CAPITAL MARKET EFFICIENCY: A Test of the Strong Form in Nigeria

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ABSTRACT

The responsiveness of the market financial instruments in terms of prices to reflect market information and the inability of information privileged market participant(s) to out-perform other counterparts pose the quest to test whether the strong form of market efficiency prevail in the Nigerian capital market or not. With the extraction of the returns on 240 stocks from the database of the Nigerian Stock Exchange (NSE), a comparison was made between a constructed random portfolio and a 3-year annualized average return on the portfolios of the mutual fund industry. In this empirical study, the analysis deduced that mutual funds were unable to out-perform the random portfolios created from the index stocks, which thus implies that the strong form of market efficiency holds in the Nigerian Capital Market. Nonetheless, profound analysis on stock volatility risk is essential to avoid substantial loss in the stock market.

Keywords: *Market Efficiency, Capital Market, Nigerian Stock Exchange (NSE) Stocks, Information, Portfolio, Random Walk, Mutual Funds.*

1. INTRODUCTION

The state of the financial system is an inevitable criterion in determining the level of development in any economy. An efficient functioning of the financial system facilitates the free flow of funds to more economically productive activities, thus promoting investment. The financial system may be viewed as a multi-faced structure in which the financial institutions and financial markets constitutes its main components. The efficiency of a financial market is a function of the availability and utilization of information for making decisions on financial transactions or activities. The issue of incorporating information in the capital market has generated a large body of researches, both theoretical and empirical. Some studies focused on information known to all market participants such as earnings and announcements while others considered private information held, especially by corporate insiders.

Market efficiency connotes that a market has taken into account all information and the market prices reflect this information. Market efficiency, however does not simply occur by itself or because information is freely available in the market. As Osie(1998) opined, it depends heavily on the analytical and interpretational abilities of those who trade in the market, the time they have and are ready to devote towards obtaining and spreading price sensitive information. A market can be deemed to be an efficient one when trading on available information fails to provide abnormal profits.

It is imperative to state that market efficiency is still a hypothesis, yet to reach a generally conclusive view in support or against it despite several empirical studies. The efficient market hypothesis was introduced in the late 1960s but prior to that, the prevailing view was that markets were inefficient. Many investors believe that there could be an efficient market and they could be in different degrees. There are three forms of market efficiency hypothesis; weak form, semi-strong form and the strong form. The Nigerian capital market has the Stock Exchange as its main institution in the capital market where most of its financial activities take place. The Lagos Stock Exchange was set up in 1959 based on the report of the Barback Committee. The attempt by the Nigerian government to accelerate economic growth through the development of the capital market was aimed at providing local opportunities for foreign-based companies to offer their shares to local investors and provide avenues for the expatriate companies to invest surplus funds. Tests to empirically ascertain the extent of efficiency in the Nigerian capital market have not reached conclusive statements. Many researchers covering most developing economies of the world focused on how efficient their capital markets are both in the weak form and the semi-strong form.

Depending on whether efficiency exist in the market or not, there are both upsides and downsides to the assumptions of the strong form hypothesis of the market efficiency. For a market to be completely efficient, each investor should have equal access to earn normal profits. An efficient market is also believed to have its prices completely timely, fair and accurate in reflecting information available, making it less relevant to make careful research and analyse securities. Hence, investing in an index fund or even choosing stocks at complete random would not create any opportunity to earn a higher return than other investors in the market.

This study primarily aims at examining empirically the Nigerian Stock Exchange as it upholds the Nigerian capital market in order to test for its strong form efficiency. The strong form market efficiency implies that no market participant can enjoy excess trading profits due to monopolistic access to important information and that all information is useless. It is evident in the Nigerian case that there are several analysts, researchers and portfolio/asset managers operating in the Nigerian Stock Exchange over a period of time. The test of this degree of efficiency is based on different investment groups that may have access to important information. Such information includes the top management of a company, investment specialist, advisers and mutual fund managers in the Nigerian Capital market. If one or more of these groups can earn above average profits, the strong form hypothesis will not be valid. Some pertinent questions which this paper seeks to provide answers to include:

- To what extent is the Nigerian capital market efficient?

- Is there any portfolio manager who systematically outperforms the market?

2.   LITERATURE AND EMPIRICAL REVIEW
The Concept of Market Efficiency
If a market is efficient, no information or analysis can be expected to result in out-performance of the market benchmark. The efficient market is one where market prices react to new information instantaneously and without bias. In essence, all information about the market is useless and any analysis as regards investments in securities is irrelevant since it cannot provide for any opportunity to outperform the benchmarks in terms of returns. Even the earliest studies by Cowles (1933, 1944) demonstrated that investment professionals do not beat market.

