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The Efficacy of the Random Walk Hypothesis in the Nigerian Stock Exchange Market

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Abstract
The Efficient Market Hypothesis (EMH) has been a subject of considerable debates in developed economies; for some time now. The debate has been carried into the emerging market. This study contributes to existing evidence on the efficiency of emerging stock markets using data from the Nigerian Stock Exchange (NSE). Quantitative research method was adopted by conducting Normality test, Runs test and modified version of Augmented Dickey-Fuller unit root tests to examine whether stock price changes in the Nigerian stock exchange market were random. Findings from the study reveal that changes in stock price were random. Overall result from the empirical analysis suggests that the Nigerian stock exchange is efficient in the weak form.
Keywords: Efficient Market Hypothesis (EMH), Random Walk Theory, Normality and Runs Tests, Nigerian Stock Exchange (NSE), Weak form Efficient.

INTRODUCTION

The capital markets, generally, are believed to be the heartbeat of the economy given their ability to respond almost instantaneously to fundamental changes in the economy. The markets encourage savings and real investment in any healthy economic environment. Aggregate savings are channeled into real investment that increases the capital stock and therefore economic growth of the country. Given this attribute, they make it possible for the discerning minds to feel the impulse of such an economy (Emenike, 2008).

Aside the importance of the capital market in the growth process of an economy, it also serves as a means for increasing the wealth of investors. Optimistic investors in the market contend that abnormal profit can be made from the market by fundamentally studying the pattern of changes in stock prices. Changes in stock prices are believed to exhibit serial pattern such that future changes in stock price serially depend on previous changes. This submission has spurred academic interest into verifying the pattern of changes in stock prices as well as the behavior exhibited by stock prices. Notable studies in this regard include Fama(1965), Alexandra (1961), Granger and Morgenstern (1970), Emenike (2008), Maku and Atanda (2009), among others.

Another side to the argument is that stock markets are efficient reflecting all available information in the market, on price movements. Thus, no investor can profit in the market using any kind of information either public or private.

One implication of an efficient market is that no abnormal returns can be made on the basis of prevailing prices as they already reflect information as regard the direction of prices. Indeed, abnormal returns (if any) should not be statistically significant from zero (Fox and Opong, 1999; Fama, 1970). Investors care about market efficiency because stock price movements affect their wealth. More generally, stock market inefficiency may affect consumption and investment spending and therefore influence the overall performance of the economy. A market is efficient with respect to publicly available information if it is impossible to make an **economic profit** by trading on the basis of the information set (Jensen and Bennington 1970).

In developed markets (such as the United States, Britain and Japan), the efficient market hypothesis (EMH) has been the subject of considerable research by economists. The outcome of this research is a strong consensus among economists on the validity of the weak and semi–strong forms of the EMH for the major developed countries (Fama, 1970; Ross and Westerfield, 1988). The EMH debate has been subsequently carried into the emerging markets. Although the number of studies has been limited, their conclusions have been mixed (Gandhi et al., 1980; Cooper, 1982; Parkinson, 1984, 1987; Ayadi, 1983, 1984; Dickinson and Muragu, 1994; Omole, 1997; Matome, 1998; Osei, 1998; Oludoyi, 2001; Adelegan, 2004).

Most evidence in Nigeria, however, indicates that the Nigerian capital market is efficient in the weak form, but not in the semi–strong form. Tests conducted in some studies to determine whether successive changes in stock price are independent, have low power. Most studies use runs test, which makes no assumption about the expected behaviour of stock prices. Some studies use correlation analysis to determine the extent to which stock prices relate to macroeconomic variables. To a large extent, the time series properties of stock prices are rarely considered when testing for randomness of stock prices, even though the issue of randomness can be examined from the data generating process of a variable. Where such time series test as unit root is conducted,

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naive conclusion is usually reached on the random nature of stock price without considering whether the observed randomness is due to stock market crash or policy change. Perron (1989) demonstrates how most macroeconomic and financial variables exhibit random walk because of exogenous level shift or trend break which can impair the ability of traditional augmented Dickey-Fuller test to reject the null hypothesis of unit root when the time series is actually trend stationary.

