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An Empirical Analysis of Efficiency of the Nigerian Capital Market

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Abstract
This study investigates empirically the efficiency of the Nigerian Stock Market and to test whether professionally managed funds beat the market index or not. The average monthly returns data of five banks over the period 2007 to 2011 were used.
The "market model" for estimating residuals was used to test the efficiency of the Nigerian Stock Market. The abnormal return of the professionally managed portfolio is found to be insignificantly different from zero. The result indicates that the Nigerian Stock Market is efficient in the strong form. The results from our findings thus recommend fully computerisation of the Nigerian Stock Exchange and Stock broking firms so that effective communication system; and timely, quick and instant access to price-sensitive information to maintain the strong form efficiency of the Nigerian Stock Market.
Keywords: Efficient Market Hypothesis, Abnormal profit, managed funds, stock market crash, public information.

Introduction

The capital market is a financial market in which long term capital are sourced for. Its purpose is to transfer funds between lenders and borrowers efficiently. Norman (1957) stated that "the more efficiently the stock exchange functions, the more readily can those with savings on hand buy variable price securities, and more easily can they sell them when they need to". Thus both borrowers and lenders are better off if efficient capital market is used to facilitate fund transfers. According to Pandey (2002), the security prices in the capital market have been observed to move randomly and unpredictably, implying that investors in the capital market take a quick cognizance of all information relating to security prices, and that security prices quickly adjust to such information. The more the speed of adjustment to any available information the more efficient the price.
An efficient capital market is that in which recent new information is freely, quickly and accurately disseminated to interested parties and market participants, and share prices fully and instantaneously reflect all available relevant new information. This means that when assets are traded, prices are accurate signals for capital allocation (Copeland and Weston (1992); James and Netter (2002), Ross (1997), Omolehinwa (2001) expressed more formally, market efficiency means that the anticipated portion of the return earned on a security is unpredictable and, over efficient number of observations, does not differ systematically from zero (Van Horne, 2002).
As stated Sharpe, Alexander and Bailey (2000), market is efficient with respect to a particular set of information if it is impossible to make abnormal profits by using this set of information to formulate buying and selling decisions. However, there has been a little actual testing of the speed of adjustment of parties to specific kinds of new information (Fama, Fisher, and Roll 1969).
Fama (1970) thus classified the capital market efficiency into weak form, semi-strong and strong form efficiency; each of which is based on a different notion of exactly what type of information is understood to be relevant in the phrase "all prices fully reflect all relevant information''. The weak form efficiency is concerned with the adjustment of security prices to historical price information. The semi strong efficiency is concerned with the adjustment of share price to public information such as published new issue, accounting changes, earnings announcement, stock split, e.t.c. the strong form efficiency is concerned with the adjustment of share prices to all types of information whether publicly available or not.
Thus, if the capital market is efficient relative to given information set, no individual with access to such information can make excess or abnormal returns by trading on them (Fama 1970; Olowe, 1990; Oloyede 2001). According to Olowe (1998) the same rate of return for a given level of risk should be realized by all investors in an efficient market.
However, certain anomalies such as the January effect (tendency for firms with small capitalization to have abnormally high returns in the first five days of that month) and speculative bubbles (as a result of stock market crash, rapid decline in technology stocks etc) among others tend to question the efficiency of the capital market. The stock market crash of 1987 when it went into free fall losing 20% in few hours for no apparent reason is not

consistent with market efficiency (Van Horne, 2002: Ross, Westerfield and Jaffe, 1996).
The empirical test of capital market efficiency began even before Engene Fama (the father of finance) of the University of Chicago offered a theory in 1970. Most of the empirical research on stock market efficiency of some countries such as U.K and U.S. reveal that their capital market are efficient in semi-strong form (Fama, Fisher, Jensen and Roll, 1969; among others); while some reveals strong efficiency (Jensen, 1968; Detzler and Wiggin, 1997), other show strong inefficiency (Annaert, Var Den Broeck and Vennet, 2001; Dan, Mayers and Raab, 1977).
This study focuses on the Nigeria capital market. The empirical research, though few that have been conducted on the efficiency in the weak form and inefficient in the semi-strong form (Olowe, 1999). Specifically, this study aims at testing the strong form efficiency of the Nigeria capital market.

LITERATURE REVIEW

This focuses on the strong form efficiency of the capital market. Under the strong form, all information–even apparent company secrets-is incorporated in security prices; thus no investors can earn excess profit trading on public or non- public information. (Jones and Nether, 2002). This was buttressed by Omolehinwa (2001) who said that if the strong form efficiency exists, prices might not move at all when new information is publicly announced as the market will already be aware of the information prior to public announcement and would have already reacted to the information. This is consistent with the position of Ross, Westerfield and Jaffe (1996).
Pandey (2002) considered the strong form efficiency as a significantly strong assertion and that empirical studies have not borne out the strongly efficient market hypothesis. It is very difficult to believe that those with true values inside information will not earn superior returns by trading on it. Some studies (Jaffe, 1974; Copeland and Weston, 1992; Finnerty, 1976) have proved those insider are able to make abnormal profit. One of the interesting implications of the empirical work on insider trading is that it is consistent with the point of view that markets do not have aggregate information.
According to Omolehinwa (2001), the timing of new issue, which is irrelevant when the market is efficient, could be relevant when considering inside information; since companies that have some bad news which have not been released to the public can take advantage by issuing new shares before the release causes the share price to fall. Also, the possession of inside information could enable a company to identify an undervalued company while considering merger or takeover. (Brealey and Myers, 2000; Omolehinwa, 2001).
Olowe (1998) asserted that in a company where there is no stiff action on insider trending, management withheld unfavourable information about their company could defraud investors. Ross, Westerfield and Jaffe (1996) reported that a U.S. government agency, the security and exchange commission, in a quest to and regulate inside trading requires insiders in companies to reveal any trading they might do in their own company's stock. By examine the record of such traders; one can see whether they made abnormal profits.
Bauman (1999) gave the summary of "Marsden's electronic trading model to help curb insider trading". He said that to eliminate the insiders' significantly excess profits, electronic communication was introduced to enable traders to easily track each other's stock orders. Thus, if one trader had inside information about a company and put it in a large purchase order for stock, the computerized system will enable other traders to observe this activity and modify their trading activity accordingly. This creates a level playing field and makes it difficult to illegally profit from insider trading.

