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The Volatility Persistence and Stock Return in the Nigerian Capital Market: Mean-revert Garch Approach

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Abstract: The level of volatility in the stock market is a major determinant factor in taking investment decisions in any of the stock markets. However, the persistent of stock price volatility in the Nigerian stock market has led to low level of participation as a result of associated high level risk in the market. This study examined volatility persistence effects on stock returns in Nigeria stock exchange market after global financial crisis between 2010 and 2018. The study employed weekly secondary data subjected to mean reverting form of GARCH model. Finding revealed that sum of the estimated ARCH and GARCH co-efficient (persistence co-efficient) for the three distributional assumptions indicates that ASI returns exhibit high volatility persistence after global financial crisis at different selection criteria models. The study concludes that ASI returns exhibit high volatility persistence after the global financial crisis. Therefore, it is recommended that the Nigerian stock exchange regulators should make available to the public an efficient information dissemination and software application to enhance ease market information accessibility which in turn improves investor confidence, patronage and liquidity in the Nigerian stock market.

Keywords: Revert in Mean-GARCH Model, Global financial crisis, Stock Return, Volatility Persistence and Nigerian Capital Market

JEL Code: G1, G4

1.1. Introduction

The volatility in the stock market has been one of the determinants factors considered in taking investment decisions in any stock market. Stock exchange market being essential components of financial system plays critical role in capital formation and wealth creation in any economy. The degree of stock market volatility in different stock markets has been a major concern to stakeholders in the market. This cursory concern among investors is due to huge losses or gains and greater uncertainty characterized with stock market volatility.

Ndigwa and Muriu (2016) are of the opinion that continuous persistent of stock price volatility cause adverse consequence for stock market

investors in terms of returns and market prediction. Furthermore, that volatility in the stock market could result to less capital investment in stock market, market-making risks, depresses investors from holding stock, demand for high risk premium to leverage volatility risks and unstable stock returns. The unstable stock prices is exhibited by the varying conditional variance of the stock prices. In high volatile stock exchange markets, it is difficult for quoted firms to raise capital as rational investor prefers less volatile stock market as case may be, except for the risk lover investors.

The developed and emerging stock markets are characterized with volatility shock causing unpredictable market trends and unstable stock returns. The level of stock market volatility affects economic activities and performance and investors' patronage. Though, continuous persistent in stock market volatility weaken investors' confidence and this drive down investors' interest in stock market investment; resulting to unstable returns. Stock return volatility propelled variability in stock prices which could result to risk associated with investment. In Nigeria stock exchange market, Central Bank of Nigeria (CBN) (2014) asserted that after global financial crisis, All Share Index drop from 66,371 point in March 2008 to 22,349 point in January in 2009, Likewise market capitalization drop from N12.640 trillion in March 2008 to N4.836 trillion in January, 2009. This indicated that All Share Index had lost a total of 67% point and the market capitalization had lost 62% of its value. In September, 2018; All Share Index drop from 32,763 point to 32,383 point in October, 2018, likewise market capitalization drop from 11.961 trillion in September, 2018 to 11.822 trillion in October, 2018. This unstable in stock market are majorly caused by stock market news or rumor, unexpected information that affects expected returns and stock trading volume and thus increase variability and unpredictable stock prices in Nigeria stock exchange market.

Onah and Obioma (2016) shown that stock prices and returns in Nigeria stock market display phenomenon of volatility clustering, leptokurtosis and asymmetry which in turn reduced investors' confidence in Nigeria stock exchange market. Moreso, the existence of excessive stock market volatility undermines the usefulness of stock price prediction of the stock market and firm value. The major causes of the Nigerian stock market volatility are stock market news or rumor, unexpected information that affects expected returns and trading volume; which are driven by the modification in macroeconomic policies, shift in investors' tolerance level of riskand increased uncertainty in the market. Various studies such as Tripathy and Gil-Alana (2010), Onwukwe, Bassey and Isaac (2011), Goudarzi and Ramanarayanan (2011), Bala and Asemota (2013), Dikko, Asiribo and

Samson (2015), Uyaebo, Atoi and Usman (2015), Owidi and Mugo-Waweru (2016), Adewale, Olufemi and Oseko (2016), Ariwa, Ani, Onyele, Ekeleme and Okwuchukwu (2017), Kuhe and Chiawa (2017), Fasanya and Adekoya (2017), Oyinlola (2018), and Kuhe (2018),), have investigated stock returns volatility within and outside Nigeria. There is sufficiently empirical literature on volatility of stock returns in Nigeria stock market but studies on volatility persistence and stock returns after global financial crisis seems to be scarce.

Furthermore, Ariwa *et al.* (2017) found that stock market news and market maker trigger market volatility and thus led to unstable stock returns, loss of investors' confidence thereby reducing market participation and liquidity in Nigeria stock market. Based on the identified gap in literature of scanty studies on persistence of volatility in stock return in Nigeria informed this current study.

