or negative performance ratios. The introduction of structural adjustment programme (SAP) as an economic policy has also impacted significantly on the stock market performance in Nigeria (Soyode, 1993). As the programme was based on the deregulation of the financial sector and privatization exercises, which exposed investors and companies to the significance of the stock market.

One of the obvious economic gauges that bring about direct impact on the stock market is the structure of interest rates. While the short term rates for savings in Nigeria are going down, the rates for bank loans and loans for term lending remained high and sticky as a result of the high cost of funds mobilised by banks. For instance, the savings rate during the period under study hovers around 3 to 7 per cent while the rate for bank loans is around 25 to 35 per cent. One of the apparent reasons for this mismatch is the high returns previous experienced in the Nigerian stock market that has soaked the appetite of savers, thus making them requiring higher interest rate on saving that is hardly generated from other form of investments.

This widening spread between deposit and lending rates is a serious economic policy shock that is quite worrisome for an economy like Nigeria that is desirous to develop. The high interest rate implies that costs of borrowing have gone up in the organised financial market, thereby increasing the cost of operations. A measure of distortions in the money market is the increasing divergence between the lending rate and the deposit rate otherwise known as the interest rate spread. The spread rose from -0.25 percent in 1985 to 13.7 in 1992 and a height of 20.7 per cent in 2002. This spread has since been on the high side. The impact of these monetary policy shocks is that it hinders efficiency and

competitiveness of the financial sector and stock market in particular with consequent negative impact on the real sector of the economy.

Table 1 below shows the trends in macroeconomic development in Nigeria over the 1980 to 2009 period. The pre-1986 structure of most macroeconomic policies in general and monetary policy in particular was characterised by controls that were by and large consistent with fix price regimes and monetary rules in international system. Before the introduction of SAP in 1986, interest rates were administratively controlled. While the deposit rates hovered between 6 and 10 per cent, the lending rate oscillated between 6 and 12 per cent. However, with the deregulation of interest rates, deposit rate rose consistently and peaked at about 17 per cent in 1993. Similarly, the prime lending rate rose from 7.5 per cent in 1980 to a peak of 29.8 in 1992, although it declined to 16.9 per cent in 2006.

Similarly, it is clear from the table that the domestic credit to the economy as a percentage of GDP declines consistently throughout the phase period. This phenomenon is expected to have adverse impact on the stock market development and consequently the real sector of the economy.

Table 1: Developments in key Macroeconomic Indicators (1980-2009)

Year	Interest Rate Spread	Inflation Rate	Exchange Rate	Growth of Money Supply	Growth Rate of GDP	Domestic Credit to the Economy (% of GDP)
1980-1984	7.72	20.26	0.66	17.80	-3.72	38.05
1985-1989	3.33	20.04	3.77	19.06	5.45	37.29
1990-1994	7.04	35.84	15.83	42.24	3.27	27.46
1995-1999	10.62	25.44	36.05	36.78	2.64	17.47
2000-2004	15.56	13.54	119.45	28.86	6.08	16.06
2005-2009	10.74	11.72	130.13	33.18	6.37	15.10

Sources: CBN, Statistical Bulletin (2009) and Annual Reports (various issues)

At the same time, the introduction of SAP led to sharp depreciation of the Naira exchange rate value vis-a-vis the currencies of her major trading partners, especially the Dollar. SAP led to high volatility of the exchange rate system thus rendering business planning a difficult task. The Naira/Dollar exchange rate was almost at par value in pre-1986, it depreciated to N7.392 in 1989 and By March 2000, the exchange rate of Naira to the Dollar has depreciated above N100 to US$1 and in the year 2003 it is over N130 to US$1. Thus, between 1986 and 1993, the Naira depreciated at an annual average rate of 31 per cent. Expectedly, the exchange rate at the parallel market was considerably higher. The sharp depreciation in the exchange rate apart from encouraging speculative activities in the parallel market as it is currently in the country, it also hurts the real sector from at least two primary areas. First, it increases the cost of imported inputs and therefore increases the general costs of production, thus hurts the competitiveness of the real sector. Second, the increased speculative activities in the parallel market divert resources from the real sector to the informal sector and this has serious implication for the capital market.