Numerous studies in literature have proved the tendency of yielding substantial profits by insiders due privileged earlier awareness of new information in the market. This tends to make the efficiency of the capital market unrealistic. It is pertinent to consciously admit that inclusive in the Efficient Market Hypothesis (EMH), there is the possibility of earning little abnormal gains from dealings before settling expenses and fees. Other costs include certain internal fund cost involved in finding or obtaining such information and acting on them, advertising, etc. Though, investors might not expect to earn above average return but analysts could therefore still have a motivating benefits to get through acting on sensitive and valuable information. In support of this idea, the dissertation by Grossman and Stiglitz (1980) amplified further the essence of making provision for some incentive in the model of equilibrium. To make sense, the concept of market inefficiency has to admit the possibility of minor market inefficiencies. The evidences accumulated during the 1960s and 1970s include; Treynor (1965), Sharpe (1966), Jensen (1968) and Fama (1970). The basic three forms of market efficiency are the weak form, semi-strong form and the strong form.

In the weak form efficiency, investors believe that the market reflects all historical information such as prices, trading volume past financial statements, news, stories etc. a market is said to be efficient in the weak form if everyone has access to such information and no opportunity for abnormal profits. Thus, all historical information would be useless to an analyst. As historical price is reflected in current prices, this form of efficiency discredits technical analysis.

Semi-strong form means that no public information will help investor select undervalued securities. In this form of efficiency, current information is available to everyone. Hence, market prices already reflect all current available information includes balance sheets, income statements, dividends, earnings, etc.

In the strong form of market efficiency, prices including public and private reflect all information. In essence, this form of efficiency emphasizes the inability of investors to make higher profit even with earlier access to inside information. While it was cleared that markets cannot be completely efficient in the strong form, there was striking support for the weak and semi-strong forms and even for some versions of strong form efficiency that focus on the performance of professional investment managers.

3. EFFICIENCY MARKET HYPOTHESIS (EMH)

Efficient market hypothesis is the idea that information is quickly and efficiently incorporated into assets prices at any point in time and cannot be used to foretell future price movements. Consequently, three versions of efficient market hypothesis are based on the level of available information. The coming into existence of the efficient market hypothesis can be dated back to the 1960s from the Ph.D dissertation of Eugene Fama (1965). He persuasively argued that in an active market, including many well-informed and intelligent investors, securities will be correctly priced and reflect all available information.

Weak form efficiency hypothesis basically asserts that one cannot use past price changes to achieve abnormal profits out of transaction costs. Semi-strong form of efficiency hypothesis enhances information sets to include all current and publicly available information. Under this form, all publicly available information is quickly incorporated to stock prices to prevent investors trading on this piece of information from extra profits in a stock market. According to strong-form efficiency stock prices reflect all information whether publicly available or not. Strong-form efficiency implies no inside information is useful to yield excess profit in an efficient capital market by investors.

The literature review on empirical studies began with the weak form market efficiency as Fama (1970) summarized the early random walk literature, his own contributions and other studies of the information contained in the historical sequence of prices, and concludes that the results are strongly in support of the weak form market efficiency. He reviewed further a number of semi-strong and strong form test to conclude that "in short, the evidence in support of the efficient market model is extensive, and contradictory evidences are sparse".

Event study has practically risen as the basic tool for analysis of securities in a capital market. The responsiveness or speed of adjustment of market prices to current or new information has formed the basis for categorizing the test of semi-strong form of market efficiency. An event study analytically incorporates cumulative performances of securities over a comprehensive period of time. Its coverage ranges from the relative to substantial movements in security prices and reflection of behavior in terms of expectations and returns effects. The earliest event study undertaken by Fama, Fisher, Jensen and Roll (1969) demonstrated the reflection of prices, as it did not only consider direct estimates of prospective performance by the selected companies as sample but also sensitive information that would require subtle approach of interpretation.

With the use of either the Capital Assets Pricing Model (CAPM) or market model as the benchmark for performance measurement, reaction of shares prices to earnings announcements and stock splits are provided as evidences respectively. Both approaches provide price adjustments but the market's sensitivity to anticipate and reflect the available information is earlier. Another study by Scholes (1979) of the price effects of secondary offerings, he critically observed stock price movements when the seller may be in possession of non-public information and noticed that share price fell averagely by an amount that reflected the value of information. In his conclusion, he posited that there is some indication of post event price drift which may constitute a violation of market efficiency.