Consequently, this study extends the debate on the efficiency of emerging stock markets, by adopting the Perron(1989) approach to unit root test in order to gain more information on the time series nature of stock price through robust analysis. By cutting across the pre and post stock market liberalization period in Nigeria, this study tests, for the weak–strong efficiency of the Nigerian stock market, using annual stock prices between 1985 and 2010.

LITERATURE REVIEW

The efficiency or inefficiency of securities market has generated a lot of controversy over a couple of decades in finance and economics discussions. The fundamental analysts try to study a company's business by publishing various historical financial statements and hence uncovering information aboutits profitability that will shed light on the value of its stock. The efficient market hypothesis is an express tool that supports the assertion that the stock market leads economic activities since market efficiency ensures that past and available current information are fully reflected in current stock prices. Investors cannot usurp any privileged information as to beat the market and make abnormal returns. Thus, in any information - efficient market, past/current levels of economic activity cannot be used to predict present/ future stock prices (Fama, 1970). Fama (1970) also categorizes types of efficient markets into three as weak - form, semi -strong - form and strong form efficient, if the set of information includes past prices and returns only, all public information and even private information.

The strong form of the efficient hypothesis states that current market price reflects all pertinent information including everything that is known whether it is public or private. In other words, the security prices reflect everything that is knowable, anything that a host of investment analysts could possibly uncover using all their talent and all the tools at their disposal. No group of investors has monopolistic access to information relevant to forming opinion about prices as to make abnormal profit. Under such circumstance, it would be impossible to ferret out any information that is not already discounted in the market price of security (French 1986). Hence, in this form of efficient market hypothesis, it becomes impossible for any investor to make consistent supernormal returns over a long run since information will be equally available to all at the same time. Tape watching, charting and professional investment analyses are a waste of time. In fact, consistently superior performance is absolutely impossible. The strong – form hypothesis encompasses both the weak and semi strong forms.

The semi -strong hypothesis contends that the price of any security reflects not only past prices of the security but also all available public information. This information includes both the original raw information about the economy, political news or an individual security and any publicly available analyses or projections made, usingthe raw data. According to this form, all information contained in the company's financial statements, potentialanalysis of such information including news release, economic data and so forth are fully reflected by each security price. The implication of this is that investors will have no generally available source of information that could lead to beating the market. Thus, it is of no use to pore over annual reports or other published data since the market prices adjust instantly to any sort of news carried by such reports or data.

The random walk hypothesis otherwise called the weak form of the efficient market hypothesis states that current market prices reflect all the information contained in the record of past prices. In other words, all information conveyed in past patterns of a stock's price is impounded into the current price of the stock. It will be useless to select stocks based on information about recent trends in stock prices. The fact that the price of stocks has risen for the past two or four days will give no useful information as what today's or tomorrow's price will be. Thus, tape watchers and chartists who follow the price trend in order to forecast price or determine when to buy and sell the stock are wasting their time. Existence of random walk hypothesis means that there are no regularities or patterns in security prices that repeat themselves over time as to predict future stock prices from past prices. Thus, each price change that occurs in the market is independent of the previous price changes. Because of these independencies, the price movement is said to behave randomly (Fama, 1970).

According to Famous (1999), the Random Walk Theory is the weak form of Efficient Market Hypothesis (EMH). The random walk hypothesis simply states that at a given point in time, the size and direction of the next price change is random with respect to the stock of knowledge available at that point in time.

The first published empirical research on the weak form efficiency of the NSE is apparently the study by Samuel and Yacout (1981), which used serial correlation test to examine weekly price series of 21 listed Nigerian firms from July 1977 to July 1979. The results show that stock price changes are not serially correlated but follow a random walk, thus accepting the notionof weak form market efficiency.In 1984, Ayadi tested the price behaviour of 30 securities quoted on the NSE between 1977 and 1984, using Monday closing prices of these shares after adjusting for cash dividends and script issues. The results show that the share price movements on the NSE follow a random walk.

Anyanwu (1998) investigates the efficiency of the NSE from the perspective of the market's relationship to economic growth of the nation. He used indices of stock market development – liquidity, capitalization, market size, among others to construct an aggregate index of stock market development andrelated it to the long-run economic growth index, emphasizing the GDP growth rate. The results show a positive association between the two indices and he therefore concluded that the NSE is efficient to the extent that it affects the economic development of the nation. Olowe (1999) examined evidence of weak form efficiency of the NSE using correlation analysis on monthly returns data of 59 individual stocks listed on the NSE over the period January 1981 to December 1992.

