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WEAK FORM EFFICIENT MARKET HYPOTHESIS IN THE NIGERIAN STOCK MARKET: AN EMPIRICAL INVESTIGATION

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Abstract
The study empirically investigated the weak form efficient market hypothesis in the Nigerian stock market for the period 1990-2017. Secondary data were used and collected from the Central Bank of Nigeria Statistical Bulletin. All-Share-Index (ASI) was used and converted to stock market returns. Time series econometrics techniques were used for the analysis. The study revealed that the large differences between the Mean and Standard deviation of the variables in the descriptive statistics suggested that the stock market is highly risky. The study showed that between 2010 to 2017, the stock market returns were normally distributed. The results of serial independent or randomness as obtained from ADF test showed that the Nigerian stock market is dependent and not random thus inefficient, which indicated that investor can predict the markets returns. The stock market returns for the period 2010 to 2017, means that investor cannot predict the market returns in the period. The result revealed that previous stock market return has 15% positive relationship, and 0.23 0.23% had predictive powers. The study concluded that the NSE was not efficient in the weak form between 1990and 2010, hence, it has become efficient from 2011 up to 2017. The study recommended that the SEC should take a leading role in regulating abnormal financial activities. Market operators should provide adequate information on securities to the market allowing the free interplay of demand and supply to determine security values as current market values of securities on the NSE reflect available security information.

Keywords: Weak Form, Efficient Market, Hypothesis, Nigerian Stock Market.

INTRODUCTION

The efficiency of the emerging markets assumes a greater importance as the trend of investment is accelerating as a result of regulatory reforms and removal of other barriers for the internationally equity investments. The term market efficiency is used to explain the relationship between information and share in the capital market literature. One way to measure the efficiency of the market is to ask what types of information, encompassed by the total set of available information, are reflected in securities prices. When we talk about market efficiency, we are interested not in the form of structural relationship between risk and expected return but rather in the precision with which the market securities in relation

to its structure. If new information becomes known about a particular company, how quickly do the prices of securities adjust to reflect the new information? If prices respond to all relevant new information in a rapid fashion, we can say the market is relatively efficient. If, instead, the information disseminates rather slowly throughout the market, and if investors take time to analyzing the information and reacting, and possibly overreacting to it, values may deviate from values based on a careful analysis of all available relevant information. Such a market could be characterized as being relevantly inefficient.

Thus, stock market is an organized market for buying and selling financial instruments known as securities which includes stocks, bonds, options and futures. Most stock markets have a specific location where the trades are completed known as stock exchanges. For a company to be traded at the exchange market, it must be listed, and for it to be listed, it must satisfy certain requirements. Stock market plays a crucial role in cementing the relationship between investors and the corporate sector. In this process, they help mobilizing the savings of people and direct them to the growth of trade, commerce and industrial sectors of an economy. Simons and Laryea (2015) in their Efficient Market Hypothesis (EMH), categorized the market efficiency into three levels based on the definition of the available information set namely, the weak form EMH, the Semi strong form EMH, and the Strong form EMH. In the weak form, only the past information on prices of shares are reflected, in the semi strong form, it reflects all publicly available information in securities prices, including the past securities prices and the announcements of dividend payments, changes in capital structure, change of management and other event; while the strong form captures ALL information be it external, internal and even unannounced.

Theoretical Framework

The study is anchored on the efficient market hypothesis. The theory states that share prices on the market place react fully and instantaneously to all information available. Thus, it also means that an operationally efficient stock market is expected to be externally and informationally efficient thus security prices at any point in time are an unbiased reflection of all the available information on the security's expected future cash flows and the risk involved in owning such a security (Reilly & Brown,2003). Such a market provides accurate signals for resource allocation as market prices represent each security intrinsic worth. Market prices can at times deviate from the securities true value, but these deviations are completely random and uncorrelated.

