International Journal of Academic Management Science Research (IJAMSR)
ISSN: 2643-900X
Vol. 6 Issue 8, August - 2022, Pages: 263-273

Efficient Market Hypothesis (EMH) and the Nigerian Stock Exchange In The Midst Of Global Financial Crisis

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Abstract: *All Share Index (ASI) was used to examine the Efficient Market Hypothesis and its effects on the global financial crisis. Monthly data from January 2, 2015 to December 20, 2020 (72 observations) and annual data from 1985 to 2020 (36 observations) were gathered from the CBN statistical bulletin. The Nigerian stock exchange was shown to be monthly form efficient for the yearly ASI throughout the study period, but weakly form efficient for the monthly ASI utilizing the unit root test, GARCH model, autocorrelation, and partial autocorrelation tests (1985-2020). The research on the monthly and annual ASI shows a substantial correlation between price series and their lag values, supporting the idea that price series in the Nigerian stock market do not follow a random walk for monthly ASI but do follow a random walk for yearly ASI. In other words, the results confirmed whether or not the mixed findings from the Nigerian Stock Exchange are effective in their weak form. It's advised that the rules governing information management transparency be loosened, including those relating to market restrictions, stringent listing requirements, the publication of accounts, notices of annual general meetings, and going to press without obtaining the exchange's formal written approval.*

Keywords: Efficient Market Hypothesis, GARCH Model, All Share Index, Financial Crisis, Nigerian Stock Exchange

Introduction

According to a number of endogenous and exogenous factors, stock markets go through cycles of rising and declining prices (Osaze, 2017). Numerous significant stock market collapses that have occurred over time and since the start of the 20th century have severely impacted world economies (Audu, Osamwonyi & Enofe, 2022). Because of the 2008 international financial crisis, significant financial institutions and a decline in stock markets all around the world. Additionally, it has challenged the tenets of the idea that capital markets are fundamentally efficient (Audu, et al, 2022). Malkiel (2017) asserts that some detractors have claimed that the Efficient Market Hypothesis (EMH) was mostly to blame for the crisis.

The idea of an efficient stock market is a fundamental idea underpinning investing analysis. From an economic standpoint, the best possible resource allocation depends on the effectiveness of stock markets. An effective stock market is essential from the perspective of the investor in order to guarantee that the investor is playing by the rules. However, the Random Walk Theory was used to establish the efficient market hypothesis (EMH). Accordingly, the market is always efficient, which implies that the value of shares constantly reflect information that is readily accessible on the financial market (Ejem, Ogbonna & Okpara, 2020). When the market price is the only reliable and accurate reference for choosing shares, the market is efficient. It might also imply that all investors automatically discount everything that is known, which would be reflected in share prices market for stocks. The outcome is that nobody has an informational advantage to generate anomalous profit (Kelikume, Olaniyi & Iyohab, 2020). Every investor in the ideal efficient market has access to all information at once, understands it equally, and holds logical beliefs (Bhalla, 2017).
Future prices will therefore adjust to the new knowledge once the intrinsic value of a share is established at issue and the price established which is in and of itself completely unpredictable (Ejem, et al, 2020). Fama (1965), who quoted Ejem et al. (2020), suggested that if successive pieces of fresh information emerge independently throughout time and investors' conceptions are inconsistent, successive price movements would be independent. This was likely done in awareness of this fact. To put it another way, the "random walk theory" is a concept used to describe the belief that stock prices appear to follow a random path. Similar to this, Samuels and Wilkes (2018) defined an efficient market as one in which the prices of traded securities always accurately reflect all information about those assets that is readily available to the public. Samuels and Wilkes (2018) also listed prerequisites for an efficient market to have precise signals for investors' decisions. This indicates that the best prediction of tomorrow's price is the price as of today, which reflects all information that is currently available to the public (Osaze, 2017).