2. Theoretical Framework

This study anchored on Efficient Market Hypothesis the origins of the EMH can be traced as far back as the pioneering theoretical contributions of Bachelier (1900) and of the Nobel Laureate Samuelson (1965) (Davis & Etheridge, 2011). The efficient market is an important concept, widely accepted since its introduction in the late 1950s and early 1960s under the covenant of the "theory of random walk" in finance literature; the theory became known as the Efficient Market Hypothesis (EMH). In his empirical analysis of stock market prices that follow random walk. EMH is an extension of the condition of zero-profit equilibrium certainty in classical asset pricing theory, to the dynamic behaviour of prices in speculative markets under conditions of uncertainty. In short, it expresses an efficient market if it is impossible to make economic profits by trading on the basis of information (Jensen, 1978). Given different types of information, EMH is described with three levels of market efficiency. Firstly, the *weak* form of EMH proclaims that all information on historical prices is fully reflected in the current market price of assets. This advocates that no analysis of the historical price patterns is useful to predict the future prices of shares. This is denoted by the term *random walk*, which means that the market price of shares is a random departure from previous prices. In other words, the future movement of prices is unrelated to historical price movements. Bachelier (1900), Samuelson (1965) and Davis and Etheridge (2011) asserted that speculative prices were generated by a random process whereby successive price changes were essentially random in character, and that price of previous trading did not influence the price of current returns.

3. Data and Methodology

This study adopted ex-post facto research design by relying on secondary data source for this study. The study used weekly data of All Share Index from 1/8/2010 to 10/26/2018 sourced from Nigeria Stock exchange fact book (2018). The mean reverting form of GARCH model was employed to determine volatility persistence in the Nigeria stock market within the period of 2008 to October, 2018.

( )

( )

Where ( ) is the unconditional long run magnitude of volatility persistence and The mean reverting rate in a good fitted model is usually close to one which controls the

( )

magnitude of mean reversion (volatility persistence). The A Priori Expectation is that; indicating that the past squared residual of the mean return and the past return variance information individually and jointly cannot influence the current return variance while the addition (sum) of reflect the magnitude of volatility persistence in return series.

4. Result and Discussion

Table 4.1: ADF and PP Unit Root Test Result of ASI Return after Global Financial Crisis

		t-Statistic	*Prob.**
Augmented Dickey-Fuller test statistic		-19.35938	0.0000
Test critical values:	1% level	-3.978221	
	5% level	-3.419664	
	10% level	-3.132445	
*MacKinnon (1996) one-sided p-values.			
PP UNIT ROOT			
		Adj. t-Stat	*Prob.**
Phillips-Perron test statistic		-19.35169	0.0000
Test critical values:	1% level	-3.978221	
	5% level	-3.419664	
	10% level	-3.132445	
*MacKinnon (1996) one-sided p-values.			

Source: Author's Computation (2019)

The unit root test result of the ASI return series after the global financial crisis covering the periods between 1/8/2010 to 10/26/2018 as presented in Table 4.1 indicating that P-Value of 0.000 under ADF and PP test statistics

meaning the null hypothesis is rejected i.e return series after global financial crisis has no unit root at 5% level of significance.

Table 4.2: ARCH Effect Result of ASI Return after Global Financial Crisis

Test Statistics	*Value*	*P-value*
F-statistics	7.627623	0.0021
Observed R^2	7.618933	0.0011

Source: Author's Computation (2019)

Table 4.3: Mean Reversion Estimate for ASI Return after Global Financial Crisis

Parameters	*Gausian Distribution Estimate*	*Student's t Distribution Estimates*	*Generalised Error Distribution Estimate*
• 0.321832 • 0.352812 • 0.281234 • 0.575234 • 0.586435 • 0.675317 • Total • 0.897066 • 0.939247 • 0.956551 •			
Half-Life Estimate	8.763241	7.854632	7.487453
AIC	-5.352641	-5.531243	-5.581074
SC	-5.183487	-5.534679	-5.643531
HQ	-5.120543	-5.327643	-5.478932

Source: Author's Computation (2019)

The ARCH effect test on the residual of the mean equation of whole ASI return series is shown in Table 4.2 with F-Statistics and the observed R^2 values having correspondence P-Value of 0.0021 and 0.0011 respectively, this indicate that the null hypothesis of no ARCH effect is rejected i.e there is ARCH effect in the residual of the mean equation of ASI return series on the Nigerian stock exchange market after global financial crisis.

Table 4.3 depicted the sum of the estimated ARCH and GARCH co-efficient (persistence co-efficient) for the three distributional assumptions as 0.897, 0.939 and 0.956 which is symptomatic of response function to shock dying very slowly i.e volatility is highly persistent. This indicated that the ASI return series on the Nigerian stock exchange after global crisis do not follow random walk which means that the return series is mean reverting. The volatility half-life estimate is approximately 9 weeks under the Gausian Distribution Assumption, 8 weeks under Student's t Distribution Assumption and 7 weeks under Generalised Error Distribution Assumption. The ASI returns volatility appears to have a long memory but it is still mean reverting such that new shock will affect the returns on the Nigeria stock exchange market for the period of 7, 8 to 9 weeks after global financial crisis depending on the distributional assumption used by the investor. The generalized error distribution estimates appears to have the lowest values among the model selection criterions suggesting that the estimates under the generalized error distribution provide the best prediction on the magnitude of volatility in ASIreturns on the Nigerian stock exchange market

after the global financial crisis. In summary, the ASI returns exhibit high volatility persistence after the global financial crisis.

5. Conclusion and Recommendations

The study concludes that ASI returns exhibit high volatility persistence after the global financial crisis. Based on the findings, this study recommends that; the Nigeria stock regulators should provide a platform for information dissemination and make available software application to the public in order to enhance market information ease accessibility which in turn enhances investors informed decisions on stock investment; this will lead to an increase in investors' confidence, patronage and liquidity of the Nigeria stock market.

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