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Speculative Bubble and the Nigerian Stock Market: An Empirical Investigation

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Abstract

The deviation of asset prices from their intrinsic price (value) is an attribute of market fluctuation/ instability arising from endogenous market dynamics. It is on this premise that this study empirically investigated whether speculative bubble existed in the Nigerian Capital Market characterizing the period 2008Q1 to 2009Q1 using three characteristic fundamentals- share price, dividend and earnings per share of ten quoted banks in the Nigeria Stock Exchange. The period is particularly instructive as it characterized fundamental upheavals in the global financial market with manifest transmission effects on domestic financial markets. The study employs the Augmented Dickey Fuller (ADF) and the Augmented Engel-Granger (AEG) tests for co-integration to determine the existence of random walks, and fundamental deviation in asset prices during the period, as well as the ARCH and GARCH models to ascertain the existence, degree, and persistence of volatility. The empirical results reveal that speculative bubble existed in the period, with evidence of volatility persistence and asymmetric effects, particularly in the case of share price and earnings per share. It is therefore recommended that strong regulatory and institutional mechanisms capable of preventing irrational tendencies by market participants be put in place in addition to policies and strategies enhancing strong market efficiency.

Key words: Speculative Bubble, Asset Price Deviation, Mean Non-reverting Variance, GARCH, Asymmetric GARCH

JEL Classification: M1, M10, M21, M40

Paper Classification: Research Paper

Introduction

One contemporary phenomenon in the financial markets is the over valuation of stocks which is termed 'bubble' and sometimes referred to as irrational exuberant. A stock market bubble is an obvious upsurge in price of a financial asset or an array of assets in an unbroken manner, with the first rise spawning expectations of further rises and thus fascinating new buyers (Mackay, 1884; Almudhaf, 2018). Since capital market and the level of its efficiency overtime is very central

in the course of economic growth and development of a nation, there is the need to re-examine the various factors (non-economic factors) whose activities usually have serious implications on the day-today activities in the markets and that might even lead to market bubble, confidence evaporation, eventual crash and total erosion of investor's money suddenly.

Bubbles are the sudden rise in the price of shares or assets not being backed/supported by basic verifiable, known economic and financial fundamentals. Asekome and Agbonkhese(2015) argue that non-fundamental factors like calendar effect, style investment, noise trading, inside information, stock market manipulation, changes in the political environment and investors' over confidence, are commonly responsible for some of the observed behavioural anomalies in the financial markets as well as the possible causes of assets price bubbles and crashes today. Usually the manifestations of bubbles are rooted in the investors' level of conviction that the securities will witness a continuous and improved demand or that the stocks will attract improved capital gains and dividends in the future (Aigbovo, Ozekhome&Isibor, 2017).

As have been seen by several authors, the existence of a bubble, if not mitigated, is always followed by a crash, stimulated by imperfections in the financial market, and other irrational and endogenous dynamics. Based on this, it becomes imperative to consider the Nigerian Stock Exchange (NSE) to ascertain if the market has witnessed a speculative bubble in the period characterizing deep-seated market upheavals 2008Q1-2009Q1. This period in the Nigerian Stock Market witnessed a significant upsurge in the prices of stocks without validation by known market economic and financial fundamentals.

Review of Related Literature

Bubbles and Stock Market Crashes

A stock market bubble is an unprecedented increase in the price of a financial asset or an array of assets in a persistent manner, with the initial rise spawning expectations of further rise and thus fascinating new buyers (Mackay, 1884). In this context, speculators are mainly focused on profits emanating from transacting on the asset (capital gain), rather than the result of its operating activities (dividend). Brunnermeier (2001) opines that a bubble occurs if upsurge in prices consistently exceeds 50% within a given period before the bubble crash. In such circumstance, prices of stocks in the market are usually overvalued. According to Janszen (2008), a bubble is the huge surge in asset prices resulting from a perverse self-reinforcing belief system, likened to a fog that clouds the judgment of all, even the most informed market participants. He added that the bubble 'is the product of that irrational financial decision that becomes noticeable only when the said fog rolls away. On his part, Osaze (2011) submitted that a meltdown is a total and disastrous economic and financial failure with extremely high contagion effects akin to the melting down of a nuclear reactor. This leads to financial crises all around the world with varying effects on the national economies. He added that Stock Market Crisis arise from a disastrous failure of governance rules and regulations giving room for financial malfeasance by the operators and speculation by the investors. The bubble eventually bursts when the stock market fundamentals do not support the soaring prices in the overheated market.

