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ARE STOCK RETURNS PREDICTABLE? THE MYTH OF EFFICIENT MARKET HYPOTHESIS AND RANDOM WALK THEORY USING NIGERIAN MARKET DATA

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Abstract

Purpose – The study sets out to investigate the application and effectiveness of random walk theory in an efficient market in the prediction of stock returns in Nigeria Stock Exchange (NSE). The secondary data of All Share Index data obtained from the Nigeria Stock Exchange for the period of five (5) years, 2015 to 2019 was considered for the analysis.

Methodology - The times series data regression analysis undisputedly being an important predictive regression tools for predicting stock returns accurately was adopted for the data estimation.

Findings -The outcome of investigation reveals that past returns, although a good guide in forecasting the future, is undoubtedly insufficient data and information for predicting stock returns in the NSE.

Conclusion – The outcome of the findings indicate that investors should adopt a mixture of both past and current stock performances in predicting future returns and recommend inter alia portfolio diversification by investors and improved market sensitization by both SEC and NSE in respect to activities in the market.

Keywords: Stock returns, Random walk theory, Efficient market hypothesis, Predictability, All share index

1.0 Introduction

Capital markets function to ensure easy liquidation of financial assets by existing shareholders or bondholders, expand ownership base through the entry of new and prospective investors in the market and encourage more efficient allocation of new investments through the price mechanism. The pricing of securities in the market is driven by information and by the expectation of investment returns by shareholders in form of dividend payments or capital gains. These expectations by investors about returns on investment is based on reliable, prompt, and efficient information in an assumed perfect market, where stock prices ought to disclose all historical, current, outsider and insider information.

Information plays vital role in the predictability and determination of stock prices. It also helps stock market participants in viable investment decision making. Information can be defined as the awareness of facts and figures which result in the elimination of ignorance or uncertainty about something. It is also key to the valuation and predictability of assets and share prices in global capital markets**.** The quest of understanding the mechanism of how stock pricing affects the workings of the market has led to Efficient Market Hypothesis (EMH).

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Bachelier, the French mathematician, in his Ph.D thesis: The Theory of Speculation (*Théorie de la spéculation*, published 1900), first expressed literature on Efficient Market Hypothesis (EMH). The Efficient Market Hypothesis later originated from two individuals who independently developed some basic notions of market efficiency models in the likes of Fama (1960) and Samuelson (1965) who described an efficient market as a place where all available information is incorporated in share prices in order to arrive at its future values. The Efficient Market Hypothesis is based on some basic assumptions. According to Awiagah and Choi (2018), a market is termed efficient when the new randomly obtainable market information adjusts individually to stock prices, the participants should have independent interest in analyzing and valuing stocks in a perfect market, and the market should be frictionless. These assumptions points to the adjustment process of shares to new independent information where large number of investors follow the stock, analyze impact of information transactions on stocks to reflect the new information.

Most of the major work on Efficient Market Hypothesis were formulated using theory of Random Walk hypothesis (RWH). The random walk theory, which was formulated from the martingale model, argued that all available information adjusts arbitrarily to share prices as soon as the information are available. This theory also points out that stock historical prices and present stock performance cannot be used to predict the future performance of stock prices to make higher gains.

Hiremath and Kumar (2014) explained an efficient market as a place where stock prices totally, efficiently, and rapidly adjust to all accessible information at no additional costs to market participants.
Eakins and Mishkin (2012) added that a market can be termed efficient if share prices totally reveal all open and hidden information in determining a stock value, thus, preventing investors from making abnormal gains. Allen, Brealey and Myers (2011) elucidated that no investor can out-perform the market in a perfectly efficient market. In a situation where outperforming the market (that is to make abnormal profit) is possible then the market cannot be termed to be efficient. Muhammad, Sajid, Shafiq, Nasir and Ali (2012) assert that stock prices already contain general information and as a result, the market cannot be outperformed by any investor. This implies that in an efficient market, an investor cannot earn returns in excess of what is available in the market especially for the already adjusted share price with all available information obtained internally and externally.