Another important macroeconomic policy shock is the sharp swing in the liquidity, from an abundance of liquidity (that is associated with the period of boom in the stock market) to the acute shortage of liquidity (which also resulted into the bust in the market). One of the factors underlying these swings has been the dependence of the financial system on the injection of liquidity from outside, even as the natural growth of financial savings has remained stunted. This period also witnessed Central Bank of Nigeria (CBN) having to guarantee interbank loans. Also, the indirect policy of the CBN and Securities and Exchange Commission (SEC) discouraging commercial banks for lending to investors in the stock market is another factor that have hindered the performance of stock market in Nigeria. The apparent consequence of swings in liquidity is seen in increased uncertainty for both the purveyors of institutional credits and productive enterprises seeking credit.

3. Theoretical Background and Literature Review

Economic theory posits that stock prices equal the expected present value of future net cash flows. Thus, changes in economic policy will be transmitted through the stock market via changes in the values of private portfolios (the wealth effect), changes in the cost of capital, and by other mechanisms as well. Another channel of differentiating the response of stock prices to economic policy is likely to be related to the response of the demand for firms' products. Firms that produce goods for which demand is highly cyclical or interest-sensitive should see their expected future earnings affected relatively more following an economic policy move. Some observers also view the stock market as an independent source of macroeconomic volatility, to which policymakers may wish to respond (Bernanke and Kuttner, 2005).

In this wise, empirical evidence that positive macroeconomic shocks increase stock returns indicates that expansionary monetary policy exerts real effects by increasing future cash flows or by decreasing the discount factors at which those cash flows are capitalised (Thorbecke, 1997). Another way of considering the effect of macroeconomic events on the stock prices is through the asset-pricing perspective in which Arbitrage Pricing Theory (APT) developed by Ross (1976) has been used as a framework to address the question of whether risk associated with particular macro variables is reflected in the expected stock returns.

The first known empirical study was carried out by Chen, Roll and Ross (1986). They hypothesised and tested a set of macroeconomic data series to explain US stock returns. They investigated the sensitivity of macroeconomic variables to stock returns using seven macroeconomic variables namely: industrial production, inflation, term structure of interest rate, consumption, market indices and oil prices. They found a strong relationship between the macroeconomic variables and the expected stock returns. They noted that industrial production, changes in risk premium, twist in the yield curve, and measured unanticipated inflation and changes in expected inflation during period when these variables are highly volatile, are significant in explaining expected returns. Their evidence suggested that consumption, oil prices and market index are not priced by the financial market. They concluded that stock returns are exposed to systematic news that is priced by the market. Since this study was conducted, there has been proliferation of studies in different countries and regions, attempting to address this important issue.

The study by Hardouvelis (1987) analyses the response of stock prices to the announcements of 15 representative macroeconomic variables. He find out that stock prices respond primarily to announcements of monetary variables and that stocks of financial companies are the most sensitive to monetary news. Implicit in the stock price reactions are the market perceptions that the Federal Reserve plays important role in future macroeconomic developments. The study also shows that post-October 1982 change in the operating target of the Federal Reserve did not affect the stock price responses substantially, although it did affect the corresponding responses of short-term interest rates.

A similar study was conducted by Thorbecke (1997) and addresses the question whether monetary policy is neutral, by examining how stock return data respond to monetary policy shocks. In the study, monetary policy is measured by innovations in the federal funds rate and non-borrowed reserves, by narrative indicators, and by an event study of Federal Reserve policy changes. In every case the evidence indicates that expansionary policy increases ex-post stock returns. Results from estimating a multi-factor model also indicate that exposure to monetary policy increases an asset's ex-ante return.

Flannery and Protopapadakis (2002) reassessed the effect of some macro announcement series on US stock returns using the GARCH model. Six macroeconomic variables, namely, balance of trade, housing starts, employment, consumer price index, money supply (M1), and producer price index seem to affect stock returns. On the other hand, two popular measures of aggregate economic activity (real GNP and industrial production) do not appear to be related with stock returns.