For Downey and Scott (2020), the efficient market hypothesis (EMH), often known as the efficient market theory, asserts that stock prices perfectly capture all data that is currently accessible and therefore it is difficult to produce consistent alpha. Downey and Stocks constantly sell at their fair market value on exchanges, making it difficult for investors to purchase discounted equities or sell them for inflated prices. Consequently, it ought to be hard to surpass the market's performance in general by adopting an investment or marketing strategy like skilled stock selecting or value investing. Only by purchasing riskier investments will an investor be able to get greater profits. It is the process of entering and exiting a financial market or switching between asset classes based on predictive methodology (Segal, 2019).

Despite what Okpara (2017), referenced in Ejem, et al. (2020), believed to be true, a security's evaluated value is determined by the judgment of impartial investors. Independent investors' assessments depend on his background and the facts at his disposal. The building elements of financial information are used by analysts to create research analyses that serve as the foundation for their investment recommendations. In such a market, a security's current price "encapsulates" its holdings and all information that is currently accessible. But the authorities' improper conduct and the hasty release of information have slowed down the market's ability to respond to pertinent information about the declaration of dividend and bonus issues. According to Manasseh, Asogwa, and Agu (2012), cited in Ejem, et al., "the agonizing influence of timidity that could arise from investors' fear due to the intentional insider trading and loss in investors' trust, deters trading activity and the performance of the market" (2020).

Share prices respond fast to new information in an information-efficient market, allowing for more intelligent and effective investment decisions (Osinubi, 2017). Investors in such markets are unconcerned with the different trading techniques used by fundamentalists, technical analysts, or chartists in an effort to outperform the market and generate abnormal returns. On the Nigerian capital market, however, the situation is different. Investors typically pay extra money to get more information, and they may even seek for insider knowledge about the market values of companies that are listed on the exchange. There are already discrepancies in the information that market participants have access to since some investors have traded on some information before it has even been announced (Osinubi, 2017).

These differences in the information that stock issuers and investors have access to potentially lead to the overpriced or underpriced shares (Gao, 2018; Ayadi and Bouri, 2019). The level of market confidence would be diminished as the business' earnings would be impacted when a share is overpriced or underpriced as a result of insider information. As a result, the enterprises' contributions to all share indices and market capitalization would be negligible. This is due to the possibility that investors who are constantly risk averse could withdraw their funds or utilize them for other, less successful endeavours, wrecking the market performance indicators (Gagan and Mahendru, 2019; George and Oseni, 2018). After taking into account information like dividends, bonuses, mergers and acquisitions, earnings, etc., stock prices adjust such that the time value of money and differential risk are equal to the market's best estimate of the future price. So, the only variables that can affect stock values are unpredictable ones that cannot be predicted in advance (Edmans, 2019).

A market where behavioural economists and financial analysts have argued that wealth holders with knowledge of previous price alterations level can forecast future prices and current industry profit-makers and arbitragers with significant market information, could predict future stock prices and profit earnings (Adam, Marcet and Beutel, 2017; Dimpfl and Jank, 2016; Yang, Jhang and Chang, 2016).

Although the EMH was well received by financial and behavioural economists from the 1970s to the 1990s, the theory was attacked in the late 1990s and remained controversial up until the several factors led to the worldwide economic meltdown of 2007–2008, including international events that questioned the presumptions on which the EMH was built. The first of these occurrences was the dot-com bubble and the technological bubble, which took place between 1995 and 2000. During this time, there was an excessive amount of speculation, rapid share price growth, and high stock price valuation, which allowed investors to earn abnormal returns (McAleer, Suen and Wong, 2016; Schubert et al., 2018).

The second is the sub-prime mortgage crisis in the USA and the 2007–2010 stock market falls, which set off the 2007–2008 worldwide economic crises. Economic analysts challenged the EMH's applicability on the grounds that the dot-com bubble and the sub-prime mortgage crisis would not have manifested if the core premise of efficient markets were fundamentally true (Adam, Marcet and Beutel, 2017).

In spite of criticisms of the EMH's underlying assumptions, the Nigerian stock market is expanding quickly, drawing private investment, and, in the midst of the economic meltdown, increasing their integration into the international financial system. Currently, there are over twenty-nine (29) stock exchanges operating in Africa, with varied degrees of discrepancies in market size, the number of listed companies, trading volume, access to financing, access to information, and market standards (Boamah, Watts and Loudon, 2017). The relevance of EMH and investment in the Nigerian stock market in the midst of the global financial crisis is affected by these institutional constraints in addition to the existence of information asymmetry, principal agency issues, regulatory constraints, and the presence of weak financial institutions.

