STOCK MARKET PERFORMANCE IN NIGERIA: APPLICATION OF PRINCIPAL COMPONENTS ANALYSIS

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ABSTRACT

This study focused on the principal components of stock market in Nigeria and their contributions to stock market performance. The Ordinary Least Square method, cointegratin test and principal components analysis were employed in the empirical analysis. The augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests were conducted and found all the variables to be stationary in first difference at intercept and trend. This implies that the variables are integrated of order one, i.e. 1(1) at intercept and trend in both ADF and PP unit root tests. The cointegration test shows that both Trace and Maximum Eigen value indicated six (6) cointegrating equations at 5% level of significance. This shows that the variables have a long-run relationship. The result of the principal components analysis shows that the variables are significantly correlated, supporting the long-run relation established in the cointegration test. The values equally suggest that the variables are strong determinants of stock market performance in Nigeria. The OLS result shows that the independent variables employed in the study were found to be positively related to All Share Index (ASHI) (proxied as a measure of stock market performance) except credit to private sector (CPS) with negative coefficient of -0.820911 and t-statistic value of -4.848472. The coefficient of determinations, i.e. R-squared has a value of 0.986844. This shows that 98 percent of changes in stock market performance are attributed to the independent variables. The study shows that stock market performance in Nigeria is significantly influenced by Current Basic Prices (CBP), Credit to Private Sector (CPS), Market Capitalization (MARKC), Turnover Ratio (TURNR) and Total Stock Traded (TST). This implies that for a better performance of stock market in Nigeria, policies should take into accounts all of these variables and also ensures liquidity of financial assets.

KEYWORDS: Principal Components, Stock Market, Liquidity, Financial Assets.

1.0 INTRODUCTION

The view of many economic and financial researchers is that stock markets may affect economic activity through the creation of liquidity. Liquid equity markets make investment less risky and more attractive because they allow savers to acquire assets

(equities) and to sell them quickly and cheaply if they need access to their savings or want to alter their portfolios (Levine, 1996). At the same time, companies enjoy permanent access to capital raised through equity issues. Stock markets are expected to increase economic growth by increasing the liquidity of financial assets, make global and domestic risk diversification possible, promote wiser investment decisions, and influence corporate governance that is, solving institutional problems by increasing share holders' interest value (Osei, 2005). Equally, stock markets are the best indicator to forecast future economic activity and describe actual causal effect between future economic growth and stock prices. These could be achieved through efficient and effective co-ordination of monetary and fiscal policies that encourage investors' confidence and stock liquidity (Ugwuanyi and Ukwueze, 2012).

Stock markets as part of the financial sector and as engine that facilitate the allocation and re-allocation of capital to corporate sector cannot be overlooked in economic growth and development of Nigeria. It is imperative to study the principal components and their contributions to the performance of stock markets in Nigeria. The findings will provide important information to policy makers on stock markets in Nigeria. To achieve the objective of this study, we organize the paper in sections. Section one introduces the study while section two reviews the related literature. Section three describes data set and methodology. Section four presents and interprets the estimated results, and finally, section five provides conclusion and policy implications.

2.0 LITERATURE REVIEW

The liquidity theorists, Stiglitz and Weiss (1981); Cho (1986); Mirakhor and Villaneuva (1990); Benchivenga and Smith (1991); Mishkin (2001); and Osei (2005), believe that stock markets could increase economic growth by increasing the liquidity of financial assets, make global and domestic risk diversification possible, promote wiser investment decisions and influence corporate governance. They also argue that efficient stock markets provide guidelines as a means to keep appropriate monetary policy through the issuance and repurchase of government securities in the liquid market, which is an important step towards financial liberalization. They remarked that stock markets liquidity positively predicts aggregate economic growth. Stock market that facilitates risk diversification encourages shift to higher return projects (Obstfeld, 1994). Donwa and Odia (2010) argue that capital market is very vital to the growth, development and strength of an economy, because it supports government and corporate initiatives, finances the exploitation of new ideas and facilitates the management of financial risk. The proponents of positive relationship between stock market development and economic growth hinged their arguments on the fact that stock market aids economic growth and development through the mobilization and allocation of savings, risk diversification, liquidity creating ability and corporate improvement.