Over the years, researches have shown that information is not readily available to parties involved, this give rise to information asymmetry theory. Some investors have used information asymmetry to earn more financial benefit from the capital market at the detriment of the majority. It therefore implies that past information can act as a stimulus for predicting future stock market returns. Dangl and Halling (2012) opined that stock return prediction occurs occasionally when the market is inefficient.

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Though several studies have been carried out on assets returns predictability, these investigations have been conducted mostly in capital markets of the developed economies notably USA, Britain, and Japan. In Nigeria, the few studies carried out used either macroeconomic or accounting variables for their analysis while in other developing economies, there is a limited documentation of research of this nature. Although the consensus may not be discouraging, it is generally greeted with mixed and conflicting feelings.

Many activities culminated in the choice of this period for this study, January 2015 to December 2019. Notably, it is post-adoption of the full implementation of International Financial Reporting Standards (IFRSs) introduced in Nigeria in 2012, commencement of new corporate governance codes following the rise of serious financial scandals, and cases of corporate mismanagement (Cadbury Nigeria Plc, 2007).

This study will have the following significant contributions; firstly, it will expand existing literature and add to the current body of knowledge as it affects both the internal and external factors militating stock returns for all listed firms on the Nigerian Stock Exchange (NSE). Secondly, the study is also geared to provide new directions to enhance the policy formulation functions for the securities regulator, SEC. Thirdly, the adoption of improved and robust parametric and non-parametric tests namely Auto-correlation test, Unit root test, BDS test and Variance ratio test to measure the random walk proposition on the Nigeria Stock Exchange (NSE) add credence to the study.

2.0 Review of Existing Literature

The fiction of future predictions of stock prices have remained unsuccessful because of the randomness and unpredictable behaviour of the market**.** The fundamental belief is that market behavior reflects relevant information rapidly and rationally. This assertion is however contradicted as stock prices do not actually reflect all information to influence its price as expected of the market. However, share prices can only reflect its value when its expected liquidity is discounted in relation to attendant risks.

2.1 Evidences from International Empirical Studies

Wijesundera, Weerasinghe, Gunawardena and Peiris (2015) examined the Colombo Stock Exchange using the historical financial information to predict stock returns. The study adopted a sample size of 60 listed companies with 10years secondary financial data for the period, 2004 to 2013. The ordinary least squares technique was used to estimate the predictive regressions. Findings show a considerable but frail influence of the independent variables (Return on Equity, Market-Book-Value and Earnings per share) on share returns.

Reddy and Narayan (2016) reviewed previous literatures on stock returns in the past 15 years, 2000-2014. The previous literatures covered areas like the effect of inflation on stock returns with an outcome of a positive effect, predictability of stock returns and its effects on stock exchanges and regulators, and the study concluded by advocating the need for future researches to focus their attention on other variables of the economy, direct attention to developing countries and other growing markets. But Ahmad**,** Urquhart and McGroarty (2016) examined the adaptive market hypothesis of the four major stocks in the US market to determine their stock

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return predictability. The daily data extracted from the NYSE for the period of twenty-five years, January 1990 to May 2014 of the selected stocks were used for the data analysis. The nonlinear predictability was established through the variance ratio test and AR-GARCH test respectively, while the BDS test was used to account for conditional heteroscedasticity. The findings indicate mixed outcome, periods of statistically significant return predictability and occurrences of no statistically significant predictability in stock returns, respectively. The study acknowledges the fact that predictability in certain markets are statistically significant due to the associated market conditions of each market and therefore suggest that because each market adapts differently to certain market conditions, investors should have a wholistic view of each market independently before selecting portfolio for assured and predictable returns.

Hadhri and Ftiti (2017) examined the 24 emerging markets to establish stock return predictability, and a dynamic multifactor model was conducted for the sample selected. The study adopted the non-parametric nonlinear approach for the regression model. The findings revealed that individual country precise domestic factors, macroeconomic and financial variables, serve as good tools for predicting stock returns; the research also indicate that asset return predictability is strongly modeled on non-linear measurement which made estimations to be economically relevant. And the study recommends the need for portfolio diversification to minimize risk for the investors, policy regulation on the stock market for the protection of the investors via-a-vis its influence on policy makers.