Statement of a Problem

International Journal of Academic Management Science Research (IJAMSR)
ISSN: 2643-900X
Vol. 6 Issue 8, August - 2022, Pages: 263-273

1. This study was motivated by the gaps in the body of knowledge regarding EMH on the African continent. Numerous empirical researches on Africa have produced conflicting results. In contrast, Adigwe, Ugbomhe and Alajekwu, (2017); Adebanjo, Awonusi and Eseyin, 2018) that supported the weak-form efficient market hypothesis, many studies (Awiagah and Choi, 2018; Katabi and Raphael, 2018; Lawal, Somoye and Babajide, 2017; Zaman, 2019) documented the inefficient market hypothesis, while a small number of studies ((Abakah et al., 2018; Vitali and Mollah, 2017). Kelikume (2016) also documented the strong-form efficient market hypothesis. The necessity to resolve existing empirical divergences on the Nigerian stock market in the midst of the worldwide economic downturn served as the impetus for this study. Additionally, investors, regulators, and other players need clarity on how efficient or inefficient the stock market is to avoid a crash soon as the Nigerian stock market develops in the face of faulty information.

Examining the applicability of the efficient market theory and how it relates to the recent financial crisis is the study's main goal. The goal of the study is to evaluate the efficient market hypothesis's faulty postulate as it relates to the Nigerian stock market. The study adds four new pieces of knowledge. First, by taking into account share price index on a monthly and yearly basis, it improved upon earlier studies on EMH in Nigeria.

There are countless disputes among the scholars in this study regarding which EMH form the Nigeria Stock Exchange (NSE) belongs. While some argue against NSE, the majority of arguments have concluded that it is a weak form of efficiency. Once more, the majority of empirical investigations used monthly, quarterly, or a combination of those data to reach their conclusion. The debate between the Nigeria Stock Exchange and weak form EMH is therefore being examined using both annual data and daily data by researchers who are eager to take an empirical stance.

Section 2 examines the theoretical and empirical research that is relevant to this study, followed by Section 3's descriptions of the data and methods, Section 4's analysis and discussion of the study's findings, and Section 5's conclusion and recommendations.

2. Literature Review

Theoretical Review

The first person to put up the random walk hypothesis was a French mathematician named Bachelier in 1900. He provided solid evidence that commodities speculation in France was "fair game," which meant that neither buyers nor sellers could anticipate making money (Okpara 2017). The efficient market hypothesis (EMH) links information flow and asset prices. One stock market assumption that has a long history of development is the EMH. Gyamfi, Kyei, and Gill (2016) dated the evolution of this theory to Cardano's 1564 work on the equal-opportunity gambling principle, to Brown's 1828 study on rapid oscillatory motion, and to Regnault's 1863 study on stock price deviation and time relation. When shares on the open market open, the efficient market is considered to exist; share prices as acquired denotes the best intelligence's assessment of them (Gibson, 1889, referenced in Ejem, Ogbonna & Okpara) (2020). Other research that led to the development of the EMH include those by Einstein (1905), Fama (1965), Friedman (1953), Granger and Morgenstern (1963), Harry (1959), Keynes (1923), Mandelbrot (1963), Sharpe (1964), Tussig (1921), and von Smoluchowski (1906), as listed in Ejem, et al (2020), Ehiedu and Toria, (2022)..

Although Fama (1965), quoted in Ejem et al (2020), offered the original conceptual stance of an efficient market, Samuelson (1965) was the first to offer a formal economic justification for efficient markets from the perspective of martingale as opposed to a random walk. Furthermore, it was claimed in Ejem, et al. (2020), citing Fama and Blume (1966), that the serial correlation rule is sufficient for determining the direction and strength of dependency in price changes. Finally, Fama's empirical results support his claim that the capital market is efficient. According to Fama, in a lively market (characterized by many knowledgeable and clever investors), adequately priced assets reflect accurately and promptly, inhibiting market participants making extraordinary profits. The theory's underlying presumption is that return distributions remain constant over time.