Agwuegbo *et al*.,(2010) analyzed the behaviour of stock price in the Nigeria Stock Exchange market. The daily behaviour of the market prices revealed that future stock prices cannot be predicted based on past movements. The sample includes daily market prices of all securities listed in the Nigeria Stock Exchange (NSE). The result from the study provides evidence that the Nigerian stock exchange is efficient even in weak form and that NSE follow the random walk model.

In contrast to the already cited works of Samuel and Yacourt, Ayadi and Olowe; Akpan(1995) studied the informational efficiency of the NSE including the risk implications of investing in the market, using time series data of stock market price indices covering the period 1989 to 1992. His results show evidence to reject the hypothesis of weak form efficiency of the NSE. In 2003, Appiah-Kusi and Menya applied the E-GARCH (Extended Generalized Autoregressive Conditional Heteroscedasticity) model toexamine the weak form efficiency in weekly price indices of eleven African stock markets.Their results provide evidence showing that the stock markets in Egypt, Kenya, Morocco, Mauritius and Zimbabwe are weak form efficient, while those of Botswana, Ghana, Ivory Coast, Nigeria, South Africa, and Swaziland are not consistent with weak form efficiency.

Emenike (2008) tests the Weak-form Efficient Market Hypothesis of the NSE by hypothesizing normal distribution and Random walk of the return series. Monthly All Share Indices of the NSE from January 1985 to December 2007 were examined. Normality tests include skewness, kurtosis, Jarque-Bera and Standardized Range tests; whereas Random walk was tested using the non-parametric Runs test Results of the Normality tests show that returns from NSE do not follow normal distribution. Runs test results reject the randomness of the return series of the NSE. Overall results from the tests suggest that the NSE was not weak form efficient. Reductions of transaction cost so as to improve market activities and minimize institutional restrictions on trading of securities in the bourse were therefore recommended.

From the empirical review of the NSE presented above, it is clear that most of the studies which conclude that the market is weak form efficient use individual price series of listed companies. This paper provides empirical evidence using All Share Indices of the NSE. Unlike other studies which use all share indices with smaller sample size, this study uses a longer time period, which according to Rahman and Hossain (2006), reduces the problem of infrequent trading bias.

Nwosa and Oseni (2011) examine the weak-form efficiency hypothesis for the Nigerian stock market by conducting serial auto-correlation and regression analysis. Findings from the study revealed that the Nigerian stock market is informational inefficient, meaning that stock price does not exhibit random walk. Similarly, Nwidobie (2014) investigate the efficiency level of the Nigerian stock exchange marketby conducting the Augmented Dickey-Fuller (ADF) test on all-price-index (API) data of of quoted firms from January 2000 to December 2012. Result of the test shows that share price movements on the Nigerian Stock Exchange do not follow the random walk pattern.

Models of Weak Form EMH

The definitional statement of EMH is that prices 'fully reflect' all the available information. To verify this, the process of price formation has to be specified in model form, in order to define more precisely the empirical implication of fully reflect. Fama (1970), suggested three models for testing weak form efficiency: the Expected Return or Fair Game model, the Sub-martingale model, and the Random walk model.

The Expected Return or Fair Game Model

The Fair Game Model States that a stochastic process X_t conditioned on information set t, is a fair game if it has the following property:

$$X_{j,t+1} = P_{j,t+1} - \left(\frac{P_{j,t+1}}{t}\right) \quad \text{(1)}$$

$$\text{With } E\left(\frac{X_{j,t+1}}{t}\right) = \left\{P_{j,t+1} - \left(\frac{p_{j,t+1}}{t}\right)\right\} = 0 \quad \text{(2)}$$

Where: $X_{j,t+1}$ is the excess market value of security J at time t + 1, $P_{j,t+1}$ is the observed (actual) price of security J at time t + 1, and $(P_{j,t+1}/t)$ is the expected price of security J that was projected at time t, conditional on the information set $_t$ or equivalently

$$Z_{j,t+1} = r_{j,t+1} - \left(\frac{r_{j,t+1}}{t}\right) \qquad (3)$$

$$\text{With } E\left(\frac{Z_{j,t+1}}{t}\right) = \{r_{j,t+1} - \left(\frac{r_{j,t+1}}{t}\right)\} = 0 \qquad (4)$$

Where: $Z_{j,t+1}$ / $_t$ is the unexpected (excess) return for security J at time t+1, r_{jt+1} is the observed or actual return for security J at time t+1, and ($r_{j,t+1}$ / $_t$) is the equilibrium expected return at time t+1 on the basis of the information set $_t$.