Some notable speculative bubbles and stock market crashes in the world history include the Dutch Tulip Mania of Netherland in 1634-1637; the South Sea bubble of Britain in 1716-1720; the Mississippi Bubble of France in 1716-1720; the Railway Mania bubble of British in the 1940s; the stock market crash of 1929 in the United States; Souk al-Manakh stock bubble of Kuwait in the early 1980s; the Dot-com bubble of the United States in the late 1990s (Columbo, 2020).

Bubbles and the Nigerian Stock Market Crash (2007-2008)

It is on record that stock market bubble was evidenced in the 2007 global financial crisis whose effect was first felt among stocks listed in the stock markets across developed economies. This bubble did not spare the Nigerian stock market, as financial and non-fundamental variables accounted for the Nigerian stock market bubbles. For instance, the signs of bubbles were gradually noticed among listed stocks in the Nigerian stock market during the 2007 and 2008 trading years. The banking sector that successfully recapitalized at the end of year 2005 was strengthened with excess liquidity but was unwilling to lend to long term projects in a country where most people believe in short term investments and quick turnaround of capital to make huge profits (Osaze and Ajao, 2009; Asekome and Agbonkhese, 2015). Many banks resorted to the capital market to raise funds most of them giving loans to investors to purchase their stocks. Evidence from the Nigerian All Share Index (ASI), shows that the index which had risen through 57,990 in December 2007 to 58,580 at the beginning of 2008 with a market capitalization of N10.284 trillion, raised to 66,371 with market capitalization of N12.640 trillion on March 5, 2008 (Aluko, 2008). Suddenly the market was over flooded with stocks and became saturated. The effect of the global financial crisis that affected investments in the U.S was being felt in Nigeria as there was massive withdrawals by foreign investors to off load their securities/portfolio investment for cash repatriation.

Crude oil prices suddenly crashed from $150 to less than $50 per barrel, prices of shares in the Nigerian capital market crashed as the naira could not withstand the trend and thus bowed to the global pressure to depreciate quickly against the major foreign currencies. Banks became uncomfortable as stocks used as security for stock margin loans fell below expectation. The urge for the banks to quickly sell to reduce their investment losses further depressed the market resulting in investor's apathy towards the market. This led to a tight liquidity crunch and then credit to the private sector declined drastically, the all share index also declined steadily from 2008 to around 19,000 and market capitalization declining to N4.5 trillion in March 2009, leading to a total loss of over N8 trillion in less than a year. The ultimate result was a market bubble culminating into a huge portfolio of non-performing and toxic financial assets that were mainly created through stock market margin loans (Aluko, 2008; Asekome and Agbonkhese, 2015). The effect of this crisis further confirmed the submission of Osaze (2011) 'that a meltdown is a total and disastrous economic and financial failure with extremely high contagion effects akin to the melting down of a nuclear reactor'. Adding that while Stock Market Crisis arises from a disastrous failure of governance rules and regulations giving room for financial malfeasance by the operators and speculation by the investors. The bubble eventually bursts when the stock market fundamentals do not support the soaring prices in the overheated market. The so-called soaring prices not supported by market fundamentals is the Sunspots (non-fundamental factors) such as Insider information, Herds Behaviour/Bandwagon effect, Noise trading (sentiments and irrational behaviour of investors who usually make decisions in buying and selling in financial assets without the use of economic fundamentals), Stock Market Manipulation and Calendar effect.

Some Prior Empirical Studies

Boubaker, Nguyen and Taouni (2007) investigated speculative bubbles using data from ten selected firms quoted in the Tunis Stock Exchange for the period 1971 to 2005, with a view to verifying the presence or absence of speculative bubbles using two sets of empirical tests (stationarity and co-integration tests). The result revealed the presence of intrinsic bubbles for sampled stocks during the study period. This position was corroborated by Almudhaf (2018) using unit root test among stocks in the Indonesian Stock Exchange market.