The fundamental analysis approach to security valuation posits that at any point in time, an individual security has an intrinsic value which depends in turn on such fundamental factors as quality of management, state of the firm's industry and returns, rate of return on equity and the general economic outlook. Changes in the values of these variables result in changes in share values which change follow any definite pattern (an outcome of random walk behaviour). The existence of these unpredictable future values of shares caused by changes in values of its fundamentals, to Nwidobie (2014), evidences the existence of efficiency in that stock market; concluding that the actual price of any security in that

market at any point in time is always a good estimate of its intrinsic value, or the actual values of the securities wandering randomly about their intrinsic values.

Empirical Review

Obayagbona and Igbinosa (2014) investigated the weak-form market hypothesis in the emerging capital market of Nigeria from January 2006 to December 2011. It uses three tests of randomness based on autoregressive technique to check for the presence or otherwise of autocorrelation in daily stock prices and returns from the Nigerian Stock Market. All the tests including the Z-statistics for both stock prices and their returns show significant indications of dependence in return series and hence, of non-randomness. The overall results suggest that the emerging Nigerian Stock Market is not efficient in the weak form.

Afego (2012) evaluated the weak-form efficient markets hypothesis for the Nigerian stockmarket by testing for random walks in the monthly index returns over the period 1984-2009. The results of the non-parametric runs test show that index returns on the Nigerian Stock Exchange (NSE)display a predictable component, thus suggesting that traders can earn superior returns by employing trading rules. The statistically significant deviations from randomness are also suggestive of suboptimal allocation of investment capital within the economy. The findings, in general, contradict the weak-form of the efficient markets hypothesis.

Nwidobie (2014) investigated the random walk hypothesis in Nigeria. Analysis of all-price-index (API) data of shares of listed firms on the Nigerian Stock Exchange from January 2000 to December 2012 using the Augmented Dickey-Fuller (ADF) test shows that share price movements on the Nigerian Stock Exchange do not follow the random walk pattern described by Fama (1965), and thus the random walk hypothesis is not supported by findings in the Nigerian capital market. Results also indicate the existence of market inefficiencies in the Nigerian capital market necessitating the inflow of cheap and free information about security fundamentals into the market for share pricing by the forces of demand and supply.

Simons and Laryea (2015) evaluated the weak form of the efficient market hypothesis for four African stock markets - Ghana, Mauritius, Egypt and South Africa. The results of both parametric and nonparametric tests (Kolmogrov-Smirnov (KS) Goodness of Fit Test, Runs Test, Auto-Correlation Test, Variance Ratio Test) show that the South African stock market is weak form efficient, whereas that of Ghana, Mauritius and Egypt are weak form inefficient. This implies that successive security returns on the South African market are independent and follow a random walk.

Ezepue and Omar (2012) explored the weak-form efficient market hypothesis for the Nigerian Stock Market is using different statistical tests including Runs Test, Autocorrelation Function Test, Ljung-Box Q-Statistics (Box-Pierce Q [BPQ] Test), BDS (Brock-Dechert-Scheinkman) Test for Independence of Returns. The analyses use overall stock market returns collected over the period 2000–2010. It is shown that the NSM is not

weak-form efficient which questions the benefits of the 2004 financial reforms. It is also shown that the degree of market inefficiency varies across the periods corresponding to the financial reforms and 2007 global financial crisis, for daily and monthly returns.

Methodology

The study adopts an *ex-post- facto* research design. The data is based on historical information obtained from the official records of the stock exchange. This study used the monthly All-Share-Index data from the Nigerian Stock Exchange (NSE). The All-Share-Index includes all listings on the exchange. $R_{mt}= Ln(P_t / P_{t-1})*100$.....(1)

Where: R_{mt} represents monthly market returns for period *t*, P_t and P_{t-1}denote market prices for period *t* and period *t-1* respectively and *Ln* denotes natural logarithm. We use this log transformation to convert our data into continuously compounded rates. This practice is common rather than using discrete compounding.

Model Specification

The study used a simple autoregressive model where the dependent variable is hypothesized to depend on its own past values. This helps to identify the presence or otherwise of autocorrelation in the model. The specified model is as follows:

$y_t = a_0+y_{t-1}b+e_t$.....**(2)**

Where: y = Monthly stock prices or returns which the dependent variable.

e = the residuals.t = Time (monthly in this case), y_{t-1}=Monthly stock prices or returns in the previous year is the independent variable in the above model a= constant; b = coefficient of the relationship between y and y_{t-1}.