Additionally, market efficiency height depends on the knowledge conditions that exist in the market environment. Because of this, the data set was separated into three forms (levels), namely the weak, semi-strong, and strong forms, according to Fama (1970), as cited in Ejem et al. (2020). Strong-form efficient markets must have the following characteristics: a large number of knowledgeable investors actively analyzing and trading stocks; information is widely accessible to all investors; events, like labour strikes or accidents, tend to occur at random; and a quick and accurate response from investors to new information. Weak-form or semi-strong form may exist when one or more of these conditions are not present in the market. A market is considered to be efficient according to the weak-form EMH if current prices accurately reflect all information found in earlier stock prices. According to this representation, previous prices are insufficient as a stock price forecasting tool. Since the semi-strong form of the EMH states that current market prices reflect all information that is publicly available, it is therefore impossible to generate anomalous returns by relying simply on historical prices (cited in Ejem, et al, 2020).

The strong-form EMH suggests that because of the intense competition among participants, private knowledge (inside information) for achieving anomalous returns is difficult to come by. The strong-form EMH is not likely to contain all available information because in reality, certain investors or market participants can experience anomalous returns. This is because a market whose securities prices represent all conceivable information is not one in which the strong-form EMH holds.

Empirical Review

With a focus on the 2018 global market collapse, Ehiedu, (2022), Audu, Osamwonyi, and Enofe (2022) looked into the connection between stock market crashes and capital market efficiency using data from January 2005 to December 2015. The research demonstrated that the semi-strong form of EMH was unable to account for the price variations of stock market assets between July 2008 and January 2009. Furthermore, the findings generally showed that market crashes around major stock markets had a significant impact on particular markets, regardless of their degree of development. This implies that the time leading up to and including the 2008 market crash, the stock markets around the world were not operating efficiently. It is advised that market fundamentals reclaim their prioritization in the examination of stock market behaviour.

The Adaptive Market Hypothesis (AMH) and Bounded rationality theories were examined by Yousuf and Makina (2022), Obi and Ehiedu, (2020), in relation to the Johannesburg Stock Exchange (JSE). To ascertain the impact of behavioural risk factors on the effectiveness of the stock market. The Efficient Market Hypothesis has a hole, as shown by behavioural theories. Our study determined the Adaptive Market Hypothesis' applicability on the JSE using quartile regression. Market returns in the past have been shown to be highly predictive of returns in the future, deviating from a random walk. Higher quartiles saw an increase in the lagged return, which varied according to changes in the market environment (i.e. pre-financial crisis, financial crisis and post-financial crisis). As a result, the predictability of returns varies as market conditions change. The Johannesburg Stock Exchange in South Africa is the sole subject of this essay, and more specifically, the movement of the all-share index. The results ought to be transferable to both developing and advanced economies. A negative correlation between business confidence and returns is discovered, indicating a delay in the incorporation of sentiment into prices. Contrarily, it is discovered that returns have a positive relationship with consumer confidence. In conclusion, it is established that both fundamental and behavioural factors have an impact on investors.

The All Share Index (ASI) was used in Ejem, Ogbonna, and Okpara's (2020), Ehiedu, Onuorah and Chigbo (2022) analysis of the Nigerian Stock Exchange and the Efficient Market Hypothesis using daily data from January 2, 2014 to May 20, 2019 (1333 observations) and annual data from 1985 to 2018 (34 observations) obtained from the Nigeria Stock Market fact books. For the assessment of weak form hypotheses on the daily and annual all share index in the Nigerian Stock Market, the study used three analytical techniques: the unit root test, GARCH Model, and the Autocorrelation cum partial autocorrelation method. The evaluations' findings showed a significant correlation between price series and their lag values, indicating that the stock price series on the Nigerian stock market do not follow a random walk process confirming that the weak form of the Nigeria Stock Exchange is not efficient. In light of this, the researchers suggest that the supervisory and regulatory authorities should strengthen the Nigerian Stock Market by easing its regulations pertaining to information management rules for transparency, such as market barriers and strict listing requirements, publication of accounts, notices of annual general meetings, and the like.