Another study by Bernanke and Kuttner, (2005) analyses the impact of changes in monetary policy on equity prices, with the objectives of both measuring the average reaction of the stock market

and understanding the economic sources of that reaction. They find out that, on average, a hypothetical unanticipated 25-basis-point cut in the Federal funds rate target is associated with about a 1% increase in broad stock indexes. They adapted a methodology due to Campbell and Ammer, and also show that the effects of unanticipated monetary policy actions on expected excess returns account for the largest part of the response of stock prices.

Kandir (2008) investigates the role of macroeconomic factors in explaining Turkish stock returns using Macroeconomic Factors Model and seven macroeconomic variables – (growth rate of industrial production index, change in consumer price index, growth rate of narrowly defined money supply (M1), change in exchange rate, interest rate, growth rate of international crude oil price and return on the MSCI World Equity index). The study find out that exchange rate, interest rate and world market return seem to affect all of the portfolio returns, while inflation rate is significant for only three of the twelve portfolios. Industrial production, money supply and oil prices do not appear to have any significant effect on stock returns.

Araujo (2009) recently examines the economic sources underlying the co-movement of real stock returns in Latin America. The study follows the literature on structural vector autoregressive models (SVARs), and uses long-run restrictions to identify three structural shocks: demand, supply, and portfolio shocks. The study finds out that for some countries, portfolio shocks are important factors behind real stock returns. Furthermore, these shocks seem to be important in explaining cross-country co-movement patterns. However, these findings are not statistically strong due to the degree of uncertainty about the estimates of the importance of each structural shock and the cross-correlation coefficients. The study concludes that macroeconomic shocks (supply and demand) cannot be neglected in accounting for the dynamics of real stock returns.

From the brief literature review above, it can be deduced that macroeconomic policy are important determinants of stock prices in both the developed countries and emerging markets.

4. Research Methodology

4.1. The Model

The fact that some of the variables are non-stationary implies that a regression with such variables may produce spurious results unless they are cointegrated. If two or more variables can be linked together to form an equilibrium relationship spanning the long-run, then even though the variables themselves may contain stochastic trends they will nevertheless move closer overtime and the difference between them will be stable. The strength of the cointegration method lies in its ability to explore dynamic co-movements among variables examined. When the variables are cointegrated then in the short-term deviations from this long-run equilibrium will feed back on the changes in the dependent variable in order to force the movement towards the long-run equilibrium. If the dependent variable is driven directly by this long-run equilibrium error, then it is responding to this feedback. If not, it is responding only to short-term shocks to the stochastic environment. The non-significance of any of the 'differenced' variable which reflects only short-run relationship, however, does not involve such violations because theory typically has little to say about short-term relationships (Chatfield, 2004; Harris, 2003).

A vector error correction (VEC) model is a restricted vector auto-regression (VAR) that has co-integration restrictions built into the specification, so that it is designed for use with non-stationary series that are known to be co-integrated. The VEC specification restricts the long-run behaviour of the endogenous variables to converge to their cointegrating relationships while allowing a wide range of short-run dynamics. The cointegration term is known as the error correction term since the deviation from long-run equilibrium is corrected gradually through a series of partial short-run adjustments.

Let us consider a two variable system with one co-integrating equation and no lagged difference terms. The co-integrating equation is

$$y_{1,t} = \beta_1 y_{2,t} + \varepsilon_t$$
$$y_{1,t} = \beta_2 y_{2,t} + \varepsilon_t \quad (1)$$

and the VEC is

$$\Delta y_{1,t} = \gamma_1 (y_{2,t-1} - \beta_1 y_{1,t-1}) + v_{1,t}$$
$$\Delta y_{2,t} = \gamma_2 (y_{2,t-1} - \beta_1 y_{1,t-1}) + v_{2,t} \quad (2)$$

In equation (2) above, the only right-hand side variable is the error correction term. In the long run equilibrium, this term is zero. However, if y_1 and y_2 deviated from long run equilibrium in the last period, the error correction term is nonzero and each variable adjusts to partially restore the equilibrium relationship. The coefficients y_1 and y_2 measure the speed of adjustment.