DATA PRESENTATION AND DISCUSSION

The data from the monthly All Share Index was converted to Stock Market Returns using the formula $R_{mt}= Ln(P_t /P_{t-1})$, where: R_{mt} is the monthly market return for period *t*. The analysis of the study was based on the stock market returns. The ASI and the computed stock market returns are shown on appendix 1.

Table 1: Descriptive Statistics: Monthly returns of NSE All Share Index (ASI)

	Stock return (1990 to 2004)	Stock return (2004 to 2010)	Stock return (2010 to 2013)	Stock return (2013 to 2017)	All Period stock return (1990 to 2017)
Mean	0.024183	0.018557	0.011726	0.006992	0.015988
Median	0.019800	0.016250	0.006950	0.005150	0.016300
Maximum	0.240400	0.184800	0.323500	0.126100	0.323500
Minimum	-0.230400	-0.185800	-0.365900	-0.102900	-0.365900
Std. Dev.	0.046192	0.049209	0.076966	0.050966	0.060558
Skewness	0.194179	-0.123598	-0.579555	0.155581	-0.499774
Kurtosis	18.96280	6.983453	8.625031	2.914011	10.92941
Jarque-Bera	1009.224	55.75152	181.4148	0.208432	955.4578
Probability	0.000000	0.000000	0.000000	0.901031	0.000000
Sum	2.297400	1.558800	1.547800	0.335600	5.739600
Sum Sq.	0.200571	0.200984	0.776010	0.122085	1.312868
Observation	28	28	28	28	28

Source: Authors' computation with the use of E-view 9.0

The descriptive statistics of the stock market returns of the Nigerian Stock Market is presented on Table 1. Normality of distribution is one of the basic assumptions underlying the weak-form efficiency (Simons & Laryea, 2006). Thus, if NSE monthly returns follow normal distribution, it means that we cannot predict the future price or returns from the mean of today's price or return. When this happens, we shall conclude that the NSE is weak-form efficient, otherwise, we say that the market is weak-form inefficient. Mean, standard deviation, Skewness, kurtosis, and Jarque-Bera have been used to test the hypothesis of normality of the study. The results show that the returns are not normally distributed. Mean stock returns are positive with large volatility (standard deviation) for all countries. This suggests that the stock market is highly risky.

Table 2: Unit Root Test Augmented Dickey-Fuller (ADF Test)

		At Level with Constant, No trend	
		t-Statistic	P.value
Stock return (1985 to 1992)		-12.45684*	0.0001
Stock return (1993 to 1999)		-3.343005*	0.0160
Stock return (2000 to 2010)		-9.834589*	0.0000
Stock return (2011 to 2014)		-5.618203*	0.0000
All Period stock return (1998 to 2014)		-6.149308*	0.0000
Test critical values:	1% level	-3.501445	
	5% level	-2.892536	
	10% level	-2.583371	

Source: Authors' computation with the use of E-view 9.0

The Augmented Dickey Fuller t-statistic has the test critical values at 1%, 5% and 10% were equal to -3.501445, -2.892536, and -2.583371 respectively. The t-statistic for Stock return (1985 to 1992) is -12.45684, Stock return (1993 to 1999) is -3.343005, Stock return (2000 to 2010) is -9.834589, Stock return (2011 to 2014) is -5.618203 and All Period stock return (1998 to 2014) is -6.149308. At a significance level of 5%, the null hypothesis of the data being non-stationary is rejected because the ADF t-statistic is too negative. All in all, both the Unit Root Test (i.e. the ADF test) revealed that the input series of data is not non-stationary and so the null hypothesis of the Nigerian Stock Markets being random has to be rejected.