This model implies that the excess market value of security J at time t+1 ($X_{j,t+1}$) is the difference between actual price and expected price on the basis of the information set $_t$. Similarly, the excess return for security J at time t + 1 ($Z_{j,t+1}$) is measured by the difference between the actual and expected return in that period conditioned on the set of available information at time t. According to the fair game model, the excess market value and the excess return are **Zero**

The Submartingale Model

The Submartingale Model is the fair game with small adjustment in expected return. In this model, the expected return is considered to be positive instead of Zero as in the fair game model. The adjustment implies that prices of securities are expected to increase overtime. In other words, the returns on investments are projected to be positive due to the risk inherent in capital investment.The Submartingale model can be estimated as:

$$\left(\frac{P_{j,t+1}}{t}\right) \geq P_{j,t+1}, \text{ or equivalently } \left(\frac{r_{j,t+1}}{t}\right) \geq 0 \qquad (5)$$

This model states that the expected return sequence ($r_{j,t+1}$) follows a Submartingale with respect to the information set $_t$, which is to say that the expected return for the next period, as projected on the basis of the information set $_t$, is equal to or greater than Zero (Fama, 1970).

The important empirical implication of the Submartingale model is that no trading rule based on the information set $_t$ can have greater expected returns than a strategy of always buying and holding the security during the future period in question.

The Random Walk Model

The financial asset's price series is said to follow a random walk if the successive price changes is independent and identically distributed (Fama, 1970). However, in practice, according to Ntim et al.(2007), a stock price is said to follow a random walk if successive residual increments are independent and identically distributed (IID). This implies that future price changes cannot be predicted from historical price changes.

$$P_t = \rho P_{t-1} + \mu_t \qquad (6)$$

Where:

P_t = Securities price under consideration

P_{t-1} = One period lag value of security price

ρ= The coefficient of p_{t-1}

μ_t = Random error term (residual) which is assumed to be IIDN (0, σ^2) i.e., Independent and identically distributed as a normal distribution with zero mean and homoscedastic variance.

The main essence of the random walk model is that price changes during period t are independent of the sequence of price changes during previous period. Fama (1970) posits that the random walk model is an extension of the fair game model. Specifically, the fair game model just indicates that the conditions of market equilibrium can be stated in terms of expected returns while the random walk gives details of the stochastic process generating returns. Therefore, he concluded that empirical tests of the random walk model are more powerful in support of EMH than test of the fair game model.

MATERIALS AND METHODS

Quantitative research method was adopted in this study. Secondary data used were taken from Nigeria Stock Exchange (NSE) Fact book. In formulating econometric model for the study, we follow the model of Emenike (2008), by modeling the process of price formation using the Random Walk model so that we could empirically test weak form efficiency of the NSE. A share price is said to follow random walk if the successive residual increments are independent and identically distributed (Fama,1970;Ntim et al., 2007). The random walk model is given as stated in equation (2.6)

The random walk model indicates that the price of a share at a time t is equal to the price of the share at time t-1 plus a given value that depends on new (unpredictable) information arriving between time t-1 and t.

The stock indices level is transformed into continuously compounded yearly index return using the

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formula:

$$R_{mt} = ln(P_t) - ln(P_{t-1}) \quad \text{...(7)}$$

Where:

R_{mt} = Annual returns for ASI for period t
P_t = All Share Index for year t
Pt = All Share Index for year t – 1.
Ln= Natural Logarithm

In other words, stock index return is calculated as the natural logarithm differences in price or as the first difference of the natural logarithm of stock indices level. A key assumption underpinning use of logarithm is that stock returns are not only log-normal, but are also traded on a continuous basis (Bodie et al, 1999:170; Simons and Laryea, 2004).