On the other hand, the traditional growth theorists argue that very liquid stock markets encourage investor myopia, because liquid markets may weaken investors' commitment and reduce investors' incentives to exert corporate control by overseeing managers and monitoring firm performance and potential. According to this view,

enhanced stock market liquidity may actually hurt economic growth (Bhide, 1993; and Singh, 1997).

In examining the stock market-growth nexus in Nigeria, Obaji (2015); Chinwuba and Amos (2011); Owolabi and Adegbite (2013); Ujunwa and Salami (2010); Kolapo and Adaramola (2012); Oke and Adeusi (2012); Oluitan and Anne (2013); Onwe (2015); and Eze and Nwankwo (2013) found that the capital market impacts positively on the economic growth. Specifically, none examined the nexus applying principal component analysis and some novelty variables like credit to private sector that provide cash for asset speculation and current basic prices that determine asset prices.

3.0 ECONOMETRIC METHODOLOGY

3.1 Model Specification

This paper uses Ordinary Least Square method, cointegration test and principal component analysis to identify the relationship between stock market variables and some other exogenous variables that may influence the performance of the stock market in Nigeria. The stock market performance-exogenous variable hypothesis was built upon the following augmented function using six identified variables.

ASHI = f(CBP, CPS, MARKC, TST, TURNR) ----------(1)

Where:

ASHI	=	All Share Index (as dependent variable, used to measure the performance of stock market)
CBP	=	Current Basic Prices
CPS	=	Credit to Private Sector
MARKC	=	Market Capitalization
TST	=	Total Stock Traded
TURNR	=	Turnover Ratio

The explicit form of equation (1) above is represented as:

$ASHI = \beta_0 + \beta_1 CBP + \beta_2 CPS + \beta_3 MARKC + \beta_4 TST + \beta_5 TURNR + \mu$---------- (2)

Where:

B_0	=	intercept of relationship in the model
β_1- β_5	=	coefficients of each of the variables
μ	=	the stochastic random term.

$Log(ASHI) = \beta_0 + \beta_1 log(CBP) + \beta_2 logCPS + \beta_3 log(MARKC) + \beta_4 log(TST) + \beta_5 log(TURNR) + \mu$----------(3)

Where:

Log	=	Natural log

3.2 Description of Data and Sources

We used annual data for the period 1981 to 2014. Data were sourced from Securities and Exchange Commission Annual Reports and Accounts of various years. Central Bank of Nigeria (CBN) Statistical Bulletin 2014. National Bureau of Statistics Annual Reports for various years.

3.3 Estimation Technique

This study employed a four step procedure in order to identify the relationship between stock market variables and some other exogenous variables that may influence the performance of the stock market in Nigeria.

Unit root test was first employed, using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests to check whether each data series is integrated and has a unit root.

Secondly, the VAR based co-integration test using the methodology developed in Johansen (1991, 1995) was employed to test the existence or non-existence of long-run equilibrium (stationary) relationships among the variables. The existence of long-run equilibrium relationship among economic variables is referred to in the economic literature as cointegration. It provides not only as estimation methodology but also explicit procedures for testing for the number of co-integrating vectors as well as for restrictions suggested by economic theory in a multivariate setting.

The principal components analysis was pursued following cointegration test. It was computed using ordinary correlations.

Finally, we employed Ordinary Least Squares to estimate the structural parameters of the model. The method involves decision on whether the parameters are statistically significant and theoretically meaningful verifying the validity of estimates and whether they actually represent economic theory.

4.0 EMPIRICAL ANALYSIS

4.1 Unit Root Test

The result of both the ADF and PP tests are presented in table 4.1.1.