Table 3: Regression Model for future returns and previous returns in Nigerian Stock Exchange

Dependent Variable: Stock Returns (y)
Method: Least Squares
Date: 05/02/19 Time: 07:24
Sample (adjusted): 1990- 2017
Included observations: 28

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Y_{t-1}	0.582760	0.052359	2.955724	0.0033
C	0.013546	0.003280	4.130209	0.0000

R-squared	0.573952	Mean dependent var.	0.016023
Adjusted R-squared	0.541211	S.D. dependent var.	0.060639
S.E. of regression	0.059992	Akaike info criterion	-2.783636
Sum squared resid	1.281264	Schwarz criterion	-2.761957
Log likelihood	500.2708	Hannan-Quinn criter.	-2.775014
F-statistic	8.736304	Durbin-Watson stat	2.045314
Prob(F-statistic)	0.000327		

Source: Authors' computation with the use of E-view 9.0

The result on table 3 shows the relationship between Future returns and previous returns as hypothesised in the model $y_t = a_0+y_{t-1}b+e_t$.....(2). From the table, the equation of the relationship is: y_t = 0.0135+0.1547b.....(3). Where: y is the future returns, 0.1547b is the coefficient of the previous return. Thus, the relationship between previous return (y_{t-1})and future return (y) is 0.1547b. This shows that there is a positive significant relationship between future stock return and previous return. This implies as unit rise in previous month stock return will lead to about 15% rise in the next month return. Also, a unit fall in previous return will lead to 15% in next month return. The Durbin Watson is 2.04 which indicate that there is no autocorrelation in the mode. Thus we say that the model is sound for predict purposes. The value of the R^2 (coefficient of determination) is 0.023and implies that only 0.23% of change in future stock return is explained by previous return. This explanatory power is too low to enable investor to predict the market without risk. However, the t-value is significant at 5%. Also, the F-value is statistically significant at 5%. These indicate that there is a significant positive relationship between previous stock returns and future stock returns in Nigeria. This implies that we can predict future stock returns from previous trends based on 15% positive relationship and 0.23 predictive powers.

Conclusion and Recommendations

The findings from the study has shown that the NSE was not efficient in the weak form between 1990 to 2017 but seem to improve into weak form efficient in the recent times 2011 to 2014. This means that share price movements on the Nigerian Stock Exchange

which previously do not follow the random walk pattern described by Omar (2918), has improved and is becoming efficient. The study recommends that the SEC should take a leading role in regulating abnormal financial activities in the market. Information should be provided by issuers as at when due for security valuation. Capital market regulators should ensure that information provided in the market are correct; Laws to protect investors and guard against manipulation of information in the Nigerian capital market should be promulgated and enforced.SEC should be more purposeful and aggressive in educating and enlightening the investing public on the workings and technicalities of the market while also committing to continuous training and retraining of their staff.

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Appendix 1:
ASIand Stock Market Returns of quoted companies in Nigeria (1990 to 2017).

SN	Years	ASI	(Pt/Pt-1)	Ln(Pt/Pt-1) (Stock Market Returns)
1	1990	111.30		
2	1901	112.20	1.00809	0.0081
3	1992	113.40	1.0107	0.0106
4	1993	115.60	1.0194	0.0192
5	1994	116.50	1.00779	0.0078
6	1995	116.30	0.99828	-0.0017
7	1996	117.20	1.00774	0.0077
8	1997	117.00	0.99829	-0.0017
9	1998	116.90	0.99915	-0.0009
10	1999	119.10	1.01882	0.0186
11	2000	124.60	1.04618	0.0451
12	2001	127.30	1.02167	0.0214
13	2002	134.60	1.05734	0.0558
14	2003	139.70	1.03789	0.0372
15	2004	140.80	1.00787	0.0078
16	2005	146.20	1.03835	0.0376
17	2006	144.20	0.98632	-0.0138
18	2007	147.40	1.02219	0.0219
19	2008	150.90	1.02374	0.0235
20	2009	151.00	1.00066	0.0007
21	2010	155.00	1.02649	0.0261
22	2011	160.90	1.03806	0.0374
23	2012	163.30	1.01492	0.0148
24	2013	163.80	1.00306	0.0031
25	2014	166.90	1.01893	0.0187
26	2015	166.20	0.99581	-0.0042
27	2016	161.70	0.97292	-0.0274
28	2017	157.50	0.97403	-0.0263

Source: Central Bank of Nigeria Statistical Bulletin, 2017