Normality test and non-parametric runs test were conducted to verify whether the NSE is efficient or not. Random Walk hypothesis posits that in an efficient market, successive residual increments follow the normal distribution (Ntim et al., 2007). It was therefore necessary to investigate the extent to which the return series on NSE approximates a normal distribution. Normality test was performed using skewness, the kurtosis and the Jarque-Bera (JB) test.

Skewness is a measure of asymmetry of the distribution of a series around its means. The Skewness of a symmetric distribution, such as the normal distribution, is zero (0). Positive skewness means that the distribution has a long right tail and negative skewness implies that the distribution has a long left tail.

Kurtosis measures the peakedness or flatness of the distribution of a return series. The Kurtosis of a normal distribution is 3. If the kurtosis exceeds 3, the distribution is peaked (Leptokurtic) relative to the normal; if the Kurtosis is less than 3, the distribution is flat (Platykurtic) relative to normal.

JB test is a statistics for testing whether or not a series is normally distributed. It measures the difference of the skewness and kurtosis of a series with those from a normal distribution.

JB test is estimated as:

$$JB = n\left(\frac{S^2}{6} + \frac{[K-3]^2}{24}\right) \text{...(8)}$$

Where:

n = sample size
S = skewness coefficient, and
K = kurtosis coefficient.

For a normally distributed series, S=0 and K=3. Therefore, the JB test of normality is a joint test of the hypothesis that S and K are 0 and 3 respectively. Under the null hypothesis of normality in distribution, the JB is equal to 0. Positive or negative JB value indicates evidence against normality in series.

Our non-parametric analysis was based on Runs test. The Runs test is a non-parametric test designed to examine whether or not an observed sequence is random. It has, extensively, been used by former researchers of weak form efficiency in emerging markets.(See, Claessens,, Susmita& Jack, 1995; Dickinson and Muragu, 1994; Simon and Laryea, 2004). It is based on the premise that if a series of data is random, the observed number of runs in the series should be close to expected number of runs. If there are too many runs, it would mean that the residuals change signs frequently, thus indicating negative serial correlation. Similarly, if there are too few runs, they may suggest positive autocorrelation (Gujarati, 2007). Implicitly, too many runs and or few runs indicate evidence against the hypothesis of random walk (Spiegel and Stephens, 1999).

Under the null hypothesis of independence in share returns, the expected number of runs can be estimated as:

$$E(M) = \frac{2N_1N_2}{N} + 1 \text{...(9)}$$

Where:

N = Total number of observation (N_1+N_2), N_1 = Number of + symbols (i.e. + residuals), N_2 = Number of – symbols (i.e. - residuals), E (M) = Expected number of runs. For a large number of observations (N > 30), the sampling distribution of M is approximately normal and the variance is given by:

$$\sigma_M^2 = \frac{2N_1N_2(2N_1N_2-N)}{(N)^2(N-1)} \text{...(10)}$$

The standard normal Z statistics which will be used to test whether the actual number of runs is consistent with the hypothesis of independence is given by:

$$Z = -1.96 \le M \le 1.96 \quad \text{..(11)}$$

Where:

M = the actual number of runs.

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We will accept the null hypothesis of randomness at 5% significance level if M lies between [(E)M $\pm 1.96\ \sigma_M^2$) and reject it otherwise.

Unit Root Test

In order to understand more fully the weak form efficiency of the NSE, the time series properties of share return were also examined using the modified version of the augmented Dickey-Fuller (ADF) unit root test that allows for structural break both the intercept and slope terms. The traditional ADF test of Dickey-Fuller (1979) assumes parameter stability in the random walk model using difference stationary process to test the null hypothesis of presence of unit root. Subsequent study by Perron (1989) reveals that most macroeconomic and financial time series data have unit roots either because of exogenous level shifts, or trend break or both, nullifying the underlying parameter stability assumption embedded in the traditional ADF test. Apparently, in the presence of parameter instability, the traditional ADF test has low power to reject the null hypothesis of unit root presence leading to type II error.