Costa,Silvaa.,de Almeidab, & Veigab (2017) examined the existence or otherwise of speculative bubbles in Brazilian firms. Their study found that twenty of the twenty-seven stocks considered exhibiting intrinsic bubbles during the period considered. Similarly, Szulczyk, Cheema and Holmes (2019) investigated the presence of speculative bubbles in the selected Asian stock markets using weekly and monthly large data set involving three bubble episodes. The result of the unit root test revealed the presence of bubbles in all selected markets considered while the outcome of the Augmented Dickey-Fuller test indicated the presence of explosive processes in Thailand, Japan and Hong Kong stocks. The test for cointegration revealed the existence of bubbles among stocks of Thailand, Japan Hong Kong and Malaysia extractions. Evidence of bubbles were observed from the result of the explosiveness test for both monthly and weekly data in all markets considered.

Zhang, Liu, Su, Tao, Lobont¸ and Moldovan (2019) investigated the presence or otherwise of multiple bubbles in the Chinese agricultural commodity market, using the general supreme Dickey-fuller test. Analyses revealed the presence of multiple bubbles in some agricultural commodities, while the price upsurge of others was attributed to the rising oil prices at the global market.

In Nigeria, Olowe (2009) using E-GARCH-in-mean model amidst global financial crises, reforms in the Nigerian insurance and banking stocks found no compelling evidence of the presence of speculative bubbles in the stock exchange. Njiforti and Chidiogo (2010), found volatility persistence, asymmetric effects and a mean- reverting variance, indicating the existence of speculative bubbles during the period examined. Similarly, a study by Aigbovo, Ozekhome and Isibor (2017) sought for the manifestation of speculative bubbles among selected stocks in the Nigerian stock exchange for the period 2008Q1 to 2009Q4 using the unit root, cointegration and the GARCH models. The result of their analysis using Eview 9.0 showed the presence of speculative bubbles for selected stocks during the study period in the Nigerian stock exchange.

The lack of plethora of compelling evidence on the presence of speculative bubbles in Nigeria necessitates the study. From the review of past studies above, there seems to be paucity of empirical evidence on the existence of bubble in the Nigerian stock market. In addition, prior empirical studies on the stock market bubbles in Nigeria are characterized with contradictions, paving the way for more empirical research on the subject matter.

Methodology

The study adopts an ex post facto design using quarterly financial data having time series properties.

Data for the empirical study are obtained from the Daily Price Listings of the Nigerian Stock Exchange (NSE), the NSE fact book, the Central Bank of Nigeria (CBN) statistical bulletin as well as the Securities and Exchange Commission quarterly magazine. The firms whose stocks are captured in the investigation are in the banking subsector. The study focused on stocks in the banking subsector because of the pivotal role of the subsector in the Nigerian stock market, and the fact that stocks in this sub-sector suffered most from the market collapse compared to other sectors of the market. Banks whose stocks were used include WEMA Bank, Eco bank, Access Bank, Zenith Bank, First Bank, Fidelity Bank, Guaranty Trust Bank, FCMB, Union Bank, and the United Bank for Africa. The variables considered are Share price, Price-earnings ratio and dividend for the selected banks for the period 2008Q1- 2009Q1.

Estimation Technique

While investigating the presence of speculative bubbles in the Nigerian Capital Market during the turbulent 2008Q1 to 2009Q1 stock market crash period, several sequential analysis were carried out. First, a preliminary unit root test was conducted on the variables to investigate if a random which implies fundamental deviation exists. Next, was the cointegration test using the Augmented Engle-Granger (AEG) residual based-cointegration test to examine whether the variables are cointegrated and thus follow a long run co-movement. This was necessary to investigate the existence of speculative bubble in asset price on account of serious deviation from fundamental. The clear absence of cointegration suggests the presence of speculative bubble and a serious deviation from fundamentals (Njiforti & Chidigbo, 2010). Such a fundamental deviation increases the propensity of bursting of financial bubbles. Finally, a volatility –presence and volatility –clustering estimates using ARCH and GARCH are presented to investigate the presence and persistence of volatility arising from such asset price deviation.

Empirical Results, Analysis and Discussions

Unit Root Analysis

This involves the test for stationary to determine the existence or otherwise of random walk in asset price fundamental, using the Augmented Dickey Fuller (ADF) test. The results are tabulated in Table 1.