Din (2017) adopted the financial ratios and control variables to investigate the predictability of stock returns. The Pakistan Stock Exchange top 100 Index listed companies for the period, 2001-2014 were considered for the study. The data analysis was carried out using the Ordinary Least Square (OLS) to estimate the multiple linear regression model and the correlation matrix. Non-multicollinearity was found between the variables. The findings confirm that all variables are statistically significant, while asset turnover ratio, EPS, inflation, interest rate and GDP exhibited negative impact on stock returns, debt ratio, return on sales, firm size, market return and Tobin's-Q showed positive and significant impact on stock returns. The study concludes with an advice to investors not to put all their eggs in one basket by not concentrating all their investments in smaller market cap firms with enormous returns but to also diversify into larger market and benefit immediately from the associated economies of scale.

Sayedy and Ghazali (2017) studied the effect of macroeconomic variables on stock returns. 300 sampled firm’s data were extracted from the firm’s audited report, world bank data bank and international data stream for a duration of 10 years (2003 - 2012). Regression analysis was employed to measure the model’s predictive value. The outcomes show that debt to equity ratio and quick ratio are moderated by money supply but do not moderate dividend per share of stock returns hence debt to equity ratio negatively affect stock returns. In conclusion, Firms with increases in DPS and quick ratio positively influence stock returns.

Sekreter (2017) study set out specifically to review previous literatures which acknowledged that stock returns predictability can either be viewed cross-sectionally and by time. The review further stated that the CAPM tests, Fama and French 3-factor model and other tests are all focused on cross sectional aspects of data. The review provides further that recent investigation

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has proved otherwise hence, the result is influenced by the time interval such as daily, weekly, monthly, or annual data collection and analysis. The study concludes by recommending that predicting stock prices and return rates accurately is hinged on the ability of the researchers to adopt a proper estimation of the parameter beta in the models.

Anandasayanan (2018) examined the predictive power of financial ratios of 33 listed manufacturing companies' yearly time series data extracted from the Colombo Stock Exchange over a five (5) years period, 2012-2017. The dividend yield, earnings per share, and earnings yield, classified as most useful and effective on stock return predictability as demonstrated by previous researches were selected variables for the study. The data was estimated by regressing the variables on the yearly stock returns, and findings indicated high R^2-value, very significant coefficients and, autocorrelation corrected standard errors, hence high predictability power. Finally, it was found that the three ratios in one way or another hold predictive power on stock returns.

Awiagah and Choi (2018) examined predictability of index returns of Ghana Stock Exchange based on the weak form efficient market hypothesis. The study adopted secondary stock returns data ranging from daily to quarterly for a period of twenty-eight (28) years (1990 – 2017) extracted from Ghana Stock Exchange for the data analysis. Various tests were conducted, and the findings ranges from high disparity in mean and standard deviation, implying riskiness of the market. Findings indicate that the stock returns apart from being positively skewed, it also confirmed the existence of weak-form efficient market hypothesis. The random walk hypothesis (RWH) result on the daily, weekly, monthly, and quarterly basis were rejected because the GSE weak-form inefficient characteristic is not sensitive to the frequency of returns of the market.

Phan, Nguyen, and Nguyen (2019) examined the predictability of the Indonesian stock index returns for period of twenty-two (22) years (1995 – 2017). The monthly secondary data was obtained from the Indonesian stock index. The study adopted eight macro variables for the determination of the predictability test and the data analysis was estimated by the feasible generalized least squares estimator. In conclusion, it was asserted that share returns of Indonesian firms can be predicted to some level by some of the macro variables such as rate of interest and Foreign exchange rate.