In this model, the two endogenous variables $\Delta y_{1,t}$ and $\Delta y_{2,t}$ will be nonzero, but the cointegrating equation will have a zero intercept. Despite the fact that the use of lagged differences is common, we have included no lagged differences on the right-hand side (see Peterson, 2000 for details). If the two endogenous variables $\Delta y_{1,t}$ and $\Delta y_{2,t}$ have no trend and the co-integrating equations have an intercept, the VEC has the form:

$$\Delta y_{1,t} = \gamma_1 (y_{2,t-1} - \mu - \beta_1 y_{1,t-1}) + v_{1,t}$$
$$\Delta y_{2,t} = \gamma_2 (y_{2,t-1} - \mu - \beta_1 y_{1,t-1}) + v_{2,t} \quad (3)$$

Another VEC specification assumes that there are linear trends in the series and a constant in the cointegrating equations, so that it has the form:

$$\Delta y_{1,t} = \delta_1 + \gamma_1 (y_{2,t-1} - \mu - \beta_1 y_{1,t-1}) + v_{1,t}$$
$$\Delta y_{2,t} = \delta_2 + \gamma_2 (y_{2,t-1} - \mu - \beta_1 y_{1,t-1}) + v_{2,t} \quad (4)$$

Similarly, there may be a trend in the co-integrating equation, but no separate trends in the two VEC equations. Lastly, if there is a separate linear trend outside the parentheses in each VEC equation, then there is an implicit quadratic trend in the series.

Therefore, the model specification will be carried out using the VEC model that allows for the co-existence of both short and long run forces that drive the often ignored deviating and cyclical influences so inherently interactive with these aggregate variables over such a time horizon. The estimation of the cointegration also takes into consideration the issue of spurious regression. The study would also conduct the impulse response functions (IRF) and variance decomposition (VD) based on a VECM specification to address the transmission of shocks issue.

4.2. Data Requirements and Sources

This study makes use of quarterly time series data from quarter one in 1985 to the second quarter in 2010. Data used in this study consist of All share Index returns (ASIR) of the Nigerian Stock Exchange, US Dollar exchange rate expressed as the amount of Nigerian Naira per unit of US Dollar (EXR), Interest rate (INT) measured by the treasury bill rate, Nigerian Consumers' Price Index (CPI), Broad Money supply (M2), Gross Domestic Product (GDP), Credit to the private sector (CPS) and International Crude Oil prices (OIL). Data on the macroeconomic variables are sourced from various issues of the Central Bank of Nigeria Statistical Bulletin and quarterly reports as well as the IMF International Financial Statistics CD-ROM, while the stock exchange performance variables are sourced from the Nigerian Stock Exchange (NSE).

5. Presentation and Analysis of Results

5.1. Unit Root Test

The co-integration analysis is preceded by tests for the presence of unit root in each of the variables to be used in the estimation of the co-integrating vector. The unit root tests are conducted using Augmented Dickey-Fuller (DF) and Philips-Perron (PP) tests. All the variables are not stationary at levels but are stationary at first difference (see Table 2).

Table 2: Results of Unit Root Tests

Variable	Augmented Dickey-Fuller (DF) Test			Phillips-Perron (PP) Test Statistic		
		With Drift	With Drift & Trend	With Drift	With Drift & Trend	Order of Integration
ASIR	Level	-0.3296	-2.1141	-0.2828	-2.0910	
	First Diff	-10.3026**	-10.3333**	-10.3067**	-10.3336**	I(1)
CPI	Level	-0.4243	-2.3066	-1.5919	-2.2270	
	First Diff	-3.0489*	-3.1806	-9.2585**	-9.5460**	I(1)
EXR	Level	-1.7830	-2.9965	-1.9774	-2.7944	
	First Diff	-10.6499**	-10.7165**	-5.5480**	-6.0360**	I(1)
CPS	Level	-0.0927	-1.2831	-1.4244	-0.4861	
	First Diff	-3.9110**	-4.2149**	-3.9707*	-4.3291**	I(1)
GDP	Level	-0.1402	-1.7274	-1.2717	-1.3218	
	First Diff	-2.8534	-4.3366**	-8.2276**	-8.8232**	I(1)
INT	Level	-2.5631	-2.6899	-2.5802	-2.7038	
	First Diff	-9.1553**	-9.1530**	-9.5136**	-9.6250**	I(1)
M2	Level	-0.9183	-0.8979	-1.7194	-0.5288	
	First Diff	-4.4013**	-4.8884**	-10.6433**	-11.0674**	I(1)
OIL	Level	-0.3254	-1.5868	-0.2924	-2.2212	
	First Diff	-11.0324**	-11.2992**	-12.6841**	-14.0820**	I(1)