Assuming that the break occurs gradually, we follow the Perron (1989) approaches to modeling the dynamic pattern of the breaks. For the null hypothesis, we have the following model:

$$y_t = y_{t-1} + \beta + \vartheta(L)(\theta D_t(T_b) + \gamma(DU_t\ (T_b) + \epsilon_t) \text{.............................(12)}$$

Where ϵ_t are independent and identically distributed (i.i.d.) innovations, and $\vartheta(L)$ is a lag polynomial representing the dynamic of the stationary and invertible ARMA error process, D_t and D_U are the break variables.

For the alternative hypothesis, we assume a trend stationary model with two breaks, namely; the intercept and the trend:

$$y_t = \mu + \beta t\ \ \vartheta(L)(\theta DU_t(T_b) + \gamma(DT_t(T_b) + \epsilon_t) \text{........................(13)}$$

We use equations (3.6) and (3.7) to construct a modified general Dickey- Fuller test which nests both the null and alternative hypothesis as follows:

$$y_t = \mu + \beta t + \theta DU_t(T_b) + \gamma DT_t(T_b) + \omega D_t(T_b) + \propto y_{t-1} + \sum_{i=1}^{k} c_i \Delta y_{t-i} + u_t \text{.... (14)}$$

Equation (3.8) above allow us to test for unit root by comparing $\propto$ estimated with 1 ($t_\propto$) using the t-statistic. It is an unrestricted Dickey-Fuller Unit Root model which tests the null hypothesis of a random walk with drift against the alternative hypothesis of a trend stationary in the intercept and trend breaks. K is the lagged differences of y which helps to remove the effect of autocorrelation in the error term on the asymptotic distribution of the statistic.

RESULTS AND DISCUSSION

Descriptive statistics analysis below show the maximum and minimum values for the present values and one period lag values of all share index as well as the distribution which is embedded in the magnitude of skewness, Kurtosis, and Jarque-Bera statistics. The nature of the variables distributions are also represented in histograms and line graphs to enhance understanding of the degree of spread and symmetry of the data sets.

Table 1: Descriptive Statistics

	PT	PT_{-1}
Mean	11698.35	10745.63
Median	6056.600	5469.550
Maximum	57990.20	57990.20
Minimum	127.3000	0.000000
Std. Dev.	14164.36	14082.75
Skewness	1.574313	1.753133
Kurtosis	5.373035	5.942809
Jarque-Bera	16.84056	22.70020
Probability	0.000220	0.00001
Sum	304157.0	279386.5
Sum Sq. Dev.	5.02E+09	4.96E+09
Observations	26	26

Source: Author's Estimation Using Eviews4.1

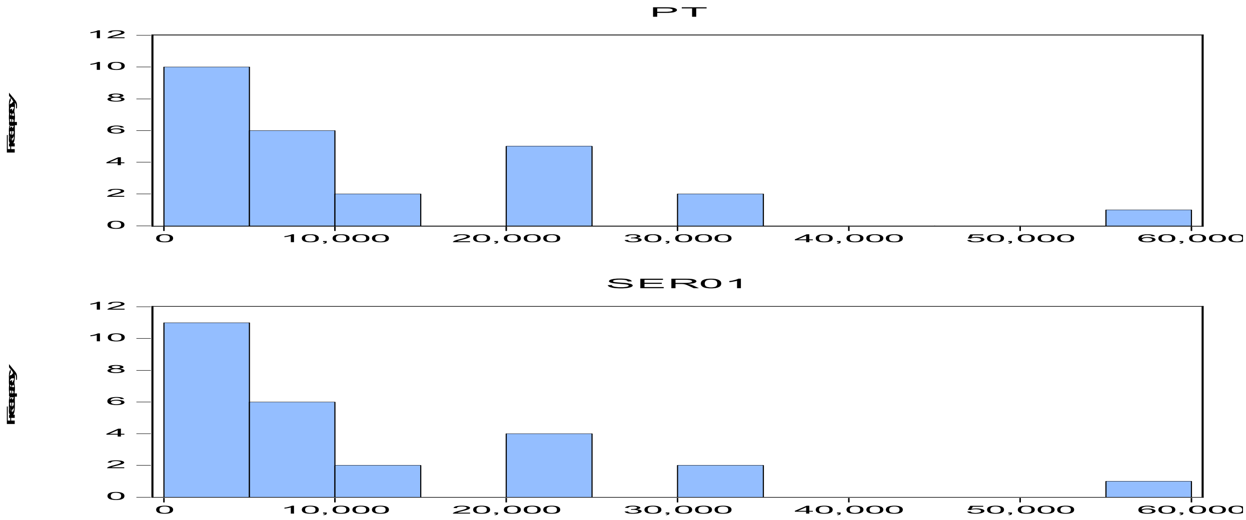

Figure 1: Histogram for Current and one period lag value of All Share Index.