2.2 Evidences from Local Empirical Studies

Abdullah, Sulong and Abdullahi (2015) review of previous studies were based on how macroeconomic variables affect stock returns. And the literature reviewed can be classified into three; those for the developed countries, developing countries, and for group of countries. While previous studies that were reviewed showed divergent opinions, those in support that macroeconomic variables have strong and positive effects on stock returns, others alluded that macroeconomic variables exhibit weak effects on stock returns while host of the remaining group showed diverse results. These differences in result were pinned down to variations in methodology, variables used and duration of study. The review concludes by supporting the need for researchers to ensure their research results are properly interpreted to avoid the public being misled in their final judgement.

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Uwubanmwen and Eghosa (2015) examined the influence of inflation rate in predicting stock returns in Nigeria. The secondary monthly data mined from Central Bank of Nigerian Statistical Bulletin and Nigerian Stock Exchange Fact Book for period of sixteen (16) years, 1995 to 2010 were used for the data analysis. The autoregressive distributed lags (ARDL) estimator model was chosen for the data analysis because of its efficiency as a forecasting tool (Ibrahim, 2010 and Panopoulu, 2007) coupled with the ability to capture persistence in prices disequilibrium over time. The findings indicate that inflation rate has negative and insignificant effect on stock returns hence inflation rate may not be considered as a good determinant for predicting stock returns in Nigeria stock market.

Aruwa and Musa (2017) examine the Nigerian Stock Exchange to determine whether return is predictable using Automatic Variance Ratio and predictive regression. The study identified that the market was inefficient for the period, 1985 and 2010 with return being predictable by economic fundamentals, interest rate, inflation rate, divided yield, financial crisis and government policies and all exhibited statistical significance. It was noted that the cyclic pattern of efficiency was not observed due to short-period duration for the work compared to other earlier studies and thus recommended that investors, regulations and academicians should not completely depend on the general belief that markets are always efficient as this may leads to negligence or non-payment of attention to fundamental and intrinsic value of stocks. The conclusion of the reviews shows that there is a period in which an investor can make abnormal gains in the stock market.

Ajekwe, Ibiamke and Haruna (2017) studied random walk theory in the context of the Nigerian stock market to determine whether stock returns follow a random walk distribution. The study adopted the daily returns of listed top 20 active stocks on the NSE for the duration of five years (2010 - 2014**).** Autocorrelation and runs tests were utilized for hypothesis testing. The findings reveal that the daily stock returns of the sampled firms are randomly dispersed, meaning that the Nigerian Stock Exchange is informational efficient at the weak form level. In conclusion, it was stated that no speculator can use past information to beat the market for long.

Ayuba, Balago, and Dagwom (2018) measured the degree of firms' level on stock returns predictability in Nigeria. Secondary data of 25 listed firms were obtained from selected firm's audited report and CBN statistical bulletin for a duration of 10years (2007 to 2016). The panel regression analysis results revealed that market-book-value (MBV) ratio is significantly positive, size of firm is insignificantly negative, price to earnings ratio shows a positive but insignificant influence on stock returns predictability of selected firms.

2.3 Gaps in the Empirical Literature

Based on the detailed review of the relevant local empirical literature on predictability of stock return, the following gap in knowledge become obvious in Nigeria. For instance, Abdullah, Sulong and Abdullahi (2015) employed macroeconomic variables; Uwubanmwen and Eghosa (2015) used inflation rate; Aruwa and Musa (2017) utilized economic fundamentals; Ajekwe, Ibiamke and Haruna (2017) employed accounting fundamental; Ayuba, Balago, and Dagwom (2018) utilized macroeconomic variables. The current study is therefore setting out to improve

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on the existing literature in the following ways. Firstly, it considers the All share index for its data analysis, secondly, the study also considers a combination of both improved and robust parametric and non-parametric methods to test and validate the EMH. Finally, the data used for the analysis is also current, which guarantees its ability to capture present-day happenings that may have bearing on market efficiency.

3.0 Methodology

3.1 Data and Empirical Tests

This study was based on historical record of the daily prices of All share index (ASI) mined from the Nigeria Stock Exchange for the period of 5 years (2015 to 2019). The All share index is chosen for the investigation because it is a benchmark for the economy, or for some sectors of the economy represents the most important and reliable index in evaluating how efficient is the Nigerian stock market. This study investigates application and effectiveness of random walk theory in an efficient market in predicting stock returns in Nigeria Stock Market.