Using the stock market index as benchmark for portfolio on the performance of mutual funds, withholding insider information, the majority of the market test on the strong form efficiency showed that the market was efficient. Jensen (1968) evaluation of the performance of mutual funds on a study of 115 funds during 1945-1964 revealed that they were on average not able to outperform the market. His results further showed that no individual fund could beat the yields of securities chosen on random chance.

Empirical studies in the period ranging from 1971 to 1979 by Henriksson and Merton (1981),Chang and Lewellen (1984) examined the performance of 67 mutual funds. They concluded that their studies were consistent with Efficient Market Hypothesis. Similar results appeared in their researches; Henriksson (1984) evaluating performance of 116 mutual funds between 1968 and 1980 reaching the same conclusion as Chang and Lewellen (1984) those mutual funds are not able to out-perform the market.

However, Molkiel (1995) research on the performance of 724 funds from 1971 to 1991 found that most funds under-performed the market. Wermers (2000), in his study discovered that mutual funds under-performed the CRSP value- weighed market index by 1% per year for the period of 1975 to 1994, even though the stocks they managed out-performed the CRSP index by 1.3 per year. Elton, Gruber, Das and Hlarko (1993) also tested the performance of 143 funds from 1965 to 1984 and they arrived at the result that on the average, the funds underperformed.

Most dispositions that have arisen against the notion are of the opinion that markets behave more consistently with the market efficiency hypothesis more specifically in the strong forms. Scholars failed to hold onto the believe that man-made market could be efficient in the strong form when there are prima- facie reasons for inefficiency including the slow diffusion of information, the relative great power of market participants and the existence of apparently sophisticated professional investors. The responsiveness in terms of timeliness and effectiveness to unexpected information or news is perhaps a visible flaw to the validity of the efficient market hypothesis.

Nigeria, as concerned in this study could not really account for a sound medium to quickly and without bias obtain, spread and incorporate information on prices. Only a privileged few may have prior knowledge of laws about to be enacted new pricing controls set by the regulatory authorities and judicial decisions as it affects the stock market. The hands in which such information lies so therewith can advantageously make favourable decisions that could earn higher returns. Another discrepancy between the theory and real market is that at market extremes. The norm might be what fundamentalists consider as irrational behavior. The perception of a theorist might be to posit that rational (presumably powerful) participants should always immediately take advantage of the artificial high or artificial low price caused by irrational participants by taking opposing positions but this is observably not, in general enough to prevent bubbles and crashes developing.

3.1 The Nigerian Capital Market: Transformational

The development in the Nigerian Capital Market dates back to the late1950s when the federal government through its ministry of industries set up the Barback Committee to advice on ways and means of setting up a stock market. Prior to independence, financial operators in Nigeria comprised mainly of foreign owned commercial banks that provided short-term commercial trade credits for the overseas companies with offices in Nigeria (Nwankwo, 1991). Their capital balances were invested abroad in the London stock Exchange. With the enactment of the Lagos Stock Exchange Act of 1961, it commenced operation in June, 1961 and assumed the major activities of the stock market by providing facilities for the public to trade in shares and in stocks maintaining fair prices through stock-jobbing and restricting the business to its members.

The Lagos Stock Exchange was renamed as the Nigerian Stock Exchange in 1977, with the following objectives;
1) To provide facilities to the public in Nigeria for the purchase and sale of funds, stocks and shares of any kind and f or the investment of money.
2) To regulate the dealings of members interests and those of their clients.
3) To control the granting of a quotation on the stock exchange in respect of funds, stocks and shares or any company, government, municipality local authority or other corporate body.
4) To promote, support or propose legislative or other measures affecting the afore-mentioned objectives.

According to its memorandum and article of association, the exchange is incorporated as a non-profit organization limited by guarantee to undertake three basic functions, which include;
1) Providing trading facilities for dealing in securities listed in it.
2) Oversee activities relating to trading in securities.
3) Enhancing the flow of long-term capital into productive investments and ensuring fairness of prices at which securities are traded.

Initially, traded activities commenced with two federal government development stocks, one preference share and three domestic equities. The market grew slowly during the period with only six equities at the end of 1966 compared with three in 1961. Government stocks comprised the bulk of the listing with 19 of such securities quoted on the exchange in 1966 compared with six at the end of 1961 (Nnanna, Englama and Odoko, 2004). As a result of the slow expansion in the stock exchange stocks and its inability to sufficiently to cater for the needs of local investors especially indigenous businessmen who wished to raise capital for their businesses, the Nigerian stock exchange introduced the Second-Tier Markets (SSM) in 1985 to provide the framework for the listing on this segment of the stock market by 1988 and by 2002 over twenty-three companies had availed themselves of the opportunities offered by this market (Nnanna, Englama and Odoko, 2004).