CRITICAL VALUES		
	1%	5%
Auxiliary Regression with Drift	-3.496	-2.890
Auxiliary Regression with Drift and Trend	-4.051	-3.455

*5% significance level
** 1% significance level

5.2. Cointegration Test

The methodology of Johansen for testing cointegration is sensitive to the lag length used in the model. The criteria for selecting the appropriate lag length structure of the variables entering the Johansen cointegration and VECM model are based on Akaike Information Criteria (AIC), the Schwartz Bayesian Criteria (SBC), Hannan-Quinn Criteria (HQ), Likelihood-Ratio (LR) and the Final Prediction Error Criteria (FPE). The basic principle underlying the test statistics criteria is to minimise the value of the determinant of the covariance matrix of the residuals but they differ according to the penalty attached to increasing the number of estimated parameters.

Table 3: Multivariate Johansen Cointegration Test Results based on Trace Statistics

Hypothesized No of CE(s)		Eigen Value	Trace Statistics	Critical Values	
Null	Alternative			5%	1%
r = 0	r = 1**	0.437	137.761	124.24	133.57
r ≤ 1	r = 2	0.335	91.802	94.15	103.18
r ≤ 2	r = 3	0.251	59.194	68.52	76.07
r ≤ 3	r = 4	0.218	36.045	47.21	54.46
r ≤ 4	r = 5	0.093	16.356	29.68	35.65
r ≤ 5	r = 6	0.074	8.514	15.41	20.04

Table 3: Multivariate Johansen Cointegration Test Results based on Trace Statistics - continued

r ≤ 6	r = 7	0.029	2.368	3.76	6.65
r ≤ 7	r = 8	0.011	1.741	1.91	2.52

Notes: All the variables are cointegrated at one per cent level.

1. The test allows for a linear deterministic trend in the data.
2. Trace statistics indicates one cointegrating equation(s) at 1% level.
3. *r* represents the number of cointegrating vectors. Maximum lag is 2.
4. *(**) denotes rejection of the hypothesis at the 5% (1%) level respectively. The asymptotic critical values are from Osterwald-Lenum (1992).

Therefore, this study employs Johansen-Juselius maximum likelihood procedure in determining the cointegrating rank of the system and the number of common stochastic trends driving the entire system. We reported the trace statistics and its critical values at both one per cent (1%) and five per cent (5%) in table 3 above. This is in line with Cheung and Lai (1993) who found that the trace test statistics shows more robustness to both skewness and excess kurtosis in the residuals than the maximum eigen-value test statistics. The result of multivariate cointegration test based on Johansen and Juselius cointegration technique reveal that there is one cointegrating relationship between the stock market returns and the macroeconomic variables at either the 1 percent or 5 percent significant level. These results suggest that the appropriate model to use is the VECM specification with one cointegrating vector in the model.

Before proceeding to error correction modelling, we will examine the static long run model which provides some useful information as shown in table 4 below. From the table, it is evident that ASIR is significantly determined by inflation (measured by changes in consumer price index-CPI), economic activities (measured by gross domestic product-GDP), interest rate (INT) and broad money supply (M2). Therefore, macroeconomic policies concerning GDP, INT, M2 and CPI are more likely to contribute most to stock market returns in Nigeria. From the empirical results below, we also observe significant negative relationship between inflation pattern and the stock returns. A 1% rise in inflation reduces stock index by 0.05%. This finding is consistency with the studies by Chen, Roll and Ross (1986) and Mukherjee and Naka (1995) which also found negative relationship between stock returns and inflation.

Table 4: Results of the Estimated Static Long-Run Model

Variable	Coefficient	t-Statistic	Prob.
C	-8.8355	-14.7736	0.0000
CPI	-0.0005	-4.0489	0.0001
CPS	0.0001	1.3890	0.1681
EXR	0.0002	1.5705	0.1196
GDP	1.0608	10.7696	0.0000
INT	-0.0175	-2.9858	0.0036
M2	0.1842	2.6214	0.0082
OIL	0.0003	0.1359	0.8922
Adjusted R-squared	0.99181		
Durbin-Watson stat	1.52288		

Source: Author's Estimation

Our results also support a positive co-movement between stock returns and economic activity in Nigeria. We found that stock returns are positively and significantly related to the real economic activity as proxy by the gross domestic product. A 1% increase in aggregate economic activity brings about 1.06 rises in stock returns. The result also shows that credit to the private sector and exchange rates have positive relationship with stock market returns, but they are statistically insignificant in the model.