The study conducted robust and improved four different parametric and non-parametric tests such as the Auto-correlation test, Unit root test, BDS test and Variance ratio test to measure the random walk proposition of the Nigeria Stock Exchange (NSE). These four tests are chosen for the following reasons:

- The weak-form efficiency does not accept the presence of correlation in its returns, hence the need for an to show it does not exist in the data.
- The weak-form efficient market requires that the return series must be stationary, hence the unit root tests was conducted to test for the return series stationarity.
- In a situation of infrequent trading especially for the emerging markets, BDS test for randomness become handy since the EMH cannot be tested by looking at autocorrelation.
- The conventional Lo and MacKinlay test is a good test for randomness of stocks, hence an invaluable tool for conducting the EMH which defined that stock returns follow a random walk.

3.1.1 Autocorrelation Test

The autocorrelation test is parametric test used to assess whether the generation of the studied return is dependent on a series of independent and identical distribution (iid) of random variables, we apply autocorrelation estimates to test the hypothesis. The autocorrelation test plays a significant role in detecting whether data under observation is random, and to also establish the degree of relationship between a given time series and lagged version of the same time series over uninterrupted time intervals.

The Ljung and Box was employed to test the joint hypothesis that all autocorrelation coefficients pk are simultaneously equal to zero.

The Ljung – Box test can be defined thus:

H_0: stand for random data

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H_1: stand for not random data

The test is shown as:

$$QLB - m(m+2) \sum_j^g = 1 \frac{t^2(i)}{m-i}$$

where m stands for sample size, t_i represent the autocorrelation at lag_i, while g is the number of lags being tested.

3.1.2 Runs Test

The runs test, a non-parametric test is used to estimate the randomness of a series of stock returns. Autocorrelation test is carried out to test for the normality distribution of returns whereas the runs test helps to establish the randomness of stock returns. The runs test aside facilitating test for linearity, also help to detect nonlinearity in a return's series. A run which carried the feature of both positive and negative series can be represented by the symbol, P and N respectively with succession of identical symbols which are followed or preceded by different symbols.

The runs test is represented by the following hypothesis:

H_0: the sequence is randomly produced

H_a: the sequence is not randomly produced

Test Statistic: The test statistic is

$$N = \frac{o - \bar{o}}{{}^{p}o}$$

where o represent the celebrated count of runs,
$\bar{o}$ stand for the expected count of runs, and
${}^{p}R$ is the standard deviation of the count of runs.

3.1.3 Variance Ratio Test

Lo and MacKinlay (1988) introduced the conventional variance ratio test which they used to find out if stock returns are serially uncorrelated or not. And since then, the Variance ratio test has remained an undisputed and primarily the most widely used tool for testing the market efficiency hypothesis to determine whether security prices display autocorrelation or not. Hoque et al. (2007) stated that there are many methodologies available to test RWH but give great support to variance ratio test which they considered as the most powerful RWH test methods. The statistical property importance of the variance ratio test demonstrates that because stock price behaves randomly. Therefore, the variance of the one period return multiplied by the sum of k correspond to the variance of the k-period return. Conclusively, one can say the variance of its 5day returns can be equated to 5 times the variance of its daily return, the situation remains the same even as more days are varied over time.

Variance Ratio($_p$) is defined as:

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$$VR(_p) = \frac{\sigma^2(n)}{\sigma^2(1)}$$

where $\sigma^2(n)$ is classified as 1/n times the variance of $(N_t - N_{t-n})$ and
$\sigma^2(1)$ represent the variance of $(N_t - N_{t-1})$. The null hypothesis result indicates that VR(q) is not statistically different from 1.