Kelikume, Olaniyi, and Iyohab (2020), Ehiedu, Odita and Kifordu (2020) looked into how the EMH holds true for fifteen (15) of the continent's top stock exchanges. In Africa, there are currently more than 29 stock exchanges, with a wide range of differences in market size, trading volume, the number of listed companies, access to funds, access to information, market standardization, etc. The article did not test the weak-form efficient market hypothesis in a linear manner as is typically done, instead using a method called the runs test for serial dependency. The tool used in this paper's wavelet unit root analysis decomposed stochastic processes into their wavelet components with a range of frequency bands. The study discovered that the EMH and stock market investment in Africa are both affected by institutional constraints. According to the study's findings, it is relevant to use historical stock prices to forecast current earnings at stock markets in Africa, refuting the EMH.

An analysis of the Nigerian stock market's weak-form efficiency was conducted. by Adebanjo, Awonusi, and Eseyin (2018), Ehiedu (2014). Employing The runs test and distribution patterns are used to determine whether stock prices are random, the partial autocorrelation (PACF) test is used to determine whether stock prices are independent, and the one-sample Kolmogorov Smirnov test is used to determine whether there is an observable trend in the movement pattern of stock prices. Following the analysis, it was discovered that stock price movements on the stock market were independent. Stock market price changes weren't just arbitrary fluctuations. The movement pattern of stock prices on the stock market also showed a discernible trend. The results of the partial auto correlation test indicated that stock price movements are independent. The results of the runs test once more demonstrate that the movements of stock prices were not entirely random, as do the distribution patterns.

The Kolmogorov-Smirnov (K-S) goodness of fit test, and autocorrelation test were used by Hawaldar, Rohit, and Pinto (2017) to test the Bahrain Bourse for the weak-form efficient market hypothesis. While the results of the K-S test indicated that the general movement of stock prices does not follow a random walk, those of the runs test showed that the share prices of seven companies do not, and those of the autocorrelation tests showed that share prices exhibit low to moderate correlation, varying from negative to positive values. Due to the inconsistent findings from the numerous research, Bahrain Bourse's weak efficiency level was difficult to ascertain, according to Hawaldar, Rohit, and Pinto (2017). using seven parametric techniques, including the Granger Causality Test, the ADF and P-P Unit Root Tests, the Autocorrelation Test, the Variance Ratio Test, and the Normality/Random Test. Ogbulu (2016) looked into the efficiency of the Nigerian Stock Exchange (NSE) throughout a range of data estimate periods that use the NSE all share indexes series from 1999 to 2013 and the ARCH-GARCH test and Regression analysis. The results revealed that the NSE is weak to unproductive all in all daily, weekly, monthly, and quarterly values are considered, irrespective of the assessment frequency and the parametric test employed in the experiments.

3. Method

This study employed an ex-post facto research design. Ex-post facto study design was used since this type of data is only gathered after the event or fact has already happened. The analysis's data was gathered from the CBN Statistical Bulletin for the years 1985 to 2020 to settle the argument over the Efficient Market Hypothesis (EMH) and the Nigerian Stock Market. The Unit Root Test, GARCH Model, and partial autocorrelation approaches were then used to analyze it. Studies inside and outside of Nigeria have followed suit to ascertain whether current share prices accurately reflect publicly available information, such that investors cannot take advantage of any confidentiality as an advantage to outperform the market, in accordance with Fama's condition precedent, which stated that a market cannot be efficient in its weak form without becoming effective in its strong form first (Ejem, Ogbonna & Okpara, 2020). The study examined data from two All Share Index (ASI) periods: monthly data from January 2, 2015, to December 20, 2020 (72 observations), and annual data from 1985, to 2020.

4. Problem Solving

The first step in this investigation was to look at the distribution of daily and annual data using the descriptive statistics below;

Table 4.1: Descriptive Statistics

	MONTHLY_ASI	YEARLY_ASI
Mean	30561.11	33988.13
Median	29641.32	31604.32
Maximum	44343.65	112180.1
Minimum	21300.47	251.9000
Std. Dev.	5139.496	30165.44
Skewness	0.748155	0.507638
Kurtosis	2.936626	2.332808
Jarque-Bera	6.728881	2.213898
Probability	0.034581	0.330566
Sum	2200400.	1223573.
Sum Sq. Dev.	1.88E+09	3.18E+10
Observations	72	36

Source: E-VIEW, 9.0, 2022.