Similarly, a negative relationship is found between interest rate and stock returns and this is consistent with our a-priori expectation. Our findings show that interest rates have significant negative relations with stock market returns in Nigeria and that a 1% increase in interest rate will bring about 1.8 per cent decline in stock market returns. On the whole, our empirical findings from the static long run model suggest that CPS, EXR, GDP, M2 and OIL are directly related to stock market returns in Nigeria while the effects of CPI and INT are negative. The results also reveal that the effects of CPS, EXR and OIL are not statistically significant in the model, but they have the right signs, except oil prices that is expected to have a negative sign. Therefore, we can deduce from the static long run model that the importance of macroeconomic policy cannot be disregarded in analysing dynamics of stock returns in Nigeria.

5.3. Error-Correction Modelling

In order to capture the short-run deviations that might have occurred in estimating the long-run co-integrating equation, a dynamic error-correction model is formulated. The ECM is estimated with respect to the dependent variable, ASIR, using ordinary least squares. Given that the primary objective of the study is to investigate the relationship between macroeconomic policies and stock market performance, the aim of this section is to analyze the coefficient of the error correction term. This depicts the speed of convergence to equilibrium once the equation is shocked.

Table 5: Results of the Estimated Parsimonious Error Correction Model

Variable	Coefficient	t-Statistic	Prob.
C	-8.9220	-20.9237	0.0000
CPI	-0.0005	-5.8061	0.0000
CPS	0.0000	0.6221	0.5354
EXR	0.0000	0.0395	0.9686
GDP	1.0805	16.2715	0.0000
INT	-0.0158	-4.1040	0.0001
M2	0.1698	2.2476	0.0270
OIL	0.0037	2.2799	0.0250
CPS(-1)	0.0000	-0.1267	0.8995
EXR(-1)	0.0002	0.7777	0.4388
OIL(-1)	-0.0046	-2.5684	0.0118
ECT(-1)	-0.7372	-10.0428	0.0000
Adjusted R-squared	0.9965		
Durbin-Watson stat	1.6189		

Source: Author's Estimation

An important feature to notice is the significance of the equilibrium in the stock market returns equation. The coefficient of the error-correction terms carries the correct sign and it is statistically significant at 1 percent, with the speed of convergence to equilibrium of 74 per cent (see Table 5 above). In the short run, economic agents adjust their holdings by 74 percent of the past quarter's deviation from equilibrium. Negative signs on the error correction term indicate that agents have corrected, in the current period, a proportion of the previous period's disequilibrium in the stock market. That is, it is essential for maintaining long run equilibrium to reduce the existing disequilibrium over time.

5.4. Parameter Stability Test and Impulse Response Analysis

The stability of the parameters in the short run model is examined using the plots of the cumulative sum of recursive residual (CUSUM) and cumulative sum of squares of recursive residual (CUSUMSQ). Instability of the parameters arises due to structural changes and the institution of different policy regimes over the sample period. Whilst the CUSUM test is particularly useful for

detecting systematic changes in the regression coefficients, the CUSUMSQ test is significant in situations where the departure from the constancy of the regression coefficients is haphazard and sudden. If either of the straight lines in the graphs is crossed, the null hypothesis that the regression equation is correctly specified is rejected at the 5 per cent level of significance. From the graphs presented in Figure 1 below, only CUSUM stays within the 5 per cent critical line, indicating parameter constancy throughout the sample period in the study. For the CUSUMSQ, parameter instability is established between 1998 and 2001.