Table 4.1.1: Unit Root Test for stationarity at 1st Difference

Variables	ADF (Intercept)	ADF (Intercept & Trend)	PP (Intercept)	PP (Intercept & Trend)
ASHI	-6.074619*(-2.960411)	-6.334352*(-3.562882)	-6.707765*(-2.957110)	-14.24067*(-3.557759)
CBP	-3.863833*(-2.957110)	-5.383957*(-3.557759)	-3.970022*(-2.957110)	-5.382610*(-3.557759)
CPS	-3.02106*(-2.957110)	-4.522952*(-3.557759)	-2.917207**(-2.957110)	-4.522952*(-3.557759)
MARKC	-5.318077*(-2.957110)	-4.869006*(-3.557759)	-5.318077*(-2.957110)	-7.061665*(-3.557759)
TST	-9.266635*(-2.957110)	-9.121547*(-3.557759)	-21.20512*(-2.957110)	-22.15981*(-3.557759)
TURNR	-5.927718*(-2.960411)	-6.617704*(-3.562882)	-5.508310*(-2.957110)	-11.55173*(-3.557759)

Note: Figures within parenthesis indicate test critical values at 5% level of significance.
* denotes significance at 5% level
** denotes not significance at 5% level
Mackinnon (1991) critical value for rejection of hypothesis of unit root applied.
Source: Author's estimation using Eviews 7.0.

The unit root tests at level were carried on the variables and found evidence of non stationarity. We proceeded to test for the unit root at first difference. The result is presented in table 4.1.1. The above table (4.1.1) reveals that all the variables became stationary at first difference at intercept and trend in both ADF and PP tests. On the basis of this, the null hypothesis of non-stationary was rejected and we conclude that the variables are stationary. This implies that the variables are integrated of order one, i.e. 1(1) at intercept and trend in both ADF and PP.

4.2 Cointegration Test Result

Having confirmed the stationarity of the variables at 1(1), we proceeded to examine the presence or non-presence of cointegration among the variables. We started the cointegration analysis by employing the Johansen and Juselius multivariate cointegration test. The test envisages that there can be just one relationship between variables in long-term. In most cases, if two variables that are 1(1) are linearly combined, the combination will also be 1(1). More generally, if variables with differing orders of integration are combined, then the combination will have an order of integration equal to the largest.

The model with lag 1 was chosen with the linear deterministic trend assumption and the result is presented in table 4.2.1.

Table 4.2.1: Unrestricted Cointegration Rank Tests

		Trace		
Hypothesized No. of CE(S)	**Eigen value**	**Trace Statistics**	**0.05 Critical Value**	**Prob. ****
None*	0.981354	319.3703	95.75366	0.0000
At most 1*	0.941360	191.9430	69.81889	0.0000
At most 2*	0.803848	101.1801	47.85613	0.0000
At most 3*	0.572003	49.05638	29.79707	0.0001
At most 4*	0.421579	21.89990	15.49471	0.0047
At most 5*	0.127958	4.381378	3.841466	0.0363
		Maximum Eigen value		
Hypothesized No. of CE(S)	**Eigen value**	**Max-Eigen Statistics**	**0.05 Critical Value**	**Prob. ****
None*	0.981354	127.4272	40.07757	0.0000
At most 1*	0.941360	90.76290	33.87687	0.0000
At most 2*	0.803848	52.12376	27.58434	0.0000
At most 3*	0.572003	27.15648	14.13162	0.0063
At most 4*	0.421579	17.51852	14.26460	0.0148
At most 5*	0.127958	4.381378	3.841466	0.0363

Note: Trace and Max-Eigen value tests indicate 6 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
** Mackinnon-Haug-Michelis (1999) ρ –values

Source: Author's estimation using Eviews 7.0.

Table 4.2.1 shows the result of the cointegration test. In the table, both trace statistic and maximum Eigen value statistic indicate six (6) cointegrating equations at the 5 percent level of significance, suggesting that three is long-run relations among the variables so tested.

Cointegration is said to exist if the values of computed Eigen values are significantly different from zero or if the trace statistic or maximum Eigen value statistic

is greater than the critical value at 5 percent level of significance. Given that six of the hypothesized equations satisfy this condition, the null hypothesis of no cointegration among the variables is rejected in the six equations. We, therefore conclude that along-run relationships exist among the variables.