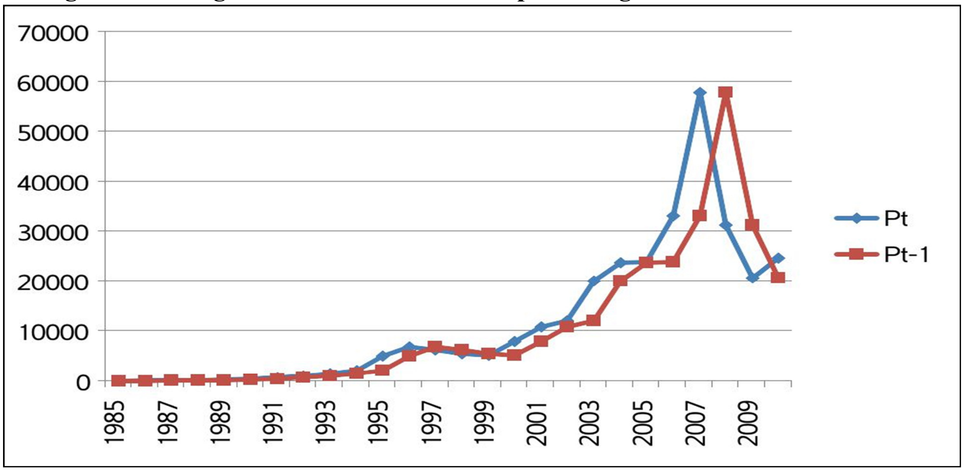

Figure 2: Line Graph for Current and one period lag value of All Share Index

Preliminary analysis on normality test was conducted using skewness, the kurtosis and the Jarque-Bera (JB) test statistics. As earlier noted, skewness measures the degree of asymmetry ofdistribution of a series, around its means. The Skewness of a symmetric distribution, such as the normal distribution, equals zero (0). The positive skewness values for the current and one period lag values (1.574313 and 1.753133) implies that the individual distribution of the variables have long right tail.

Kurtosis which measures the peakedness or flatness of the distribution of a series has the number three (3) as a coefficient for a normal distribution. Since the kurtosis values for the variables (5.373035 & 5.942809) exceed the expected numerical value of three (3), the distribution is adjudged peaked (Leptokurtic) relative to the normal.

From the descriptive statistics in table 1 above, JB values for the series are 16.84056 and 22.70020, and based on the associated probability levels of 0.000220 and 0.000012 (which are individually less than the bench mark), we reject the underlying null hypothesis of normality and conclude that the series are not normally distributed.

Table 2: Descriptive Statistics on Current level of All Share index, one period lag value and Return on All Share.

	LN(PT)	LN(PT-1)	LN(PT) - LN(PT-1) = R_{mt}
Mean	8.379864	8.169029	0.210835
Median	8.770361	8.643420	0.301314
Maximum	10.96803	10.96803	0.836982
Minimum	5.098646	4.846547	-0.611850
Std. Dev.	1.801846	1.895978	0.306898
Skewness	-0.501834	-0.396759	-0.786596
Kurtosis	1.982431	1.852408	4.026192
Jarque-Bera	2.127915	2.027748	3.675005
Probability	0.345087	0.362811	0.159215
Sum	209.4966	204.2257	5.270863
Sum Sq. Dev.	77.91960	86.27358	2.260466
Observations	25	25	25

Source: Author's Estimation Using Eviews7.1

After taken the natural log of the series, the distribution of the variables conforms to normality. This is particularly true as the skewness of the series (-0.501834, -0.345087 & -0.786596) are not different from zero, and kurtosis (1.9824312, 1.852408 & 4.026192) is on the average not different from three (3).Based on the 5% level of significance, we observe that the probabilities (0.345087, 0.362811 & 0.159215) of obtaining the associated Jarque-Bera statistics (2.127917, 2.027748 & 3.675005) are individually greater than the 5% bench mark. Hence, we accept the null hypothesis of normality in the series.