Figure 1: Stability Tests using CUSUM and CUSUMSQ of Residual Tests

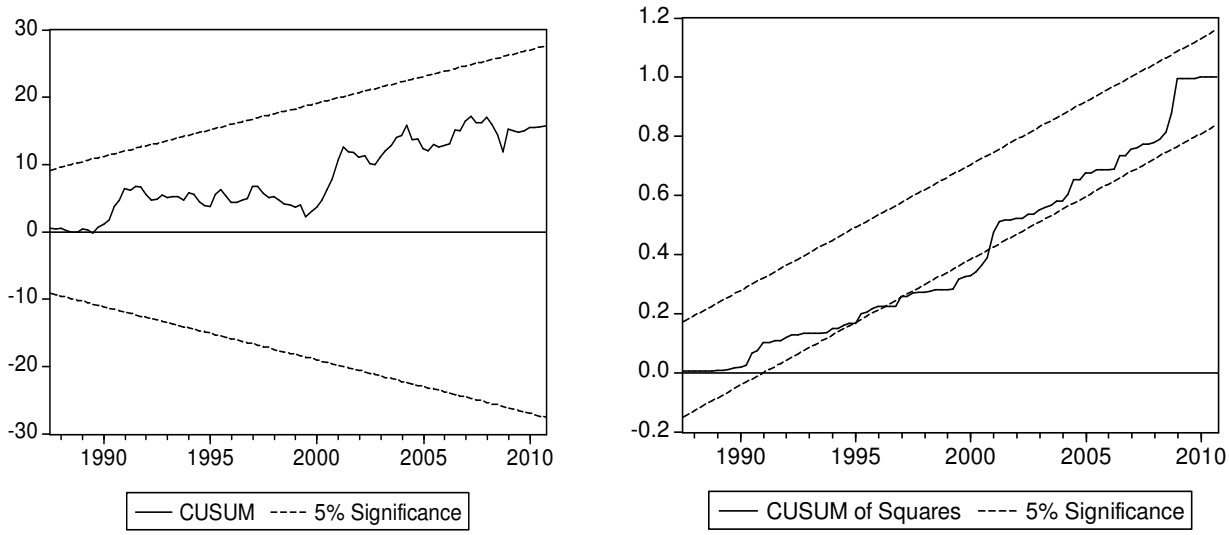

Table 6: Variance Decomposition of ASIR

Period	S.E.	ASIR	CPI	CPS	EXR	GDP	INT	M2	OIL
1	0.096327	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.136712	85.45137	1.929383	0.163994	4.35E-05	1.327206	2.902862	0.010584	8.214558
3	0.160596	77.09050	1.630482	0.361481	0.000371	6.886697	5.274030	0.057163	8.699278
4	0.179410	69.41090	1.307018	0.517504	0.052060	12.96743	6.870789	1.408031	7.466261
5	0.195981	62.13894	1.095784	0.684135	0.258020	17.79257	7.909812	3.808024	6.312717
6	0.210799	55.98402	0.947203	0.937457	0.640824	20.94780	8.223544	6.862746	5.456401
7	0.224074	50.95581	0.839306	1.289327	1.170092	22.72380	7.973339	10.19496	4.853360
8	0.236099	46.81398	0.766196	1.729122	1.790082	23.49169	7.423842	13.54847	4.436611
9	0.247198	43.30890	0.732522	2.227749	2.443579	23.59303	6.805137	16.73720	4.151886
10	0.257647	40.25785	0.744203	2.750782	3.085494	23.28259	6.271276	19.64863	3.959185

Source: Author's Estimation

An examination of the short-run dynamic properties of stock market index is further supplemented by variance decomposition and Generalized Impulse Response Analysis presented in Tables 6 and 7 respectively. Table 6 gives the fraction of the forecast error variance for each variable that is attributable to its own innovations and to innovations in another variable. From the Table, "own shocks" constitute a significant source of variation in stock market index returns forecast errors in the short run, ranging from 40 per cent to 100 per cent over the 10 quarters horizon. Ten quarter after a stock market returns shock, the persistence of stock market returns shock only explains 40% of the variance of stock market returns, while gross domestic product and broad money supply account for 23% and 19% respectively. The relative importance of past stock market returns in determining current stock returns declines from 100% in period one to 40 % in period ten. In the long run, the stock market returns is significantly determined by gross domestic product, broad money supply and interest rates. Consumer price index, credit to the private sector, exchange rate and oil prices constitutes relatively

insignificant proportion to stock returns. The salient feature of the variance decomposition results, in this study, is that the predominant sources of stock market returns fluctuations are due majorly to own shocks, gross domestic product and broad money supply.