An overview of the monthly and annual all share index distribution is shown in Table 4.1 above (ASI). Jarque Bera's monthly data had a coefficient of 6.728881 and a probability value of 0.034581, both of which indicate an abnormal distribution, whereas Jarque Bera's annual data had a coefficient of 2.213898 and a probability value of 0.330566, both of which indicate a normal distribution. The unit root test is a frequently used test of time series data stationarity in macroeconomic analysis because the bulk of economic variables are dependent. Here is an illustration of the study's use of ADF unit root:

Table 4.2: Unit root at Level

Null Hypothesis: MONTHLY_ASI has a unit root				
Exogenous: Constant				
Lag Length: 5 (Automatic - based on SIC, maxlag=11)				
			t-Statistic	Prob.*

International Journal of Academic Management Science Research (IJAMSR)
ISSN: 2643-900X
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Augmented Dickey-Fuller test statistic			-1.537666	0.5085
Test critical values:	1% level		-3.533204	
	5% level		-2.906210	
	10% level		-2.590628	
Null Hypothesis: YEARLY_ASI has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-1.424993	0.5589
Test critical values:	1% level		-3.632900	
	5% level		-2.948404	
	10% level		-2.612874	
*MacKinnon (1996) one-sided p-values.				
Unit root at 1st Difference				
Null Hypothesis: D(MONTHLY_ASI) has a unit root				
Exogenous: Constant				
Lag Length: 4 (Automatic - based on SIC, maxlag=11)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-24.40774	0.0001
Test critical values:	1% level		-3.533204	
	5% level		-2.906210	
	10% level		-2.590628	
Null Hypothesis: D(YEARLY_ASI) has a unit root				
Exogenous: Constant				
Lag Length: 1 (Automatic - based on SIC, maxlag=9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-6.245581	0.0000
Test critical values:	1% level		-3.646342	
	5% level		-2.954021	
	10% level		-2.615817	
*MacKinnon (1996) one-sided p-values.				

Source: E-VIEW, 9.0, 2022.

The outcomes of the unit tests for the monthly ASI and annual ASI are displayed in Tables 4.2. The results demonstrated that neither monthly nor annual data are level-stationary; rather, they are both differenced once to be level-stationary at 5%. The researchers get to the conclusion that the price changes on the Nigerian stock exchange do not exhibit the random walk phenomenon since their level series are not stationary but can be differentiable of order one to be stationary. Or to put it another way, the Nigerian Stock Market is robust and successful. Academics like Ejem, Ogbonna, and Okpara (2020), who asserted that the unit root tests may not be able to detect departures from a random job, warned against this result. The researchers therefore employed the GARCH Model, partial Autocorrelation tests, and Autocorrelation tests to verify the accuracy of the results.

Table 4.3 GARCH Test

Dependent Variable: MONTHLY_ASI				
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)				
Date: 07/25/22 Time: 05:46				
Sample: 1 72				
Included observations: 72				
Estimation settings: tol= 0.00010, derivs=numeric (linear)				
Initial Values: C(1)=30561.1, C(2)=1.7e+07, C(3)=0.15000, C(4)=0.60000				
Failure to improve likelihood (non-zero gradients) after 26 iterations				
Coefficient covariance computed using outer product of gradients				
Presample variance: backcast (parameter = 0.7)				
GARCH = C(2) + C(3)*RESID(-1)^2 + C(4)*GARCH(-1)				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	30405.65	585.5172	51.92956	0.0000
	Variance Equation			
C	11604901	4202685.	2.761306	0.0058
RESID(-1)^2	-0.136207	0.029032	-4.691617	0.0000
GARCH(-1)	0.619789	0.233828	2.650615	0.0080
R-squared	-0.000928	Mean dependent var		30561.11
Adjusted R-squared	-0.000928	S.D. dependent var		5139.496
S.E. of regression	5141.880	Akaike info criterion		19.93127
Sum squared resid	1.88E+09	Schwarz criterion		20.05775
Log likelihood	-713.5256	Hannan-Quinn criter.		19.98162
Durbin-Watson stat	2.231359			