The major instruments/products available in the Nigerian Capital Market to date include; the industrial equities otherwise referred to as ordinary shares; industrial loans such as debentures, unsecured zero coupons preference bonds/stocks, specialized project loans/infrastructural loans, government stocks/bonds, unit trust schemes, unlisted corporate/industrial loans stock among others. The market is currently divided into two broad categories, namely equities and debt markets. The former are instruments or products that confer ownership rights on the investors while the latter are interest-bearing obligations with fixed or floating interest rates.

4. RANDOM WALK HYPOTHESIS

A comprehensive knowledge of assumptions and observations prominent in efficient market hypothesis in line with price formation in competitive capital market, consistency is evident with the random walk hypothesis except for some notifications specified by Samuelson (1965), whose proof that Properly Anticipated Prices Fluctuate Randomly began with the observation that "in competitive markets there is a buyer for every seller. If one could be sure that a price would rise, it would have already risen." *Samuelson further posited that "arguments like this are used to deduce that competitive prices must display price changes … that perform a random walk with no predictable bias."*

Samuelson explains that "*we would expect people in the market place, in pursuit of avid and intelligent self-interest, to take account of those elements of future events that in a probability sense may be discerned to be casting their shadows before them."* The prescriptions attributed to a well-functioning market were presented in Samuelson's proof. However, there is still ambiguity as to whether these results ought to be seen as obvious or surprising, nor was it clear to Samuelson who asserted that "*the theorem is so general that I must confess to having oscillated over the years in my own mind between regarding it as trivially obvious (and almost trivially vacuous) and regarding it as remarkably sweeping. Such perhaps is characteristics of bad results"*

4.1 Stock Market Anomalies

The utilization of the price per earnings ratios to forecast stock returns and make it reflect on stock prices did not gain importance until the1980s. With coverage of 1400 firms over a period 1956-1971, Basu (1977) applied price/earnings (P/E) ratio to forecast their stock returns. He observed that the low P/E securities out-performed their high P/E counterparts by more than seven percent per year. Though his results could be interpreted to pose a challenge to the CAPM benchmark that he employed, Basu's result is an indicative of market inefficiency: *"securities traded at different multiples of earnings, on average, seem to have been inappropriately priced vis-a-vis one another and opportunities of earning abnormal returns were afforded to investors."*

Other publications of researches identified the use of size-related regularities in returns alongside P/E ratios as useful analytical tool to make higher gains (see Schwert, 1983; Dimson and Marsh, 1989, 1989). Other hypothetical assumed approach is the study of long-run performance of new issues as documented by Ritter (1991) and Loughran and Ritter (1995).

Anomalous behaviour may be seen as an indicator of market inefficiency on one hand while on the other hand the regularities in returns still could be an indicator of the shortcomings in the underlying Capital Asset Pricing Model. On the latter, it is possible even if there are no biases or error like misestimating the computed abnormal returns.

5. METHODOLOGY

With the aim of testing the Nigerian capital market to ascertain whether it is efficient in the strong form or not, this study intend to examine the returns provided by diversified equity funds of various mutual funds and the returns offered by the randomly constructed portfolios without an advocacy to any inefficiency in mutual funds. To achieve this, a comparison is set between the returns of the highest and lowest returns of the mutual funds and that of the randomly constructed portfolios of stock index in order to know which one out-performs the other.

The model adopted in this research is a modification of the model put up in the work of Deepak Gupta, Arti Anand, Rohini Singh (2010). They researched on "Empirical testing of strong form of market efficiency in turkey" and their study supported the strong form of efficient market hypothesis. The hypotheses proposed are:

$H_{o:}$ μ = *is the null hypothesis (There is no difference)*
H_1: μ = *is the alternative hypothesis (There is difference)*

For the purpose of this study, stocks were chosen from 2003 to 2007. Data for 251 stocks was extracted from the database of Nigerian Stock Exchange (NSE). Prices at the beginning and end of the financial year were collected for 2008, 2009, 2010. Stocks for which the data was not available were excluded for further analysis. After excluding eleven (11) stocks, the remaining 240 stocks were used for further analysis. The standard error test of the parameter significance has been used for calculating the significance. The data pertaining to mutual funds was taken from Hard Castle Data Management Services and these were ranked in the descending order of their returns i.e. rank one was given to the mutual fund scheme having the highest return, rank two for the mutual fund scheme having the second highest return and so on.