3.1.4 BDS Test

Chen and Yeh, 2002, explained that the BDS test, apart from being a powerful and frequently used non-parametric test for serial dependence in time series analysis, it has also proved to be dependable. This is being collaborated with the work of Brock et al. in 1987 and 1996, respectively. Despite the reliability of the BDS test, it has proved deficient as it does not provide information in respect of the data generation mechanism that will stand out as most appropriate to model a specific data, hence the need to review other non-parametric tests appropriate to counter this dearth. When the data generating processes are both independent and identically distributed (iid), we have a situation of null hypothesis whereas when data are not properly specified, we settled for the alternative hypothesis. Therefore, it guides against model misspecification resulting from when linear model is used to estimate the parameter of the non-linear model which can necessitate model judgmental error.

The BDS test statistic is defined as:
$BDS_{m,Z(\varepsilon) = T}{}^{1/2}[b_{m,Z}(\varepsilon) - b, Z(\varepsilon)^m]/\sigma_{m,Z}(\varepsilon)$

Where bm, Z(ε) represent the value correlation integral or simply defined as the number of clustered pairs lying within a particular tolerance distance ε at a special dimension m. The $\sigma_{m,Z}(\varepsilon)$ denote the standard deviation of the statistic which varies with dimension m.

4.0 Data Analysis, Interpretation and Discussion of Findings

The data analysis, interpretation, and discussion of findings will be addressed in this section in respect to the test carried out for both linear and nonlinear tests.
The mean exhibited a negative return during the period examined as depicted in the descriptive statistics for ASI returns in the appendix. There is evidence of high volatility of the sample returns as shown in the figure for standard deviation.

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Table 1: Descriptive Statistics – Returns

	RETURNS	LAGRETURNS
Mean	-0.0002	-0.0002
Median	-0.0006	-0.0006
Maximum	0.0798	0.0798
Minimum	-0.0435	-0.0435
Std. Dev.	0.0105	0.0106
Skewness	0.4578	0.4067
Kurtosis	8.1134	8.1259
Jarque-Bera	1365.027	1362.508
Probability	0.000	0.000
Sum	-0.1860	-0.2354
Sum Sq. Dev.	0.1345	0.1362
Observations	1214	1214

Author's Computation, 2020

The mean for returns is -0.000153 while Lagreturns is -0.000194, which implies the uncertainty in predicting the stock movements. The Returns and Lag returns both has long-right tail (positive skewness) and leptokurtic of 8.113435>3 and 8.125859>3, respectively. The Jarque-Bera test of normality with its associated probability reveals that there is normality of the various distributions on the table above. Since the probabilities of all variables are less than 5%, an indication that a normal distribution is exhibited by the variables.

Table 2: BDS Test Statistic

Dimension	**BDS Statistic**	**Std. Error**	**z-Statistic**	**Prob.**	
2	0.039	0.003	12.634	0.000	
3	0.068	0.005	14.008	0.000	
4	0.087	0.006	14.862	0.000	
5	0.093	0.006	15.239	0.000	
6	0.093	0.006	15.817	0.000	
Raw epsilon	0.013				
Pairs within epsilon	104	V-Statistic	0.704		
Triples within epsilon	9.86	V-Statistic	0.550		
Dimension	**C(m,n)**	**c(m,n)**	**C(1,n-(m-1))**	**c(1,n-(m-1))**	**c(1,n-(m-1))^k**
2	393	0.534	518	0.704	0.496
3	307	0.417	517	0.704	0.348
4	243	0.332	516	0.703	0.245
5	194	0.265	515	0.703	0.172
6	157	0.214	514	0.703	0.121

Author's Computation, 2020

From the Table 2 above, we observed that all the test statistics are bigger than the critical values hence rejection of null hypothesis because the series are linearly dependent. The

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outcome of the results is an indication that the ASI stock returns in Nigeria are non-linearly dependent.