Dependent Variable: YEARLY_ASI				
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)				
Date: 07/25/22 Time: 05:40				
Sample (adjusted): 1 36				
Included observations: 36 after adjustments				
Estimation settings: tol= 0.00010, derivs=numeric (linear)				
Initial Values: C(1)=33988.1, C(2)=5.8e+08, C(3)=0.15000, C(4)=0.60000				
Convergence not achieved after 500 iterations				
Coefficient covariance computed using outer product of gradients				
Presample variance: backcast (parameter = 0.7)				
GARCH = C(2) + C(3)*RESID(-1)^2 + C(4)*GARCH(-1)				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	34913.29	5292.367	6.596914	0.0000
	Variance Equation			
C	3.51E+08	2.16E+09	0.162426	0.8710
RESID(-1)^2	-0.057322	0.326598	-0.175512	0.8607
GARCH(-1)	0.647537	2.222936	0.291298	0.7708
R-squared	-0.000968	Mean dependent var		33988.13
Adjusted R-squared	-0.000968	S.D. dependent var		30165.44
S.E. of regression	30180.03	Akaike info criterion		23.65356
Sum squared resid	3.19E+10	Schwarz criterion		23.82950
Log likelihood	-421.7640	Hannan-Quinn criter.		23.71497

Durbin-Watson stat	0.259344

Source: E-VIEW, 9.0, 2022.

According to the estimated standard GARCH (1,1) model, which is shown in table 4.3 above, the conditional means and the lagged price parameter in the GARCH(1,1) model's mean equation are significant. The results of the GARCH models in Tables 4.3 show that the conditional means and the lagged price parameters in both of the mean equations do not deviate statistically from zero. The fact that the error terms of the mean equations are not distributed independently and uniformly suggests that the Nigerian Stock Market is inefficient (iid). Additionally, the ARCH and GARCH parameters' combined total, +, is far from 1 (+ = 2.650615) for the yearly all-share index and (+ = 0.291298) for the daily all-share index, suggesting that volatility clustering is not persistently high. Because the lagged value of the monthly ASI is positively and significantly different from zero and the error terms (by the rule of thumb, DW2) are not autonomously distributed, the study concludes that the Nigerian stock exchange is inefficient. In contrast, the lagged value of the annual ASI is optimistically and inconsequentially different from zero and the error terms (by the rule of thumb, DW2) are not.

Table 4.4a: Monthly Autocorrelation and partial Autocorrelation tests

Date: 07/25/22 Time: 06:04
Sample: 1 72
Included observations: 71

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
***| . |	***| . |	1	-0.362	-0.362	9.7028	0.002
***| . |	*****| . |	2	-0.404	-0.616	21.967	0.000
. |**** |	. |*. |	3	0.518	0.109	42.430	0.000
***| . |	****| . |	4	-0.360	-0.516	52.451	0.000
**| . |	*****| . |	5	-0.274	-0.658	58.345	0.000
. |******|	. |** |	6	0.812	0.235	110.96	0.000
**| . |	. | . |	7	-0.325	0.028	119.50	0.000
**| . |	. |** |	8	-0.323	0.254	128.08	0.000
. |*** |	.*| . |	9	0.416	-0.066	142.54	0.000
**| . |	. | . |	10	-0.310	-0.039	150.70	0.000
.*| . |	. |*. |	11	-0.142	0.087	152.44	0.000
. |***** |	. | . |	12	0.624	0.054	186.64	0.000
**| . |	. | . |	13	-0.309	0.051	195.14	0.000
**| . |	. | . |	14	-0.238	-0.023	200.28	0.000
. |** |	. | . |	15	0.332	-0.011	210.48	0.000
**| . |	.*| . |	16	-0.288	-0.121	218.30	0.000
. | . |	. | . |	17	-0.026	-0.025	218.37	0.000
. |*** |	.*| . |	18	0.475	-0.072	240.47	0.000
**| . |	. | . |	19	-0.299	-0.021	249.36	0.000
.*| . |	. |*. |	20	-0.134	0.099	251.18	0.000
. |** |	.*| . |	21	0.220	-0.085	256.19	0.000
**| . |	. | . |	22	-0.249	-0.000	262.75	0.000
. |*. |	. | . |	23	0.084	0.033	263.52	0.000
. |** |	. | . |	24	0.322	0.019	274.92	0.000
**| . |	. | . |	25	-0.279	0.054	283.67	0.000
. | . |	.*| . |	26	-0.057	-0.066	284.05	0.000
. |*. |	. | . |	27	0.146	0.042	286.55	0.000
**| . |	.*| . |	28	-0.224	-0.083	292.60	0.000
. |*. |	. |*. |	29	0.173	0.078	296.27	0.000
. |*. |	. | . |	30	0.196	-0.042	301.12	0.000
**| . |	. | . |	31	-0.273	-0.027	310.79	0.000
. | . |	. | . |	32	0.015	-0.024	310.82	0.000