Table 3: Runs Test

	RMT
Test Value[a]	.31
Cases < Test Value	13
Cases >= Test Value	13
Total Cases	26
Number of Runs	10
Z	-1.401
Asymp. Sig. (2-tailed)	.161

a. Median

A runs test was performed for 26 years of all share index from the period 1985-2010. The following hypotheses are hereby investigated as follows:

H_0: the sequence of share price was produced in a random manner, that is successive changes in stock price are independent

H_1: the sequence of share was not produced in a random manner, that is successive changes in stock price are dependent.

Test statistic: $Z = -1.401$

Significance level: $\alpha = 0.05$

Critical value (upper tail): $Z_{1-\alpha/2} = -1.96$

Critical region: Accept H_0 if $Z < -1.96$

Since the test statistic is less than the critical value, we conclude that the data on all share index are random at the 0.05 significance level. This implies that stock price index is random and unpredictable.

Table 4: UNIT ROOT TEST RESULTS
Null Hypothesis: RMT has a unit root
Trend Specification: Trend and intercept
Break Specification: Trend and intercept
Break Type: Innovational outlier

Break Date: 2001
Break Selection: Minimize Dickey-Fuller t-statistic
Lag Length: 2 (Automatic - based on Schwarz information criterion, maxlag=5)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.714424	0.1528
Test critical values:	1% level	-5.719131	
	5% level	-5.175710	
	10% level	-4.893950	

*Vogelsang (1993) asymptotic one-sided p-values.

Table 4 above shows unit root test with breaks and trends in both intercept and trend term for the modified augmented Dickey-Fuller (ADF) test following the Perron (1989) procedure. The test allows for a constant, one-sided (lower tail) test of the null hypothesis that return on securities in NSE follows random walk with drift, at 1%, 5%, and 10% respectively; as against a trend stationary in the intercept and trend breaks. Judging by the critical values of -5.719131 (1%), -5.175710 (5%), and -4.893950 (10%), as against ADF test statistic value of -4.714424; we find no evidence to reject the null hypothesis of unit root with drift, even at 10% level. This implies that securities return in NSE follow random walk.

The various methods of data analysis employed in this paper provide evidence for the random and independent nature of stock prices in the NSE. Hence, findings from this study provide support for Olowe (1999) and Agwuebo *et al.* (2010) who found that the NSE is weak-efficient. They however contradict studies by Akpan (1995) and Emenike (2008) who found evidence against the weak form efficiency of the NSE. It is important to note that the evidence provided in this study relates to the behavior of the security prices relating to the activities of the NSE only. This basic analysis allows us to isolate the influence of corporate management and macroeconomic condition on the behavior of security prices. However, one major implication of the study, borrowing from the result of unit root test, is that political or macroeconomic instability are more likely not to provide basis for speculating the behavior of stock prices. This is because such instability might not cause changes in stock prices to be predictable, as the mean of stock price changes show no sign of reversion even after crash or change in policy.

CONCLUSION AND POLICY RECOMMENDATION

This study sought to examine the degree to which the Nigerian stock exchange market satisfies the market efficiency hypothesis. That is, it investigates whether the stock exchange market is efficient or not such that investors or analysts cannot predict future part of stock price changes.

A test of randomness was carried out on the natural log of the current and one period lag values of all share price index in the stock exchange market based on Jarque-Bera statistic criterion. The probabilities of observing the estimated JB statistic for the series were found to be individually greater than the 5% bench mark. Hence, an acceptance of the null hypothesis for normality in the series was the case.

In addition, runs test was performed on the series at 5% level to investigate whether successive changes in stock price are independent or whether the sequence of share price was produced in a random manner. The analysis reveals that changes in stock prices index are random. Overall result from the empirical analysis suggests that the Nigerian stock exchangeis efficient in the weak form. The acceptance of weak form efficiency is consistent with some previous studies (see, Agwuegbo *et al.,* 2010; Olowe, 1999; Anyanwu, 1998). The implication of this inquiry is that investors might not be able to make abnormal gains from the market on the basis of past changes in stock prices as current level of stock price is not determined by such changes.

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