Table 3: Unit Root Test

Augmented Dickey Fuller test				
Null Hypothesis: RETURNS has a unit root				
		t-Statistic	**Prob.***	
Augmented Dickey-Fuller test statistic		25.92	0.0000	
Test critical values:	1% level	-3.44		
	5% level	-2.86		
	10% level	-2.57		
***MacKinnon (1996) one-sided p-values.**				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(RETURNS)				
Method: Least Squares				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
RETURNS(-1)	-0.71	0.03	-25.92	0.00
C	-9.64	0.00	-0.33	0.74
R-squared	0.36	Mean dependent var	4.07	
Adjusted R-squared	0.36	S.D. dependent var	0.01	
S.E. of regression	0.01	Akaike info criterion	-6.36	
Sum squared resid	0.12	Schwarz criterion	-6.35	
Log likelihood	3861.35	Hannan-Quinn criter.	-6.35	
F-statistic	671.82	Durbin-Watson stat	1.97	
Prob(F-statistic)	0.0000			

Author's Computation, 2020

In table 3 above, the H0H0 was rejected at a significance level <1% because the test statistic have lower value than all the critical values, hence the conclusion that with a very low probability of making an error, the time series has no unit root.

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Table 4: Variance Ratio Test

Heteroskedasticity robust standard error estimates				
Lags specified as grid: min=2, max=16, step=1				
Joint Tests	Value	df	Prob.	
Max |z| (at period 4)*	8.438428	1214	0.000	
Individual Tests				
Period	Var. Ratio	Std. Error	z-Statistic	Prob.
2	0.693	0.044	-6.983	0.000
3	0.484	0.065	-7.997	0.000
4	0.330	0.079	-8.438	0.000
5	0.252	0.091	-8.218	0.000
6	0.231	0.100	-7.653	0.000
7	0.211	0.109	-7.269	0.000
8	0.183	0.116	-7.072	0.000
9	0.157	0.122	-6.920	0.000
10	0.145	0.127	-6.711	0.000
11	0.138	0.133	-6.502	0.000
12	0.122	0.137	-6.389	0.000
13	0.113	0.142	-6.248	0.000
14	0.100	0.146	-6.145	0.000
15	0.095	0.151	-6.007	0.000
16	0.088	0.154	-5.895	0.000
*The prob. approximation using studentized maximum modulus with				
parameter value 15 and infinite degrees of freedom				
Test Details (Mean = 4.0663689423e-05)				
Period	Variance	Var. Ratio	Obs.	
1	0.00016	--	1214	
2	0.00011	0.6931	1213	
3	7.60E-05	0.48354	1212	
4	5.20E-05	0.32988	1211	
5	4.00E-05	0.25233	1210	
6	3.60E-05	0.23101	1209	
7	3.30E-05	0.21118	1208	
8	2.90E-05	0.18291	1207	
9	2.50E-05	0.15741	1206	
10	2.30E-05	0.14486	1205	
11	2.20E-05	0.13773	1204	
12	1.90E-05	0.1218	1203	
13	1.80E-05	0.11257	1202	
14	1.60E-05	0.10026	1201	
15	1.50E-05	0.09524	1200	
16	1.40E-05	0.08789	1199	

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As the p-value is below 0.05, we reject the null hypothesis of equal variance at the 5% significance level.

5.0 Summary and Conclusion

The study tested random walk hypothesis and its ability in predicting stock returns on the Nigeria Stock Exchange. The data for the study consists of All Share Index secondary daily prices data extracted from the Nigeria Stock Exchange Daily Official List for the period, 2015 to 2019. The findings indicate a mixed outcome hence the inability to give and assert conclusion based on the analyzed data in determining the linear dependence of the All Share Index markets. The market exhibits strong nonlinear dependence thus inefficient to determine the stock returns predictability. The linear tests results indicate how the market has moved generally from efficiency and inefficiency status. The nonlinearity tests of the markets also exhibited an inefficient paradigm at predictable levels which are both statistically and significant. And since this inefficiency has not declined over time, it implies that predictability of stock returns cannot solely be dependent on past or today's performances. This support Gujarati and Porter (2009) assertion that stock prices are fundamentally random going by the submission of advocates of the efficient market hypothesis. It is therefore difficult to benefit from speculation in stock trading. It is therefore assumed that if stock prices can actually be predicted with some level of certainty on the basis of current price, **many millionaires would have been made.** On the basis of aforementioned, the study recommends inter alia that investors should adopt a mixture of both past and current stock performances in predicting future stock returns, embrace portfolio diversification while SEC and NSE should improve their market sensitization for the benefits of investors and policy makers.

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