Table 1: Unit Root Test Result for Variables in levels and First Difference

Variable	ADF Statistic (in Levels)	ADF Test Statistic (in First Difference)	Order of Integration	Remark
ΔSP	-1.1160	-5.8554**	I(1)	Stationary
ΔDIV	-1.0316	-5.4067**	I(1)	"
ΔEPS	-1.1653	-5.8942**	I(1)	"

**(**) denotes significance at 5% (1%) level*
Source: E-views 9.0

The result as seen in Table 1 above indicates that the variables were non-stationary at levels, implying the existence of random walk in which serious fundamental deviations was experienced in the asset prices; a pointer to asset price bubble during the period. Consequently, the result attested to the existence of asset price bubbles.

Cointegration Test

Having established non-stationarity of the series at their levels and that they are characterized by a unit root process (random walk), a clear indication of the existence of speculative bubble in asset prices; their cointegration is tested. In the stock market, if the prices are true reflections of the value of expected flow, a cointegration is expected between price-earnings ratio, dividend and stock prices in the long-run. If they fail to cointegrate, then there is evidence of a speculative bubble. Using the Augmented Engle and Granger (1987) (AEG) OLS test of residual, the result is reported in Table 2. In the table, the ADF test statistic value of (-5.3570) is not up to the 95per cent critical ADF value of 5.4483 (in absolute values). Thus, there is clear absence of any co-movement (cointegration) among the variables attesting to the existence of asset price bubbles, arising from

serious deviation from fundamentals during the period. The Engle and Granger cointegration test output is presented in Table 2.

Table 2: Engle and Granger Cointegration Test Output

Variable	ADF Test Statistic	95% Critical ADF Value	Remarks
Residual	-5.3570	-5.4483	Stationary

Source: E-views 9.0 output

Given that speculative bubble existed in the market, implying fundamental deviation (volatility) in stock market during the period, there is a need to investigate volatility persistence and clustering in the market during the period; necessitating the ARCH and GARCH estimates reported.

ARCH and GARCH Estimates

Specifically, the ARCH is specially intended to model conditional mean and conditional variance (i.e. inclusion of earlier variants in accounting for subsequent variations), while the declining effects of information on volatility is captured by the GARCH models.

In the share price result in Table 3, the variance equation indicates that the z-test of the ARCH term is significant at 5 per cent level. The mean equation in the result shows that share price volatility persists for a considerable length of time. Similarly, a significant negative coefficient is observed in the GARCH term, at 5 per cent level, indicating a clear evidence of volatility in the system. Thus, there is outright fundamental deviation of asset prices from their fundamentals or equilibrium value over time. It is also an indication of volatility persistence for a considerable length of time in the system. This negative connotation of the GARCH term, however, suggests of declining volatility (i.e. volatility may be moderated) after sometime akin to successive radioactive decay of the volatility particle. Nevertheless, a feedback mechanism is apparent. The period is also seen to characterize a sluggish mean-reverting process, as the sum of the coefficients are very close to one. Below is the GARCH result for share price.

Table 3: GARCH Output for Share Price

Variable	**Coefficient**	**Z-Statistics**
C	1.1705	1.51206
Variance Equation		
C	1.1224	1.17741
ARCH	0.60057	3.86765
GARCH(1)	-0.13860	-10.20337
LPOILV	-0.00312	-1.18E.03
R-squared = 0.872 Adjusted R-squared = 0.830 Durbin-Watson Test Stat. = 1.772 F-statistics = 64.22		

Source: E-views 9.0 output

Table 4 depicts the volatility estimation for the dividend. The mean equation in the result shows the existence of volatility persistence during the period. Nevertheless, the significance test using the z-values was not impressive for ARCH and GARCH at five per cent level. Implying that although evidence of volatility exists in dividend, the volatility is not remarkable.