4.3 Principal Components Analysis Result (Using Ordinary Correlations)

Table 4.3.1: Ordinary Correlations

	ASHI	CBP	CPS	MARKC	TST	TURNR
ASHI	1.000000					
CBP	0.833987	1.000000				
CPS	0.810235	0.980308	1.000000			
MARKC	0.923364	0.942706	0.948333	1.000000		
TST	0.645429	0.606308	0.608042	0.607273	1.000000	
TURNR	0.947438	0.862043	0.856846	0.913486	0.674993	1.000000

Source: Author's estimation using Eviews 7.0.

The result presented in table 4.3.1 shows that the variables are significantly correlated. This result suggests a support to the long-run relation established in the cointegration test earlier presented. Equally the values suggest that the variables are strong determinants of stock market performance in Nigeria.

4.4 Ordinary Least Squares (OLS) Estimate

Table 4.4.1: OLS Result

Dependent variable : LOG(ASHI)

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	2.815458	0.609505	4.619253	0.0001
LOG(CBP)	0.691209	0.150967	4.578546	0.0001
LOG(CPS)	-0.820911	0.169313	-4.848472	0.0000
LOG(MARKS)	0.678156	0.132592	5.114593	0.0000
LOG(TST)	0.045906	0.044986	1.020459	0.3162
LOG(TURNR)	0.317327	0.124785	2.542996	0.0168
R-Squared	0.986844			
Adjusted R-Squared	0.984495			
F-Statistic	420.0700			
Prob (F-Statistic)	0.000000			
Durhim-Watson Stat.	1.134088			

Source: Author's estimation using Eviews 7.0.

The OLS result presented in table 4.4.1 shows that the independent variables employed for this study were found to be positively related to All Share Index (ASHI) except Credit to Private Sector (CPS) with negative coefficient of -0.820911 and t-statistic value of -4.848472. The Current Basic Prices (CBP), Market Capitalization

(MARKC) and Turnover Ratio (TURNR) have significant t-statistic value of 4.578546, 5.114593 and 2.542996 respectively, while, Total Stock traded (TST) has insignificant t-statistic value of 1.020459. It can further be confirmed from its ρ –value of 0.3162 that is greater than 0.05.

The coefficient of determination, i.e. R-squared has a value of 0.986844. This shows that 98 percent changes in All Share Index as measure of stock market performance are attributed to the independent variables. The table 4.4.1 equally shows that the probability value of the F-statistics is 0.000000, i.e., less than 0.05. This shows that the entire influence of the independent variables on the dependent variables is statistically significant.

Based on the above findings, it is safe to conclude that stock market performance, proxied by All Share Index, is significantly influenced by current basic prices, credit to private sector, market capitalization, turnover ratio, and total stock traded.

5.0 CONCLUSION

This study focused on the principal components of stock market in Nigeria and their contributions to stock market performance. The Ordinary Least Square method, cointegratoin test and principal components analysis were employed in the empirical analysis. We tested for stationarity of the variables using augmented Dickey-Fuller (ADF) and Phillip-Perron (PP) tests. The unit root tests at level were carried on the variables and found evidence of non-stationarity. We proceeded to test for the unit root in first difference, and all the variables became stationary at intercept and trend in both ADF and PP tests. This implies that the variables are integrated of order one, i.e. 1(1) at intercept and trend in both ADF and PP.

The Johansen and Juselius cointegration test was used to determine the presence or otherwise of a cointegrating vector in the variables. Both Trace and Maximum Eigen value indicated six (6) cointegratoin at 5% level of significance pointing to the fact that the variables have a long-run relationship.

The OLS result shows that the independent variables employed in the study were found to be positively related to All Share Index (ASHI) except credit to private sector (CPS) with negative coefficient of -0.820911 and t-statistic value of -4.848472. The coefficient of determinations, i.e. R-squared has a value of 0.986844. This shows that 98 percent changes in stock market performance are attributed to the independent variables.

Conclusively, the study shows that stock market performance in Nigeria is significantly influenced by current basic prices, credit to private sector, market capitalization, turnover ratio and total stock traded. This implies that for a better performance of stock market in Nigeria, policy makers should take into account all of these variables and also ensure liquidity of financial assets.

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