Source: E-VIEW, 9.0, 2022.

Tables 4.4a above display the autocorrelation test for monthly data. It was found that the individual autocorrelation (AC) at different lags from 1-36 and the corresponding probability values suggest that the prices' subsequent autocorrelation from 1-36 is significant for the monthly ASI. Since there is evidence of volatility clustering in the price series, this indicates that price series in markets do not move in a random manner.

Table 4.4b: Yearly Autocorrelation and partial Autocorrelation tests

Date: 07/25/22 Time: 06:06
Sample: 1 72
Included observations: 35

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
.*| . |	.*| . |	1	-0.097	-0.097	0.3586	0.549
***| . |	***| . |	2	-0.391	-0.405	6.3686	0.041
. |*. |	. | . |	3	0.129	0.044	7.0391	0.071
. | . |	**| . |	4	-0.060	-0.237	7.1871	0.126
.*| . |	.*| . |	5	-0.196	-0.200	8.8445	0.115
. |*. |	. | . |	6	0.152	-0.023	9.8767	0.130
. |*. |	. | . |	7	0.144	0.026	10.841	0.146
.*| . |	.*| . |	8	-0.165	-0.106	12.150	0.145
.*| . |	**| . |	9	-0.154	-0.218	13.331	0.148
. |** |	. |*. |	10	0.293	0.187	17.789	0.059
. | . |	.*| . |	11	-0.030	-0.081	17.838	0.085
.*| . |	. | . |	12	-0.202	-0.045	20.145	0.064
. | . |	.*| . |	13	0.052	-0.156	20.305	0.088
. | . |	.*| . |	14	0.018	-0.073	20.325	0.120
. | . |	. | . |	15	-0.061	-0.013	20.567	0.151
. | . |	.*| . |	16	0.003	-0.167	20.568	0.196

Source: E-VIEW, 9.0, 2022.

Tables 4.4b above display the results of the autocorrelation test for annual data. It was found that there is no following autocorrelation of the prices between 1 and 17 for the yearly ASI based on the autocorrelation (AC) at various delays between 1 and 17. This proves that there is an annual pattern in market pricing for the annual data.

4. Conclusions

The unit root test, GARCH model, autocorrelation, and partial autocorrelation tests used in this study indicate that the Nigerian stock exchange is weak form efficient for the yearly ASI during the study period, but not for the monthly ASI (1985-2019). According to a study on the monthly and annual ASI, which demonstrates a strong correlation between price series and their lag values, price series in the Nigerian stock market do not follow a random walk for monthly ASI but do for yearly ASI. In other words, the outcomes confirmed the idea that either ineffectiveness or inefficiency characterized the mixed findings of the Nigerian Stock Exchange.

Recommendations

i. Relax its policies pertaining to openness of information management norms such market barriers and tight listing criteria, disclosure of accounts, notices of annual general meetings, and going to press without formal written exchange clearance.
ii. Ensure the timely and transparent disclosure of company-specific information to investors and other market participants.
iii. In order to reach out to rural populations, it is important to adequately fund the regional commodities markets and capital trading platforms mentioned in the SEC Act.

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