Table 4: GARCH Output for Dividend

Variable	Coefficient	Z-Statistics
C	0.22014	0.189063
Variance Equation		
C	1.27014	1.103200
ARCH(1)	0.101621	1.781940
GARCH(1)	0.70877	6.620229
R-squared = 0.874 Adjusted R-squared = 0.8534 Durbin-Watson Test Stat. = 1.72 F-statistics = 70.30		

Source: E-views 9.0 output

Table 5 shows the result of the volatility estimation for earnings per share. The mean equation in the result shows that volatility in earnings persists for a considerable length of time. Both the ARCH and GARCH are statistically significant using the z-values at the 5 per cent level in all periods considered, indicating explosiveness in earning per share. The sum of the coefficients of their effects (GARCH and ARCH) exceeds one, implying a non-mean-reverting process. Thus, shocks that give rise to a change in volatility seems intractable and perpetual.

Table 5: GARCH Output for EPS

Variable	Coefficient	Z-Statistics
C	0.25908	2.31633
Variance Equation		
C	1.21169	2.0090
ARCH(1)	1.17902	3.0340
GARCH(1)	0.169052	3.37339
R-squared = 0.792 Adjusted R-squared = 0.764 Durbin-Watson Test Stat. = 1.821 F-statistics = 70.18		

Source: E-views 9.0 output

Asymmetric GARCH Estimates

The estimated asymmetric GARCHA model result is presented in Table 6 .

Table 6: AR (1)- TGARCH (1,1) Estimation

Dependent Variable: Stock Price	
Variable	Coefficient
Constant (M)	-0.1504 (-1.226)
AR (1) (M)	0.172 (-0.926)
Constant (V)	0.116 (7.27) **
ARCH 1 (V)	0.1072 (10.32)* *
GARCH 1 (V)	0.671 (7.66)**
Asymmetry (V)	-0.232 (-8.75)**
AIC3s	-4.193
SIC	-4.242
HQC	-4.289

**(**) denotes significance at 5% (1%) level*
T-ratio in parenthesis
Source: E-views 9.0 output

The asymmetric GARCH model is engaged to investigate the presence of leverage effects. Table 6 shows the outcome of the estimated asymmetric model. It reveals the presence of strong leverage effects for the series. It indicates that the positive shocks amplified explosiveness than negative shocks of the same degree during the sample period under consideration. Nevertheless, there is evidence of a declining effect of volatility, as the sum of the coefficients of their effects (GARCH and ARCH) are not up to one using the TGARCH (1, 1) model.; implying a mean-reverting process, which, however, seems very sluggish.

The co-integration test and GARCH results reveal the existence of a price surge, not supported by the market and economic fundamentals, alongside explosiveness clustering, implying persistency of the shock in the series, with a sluggish mean -reverting process for the asset price. The T-ARCH estimate shows that shocks whether negative or positive are asymmetrical and exert asymmetric effect on volatility corroborating the findings of Njiforti and Chidiogo(2010); Aigbovo, Ozekhome and Isibor (2017) in the literature.

Conclusion and Recommendations

The paper investigates whether or not speculative bubble existed in the Nigerian Stock Exchange (NSE), using evidence from the three price fundamentals in the Nigerian Stock Market-share price, dividend, and price dividend ratio of the five quoted big banks- Access, First Bank, UBA, GTB and Zenith banks over the period 2008Q1 to 2009Q1, which characterized entrenched stock market upheavals. Employing various econometric process, involving the Augmented Dickey Fuller (ADF) test of series stationarity, Augmented Engle and Granger (AEG) residual cointegration test and GARCH estimation, the empirical results reveal the presence of speculative bubble among selected stocks in the market, characterizing serious fundamental deviation from the asset price over the sample period.

Against the backdrop of the above findings, it is important that policies and measures to ensure

the operational efficiency of the capital market be put in place to reduce market distortionary forces. Market bubbles if not mitigated can precipitate financial crises arising from sustained volatility, which may erode investor's confidence and compromise the confidence repose on the financial intermediation process. Information asymmetry should be minimized to eliminate the possibility to the barest minimum through efficient dissemination of information via strong institutional, technological and innovative mechanism. The regulatory role of the Securities and Exchange Commission (SEC) and other institutions in driving the Nigerian Capital Market to global competitive standards are important in this respect. Importantly, market regulators should guide against irrationality and arbitrariness on the part market participants that may distort the efficiency of the market. Further studies are required to ascertain the presence or otherwise of speculative bubbles among stocks in the Nigerian stock market during the period 2015 to 2016, a period where the Nigerian economy witnessed a downturn in economic activities.

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