Table 7: Impulse Response Functions of ASIR

Period	ASIR	CPI	CPS	EXR	GDP	INT	M2	OIL
1	0.096327	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.081806	-0.018990	-0.005536	-9.02E-05	0.015750	-0.023293	-0.001406	-0.039183
3	0.062540	-0.007740	-0.007911	-0.000296	0.039091	-0.028595	0.003573	-0.026614
4	0.049594	-0.000430	-0.008564	-0.004082	0.048967	-0.029178	0.020940	-0.012634
5	0.039047	-0.000415	-0.009808	-0.009074	0.051574	-0.028748	0.031771	-0.004624
6	0.031790	0.000166	-0.012402	-0.013626	0.049745	-0.024823	0.039836	2.63E-05
7	0.026593	-0.000711	-0.015192	-0.017399	0.045836	-0.018684	0.045489	0.003493
8	0.022607	-0.002386	-0.017791	-0.020257	0.041055	-0.011616	0.049331	0.006023
9	0.019217	-0.004530	-0.019936	-0.022257	0.036360	-0.004489	0.051723	0.008000
10	0.016099	-0.006811	-0.021557	-0.023559	0.032225	0.002140	0.053062	0.009544

Source: Author's Estimation

The impulse response functions are reported in Table 7. Impulse response analysis is a device to display the dynamics of the variables tracing out the reaction of each variable to a particular shock at time t. The impulse response functions allow a sensible economic interpretation. According to the table, a negative credit to the private sector shock affects stock returns in the short run and long run as stock returns increases significantly in all the periods. The results of the impulse responses of CPS shocks are consistent with standard economic theory. The impulse responses also show that the response of stock returns to gross domestic product, interest rate and broad money supply are the most significant. While the shocks in other macroeconomic policies show that they have marginal effects on the on stock returns in Nigeria. The response of stock returns to one standard innovation in oil price is negative in the short run but turns positive and declined throughout the period. Also, past stock returns is positive but declining throughout the period. The shocks in stock market index responds negatively to changes in CPS, EXR and INT in all the periods. The response of stock market index to shocks in CPS is negative and rising throughout the period.

6. Conclusions and Policy Implications

The objective of this study has been to investigate the effects of macroeconomic policy on the stock market performance in Nigeria. More specifically, the study seeks to estimate, using an error correction model, the relative effects of changes in key macroeconomic variables such as the credit to the private sector of the economy, inflation, exchange rate, international oil prices, interest rates, broad money supply as well as measure of real economic activity in Nigeria between 1985 and 2010. This study is particularly important because it is expected to bridge a yawning gap in the existing state of knowledge about the impact of macroeconomic policy shocks on the stock market performance in Nigeria.

Our empirical findings from the static long run model suggest that CPS, EXR, GDP, M2 and OIL are directly related to stock market returns in Nigeria while the effects of CPI and INT are negative. The results also reveal that the effects of CPS, EXR and OIL are not statistically significant in the model, but they have the right signs, except that of OIL. The results from structural analysis also reveal that the response of shocks of stock returns to gross domestic product, interest rate and broad money supply are the most significant. While the shocks in other macroeconomic policies show that they have marginal effects on the stock returns in Nigeria. The study, therefore, concludes that macroeconomic policy shocks cannot be ignored in accounting for the dynamics of stock returns in Nigeria.

Two important implications need to be drawn with respect to conclusions from the model estimation results. First, while this study recognises the potential significance of other variables in explaining stock market returns over the years, the results emanating from the estimated regression model seem to suggest that macroeconomic policy also play a major role. Therefore, a government that is desirous of using stock market as an instrument to stimulate investment must adopt appropriate mix of regulatory, fiscal and monetary policies. Second, empirical insight from the literature clearly stipulates *a priori* expectations for each of the partial regression coefficients. However, some of the coefficients displayed illogical or theoretically inconsistent signs. Theoretically, this could have been due to one or a combination of several factors, including data collection, data generation, or measurement errors or due alternatively to the peculiarities of the Nigerian economy.

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