Daily observations of the Nigerian Stock Exchange Composite Index (NSECI) are employed to investigate informational efficiency of the Nigerian Stock Exchange. NSECI is a weighted index using the closing prices of stocks published by the NSE. Daily index numbers provided by the stock exchange and the central bank of Nigeria ranges between January 2008 and December 2010. The Ordinary Least Squared (OLS) assumptions applied in all tests.

$$R_t = \log (I_t/I_{-1}) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

Where I_t = NSECI

R_t = Return on the NSECI on day t, respectively

The theory behind random portfolios adopted in this analysis is that, as the prices of securities reflect all the available information, whatever the price they are quoted, they are quoted at intrinsic worth. Hence, any share is a good share. Therefore, stocks are picked randomly using "rand between" function of Microsoft excel and the stocks were finally grouped into 6 portfolios. The stocks were arranged in alphabetical order and a code number was given to each stock. The code was 1 for the first stock in the list, 2 for the second stock in the list and so on. In a similar manner, 30 random numbers were granted and were then matched with the corresponding stocks to form a portfolio. Thus, (i) three random portfolios, with 80 stocks in each portfolio, (ii) 2 random portfolios with 60 stocks in each portfolio and (iii) 1 random portfolio with 100 stocks in each portfolio were constructed. Subsequently, the returns of the portfolio were computed using the share price at the beginning and at the end of the financial year. Average return on the portfolio was calculated by summing up the individual returns of the portfolio of the year.

6.   ANALYSIS AND DISCUSSION
This section presents the results of the findings while the interpretation and discussions were logically presented. Regression for categorical data was used to estimate the data.

Coefficients

	Standardized coefficient		Degree of Freedom	F- Stat	significance
	Beta	Bootstrap (1000) estimate of standard error			
PF1	-.294	.085	2	12.109	.000
PF2	-.169	.133	1	1.606	.207
PF3	-.221	.164	2	1.812	.167
PF4	.293	.223	1	1.738	.189
PF5	.030	.146	2	.042	.959
PF6	.483	.140	3	11.817	.000

Dependent Variable Mutual Fund index

From the foregoing, the beta coefficient (β) which shows the volatility of stock returns with respect to market returns is negative for portfolio 1, 2 and 3, while portfolio 4, 5 and 6 are positive but with low significance. The beta for each of the constructed portfolio is stated below:

MFs and random portfolio 1, β = -0.294
MFs and random portfolio 2, β = -0.169
MFs and random portfolio 3, β = -0.221
MFs and random portfolio 4, β = 0.293
MFs and random portfolio 5, β = 0.30
MFs and random portfolio 6, β = 0.483

All the values are far lower than the market beta coefficient, likewise in excess of critical value of the T-Test coefficient using the standard error test. Thus, it implies that there is a highly significant difference between the means of mutual funds scheme and the random portfolio 2,3,4 and 5 while mutual fund schemes and random portfolio 1 and 6 perform slightly better. Therefore, null hypothesis is rejected which states that there is no significant difference in the means of two samples, i.e. random portfolios and mutual funds schemes. It implies that mutual funds were unable to out-perform the random portfolios created from index stocks. Hence, the strong form of market efficiency holds in Nigerian capital market.

7. SUMMARY AND CONCLUSION

In view of testing the strong form market hypothesis, this paper stands to uphold its possibility in the Nigerian capital market as the results in this study proves that mutual funds managers with access to sophisticated tools and superior information (even insider information) were not able to out-perform randomly selected portfolios of index stocks. This research work therefore appear as empirical source with proof in line with some existing studies on the efficiency of the capital market in the strong form covering a reasonable sample of the mutual funds in Nigeria.

Hence, it is evident that mutual funds do not out-perform passive methods such as investing in the index stocks. In this study, investing in a random portfolio of stocks generated more return when compared to the returns generated by investing in the equity-oriented mutual fund schemes. It implies that no special expertise is required for investing in the stock market and investors need not pay a premium for these funds in the form of paying entry load, exit loads and other management charges. Though, other theories have shown that insiders of corporations appear to be able to earn abnormal returns from their trades. On average, price increases just after insiders purchase the stock and decrease just after they sell the stock. Conclusively, prices in the market react to public information that had been private and efficiency can be realized there from.

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EXTERNAL LINKS

- Efficient Market Hypothesis Summary; Web page by Alvin Han (Oxford Brooks University) with extensive bibliography.
- "Earnings Quality and the Equity Risk Premium: A Benchmark Model" Abstract from Contemporary Accounting Research
- "Does EMH provide an evidence against trading" paper by Edward Ng Hon Khay (National University of Singapore) and Paolo Nalin (McGill University)
- Stock Market Technical Publications