Test of Strong Form

A direct test of strong form efficiency is whether or not insiders with assess to information that is not public available cannot outperform the market (Copeland and Weston, 1992). Tests of the strong form efficiency hypothesis have examined the recommendations of professional security analysts and have looked for mutual funds or pension funds that could predictably outperform the market (Brealey and Myers 2000). These tests consist of analyses of the performance of professionally managed portfolios. Some researchers have found a slight persistent out-performance, but just as many have concluded that professionally managed funds fail to recoup the costs of management.

Empirical Evidence

Jensen (1998) studied the performance of 115 mutual funds, using annual data between 1955 and 1964. The result of his work shows that on the average, the mutual funds were not able to predict security prices well enough to outperform a buy-and-hold strategy. There was a little evidence that any individual fund was able to beat the market. This tends to show that the strong form of efficient market hypothesis hold. Detzler and Wiggins (1997) studied the performance of 35 actively managed international funds using 111 monthly returns. They used a multi- index benchmark. Their result suggests that these funds exhibit no significant performance persistence.
Carhart (1997) also conducted a study on the persistence in mutual fund performance. He used the average annual returns on 1493 U.S mutual funds and the market index for the period 1962-1992. He noticed that mutual

funds under perform the market in approximately half the years. However, mutual funds beat the market in some years, but as often as not it was the other way round. One can thus infer from this that smarter managers can earn superior profits, but it seems difficult to spot the smart ones. In a further study by Jensen (1969), he plotted the average return and beta of different mutual fund managers over the period 1955-1964. The evidence of this study suggested that about half of the mutual funds outperformed the standard and poor composite index and about half under performed the index. This evidence is therefore consistent with the market efficiency. Guy (1978) while examine the effects of international diversification of portfolios discovered that the British trusts do not significantly out perform the London stock exchange nor randomly selected portfolios of U.K. and U.S. stock.

Most mutual funds do claim to be able to use their professional expertise to earn abnormal returns through successful prediction of future security prices. This was looked into by Howe and Pope (1996). They investigated the usefulness of Forbes equity fund performance ratings in predicting future mutual fund returns for the period of "September 1974 through August 1990", using the correlation analysis. Their result shows that Forbes equity fund rating show some ability to predict the fund's beta over virtually every period examined, while it is of little use in predicting future fund performance.

Brealey and Myers (2000) and Ross, Weston and Jaffe (1996) asserted that evidence on strong-form efficiency has proved to be sufficiently convincing that many professionally managed funds have given up the pursuit of superior performance; they simply "buy the index", which maximizes and minimizes the cost of managing the portfolio.

The traditional efficient market hypothesis paradigm was critically re-examined by Russel and Torbey. They emphasized that the dynamics of stock market behaviour would perhaps be best advanced by adopting a multi-disciplinary approach that incorporates both qualitative and quantitative research tools. They thus proposed that the popular efficient market hypothesis paradigm be refined to embody the psychological and speculative aspect of the stock market.

Annaert, Vanden Broek and Vennet (2001) studied the determinants of mutual fund performance using the Bayesian Stochastic frontier approach. Their analysis of the European equity funds over the period 1995-1998 reveals that size and historical performance are related to fund efficiency and fail to find a link between fund age and performance. Also, they find no relationship between efficiency and historical return in the top 80% of funds. This is in line with the fund performance persistence in literature.

In order to provide the strongest test of market efficiency, Dann, Mayers and Raab (1977) collected continuous transaction data during the day of a block trade for a sample of 298 blocks with large prices declines between July 1968 and December 1969. Their report shows the possibility of earning excess rate of return even after adjusting for risk, transaction costs and taxes. They thus interpreted this as evidence that the capital market is inefficient in the strong form. This is consistent with the position held by Copeland and Weston (1992) about individuals who participate at the block price. Individual who are notified of the pending block trade and who can participate at the block price before the information becomes publicly available do in fact appear to earn excess profits.

Abnormal returns computed from the market model indicate that insiders are able to "beat the market" on a risk-adjusted basis, both when selling and when buying, indicate that the strong form efficient market hypothesis does not hol (Jaffe, 1974 Finnerty, 1976; Copeland and Weston, 1992).

According to Grossman (1980) and Main (1977), investors who utilize costly information will have higher gross rates of return than the uninformed investors. However, if the capital market is efficient in the strong forms, the net rates of return for the informed investor after paying for the information would equal to the rate of return of the uninformed investors. This is what Bauman (1999) referred to as a level playing field. Considering the Nigerian case, Unugbu (2003), stated in a write-up, that in spite of the activities of these regulatory institutions (SEC and NSE), some under-the-table activities still abound in the market.

However, Osinbajo (1991) said that the evidence on the existence of insider trading in the Nigerian capital market is hard to come by, either because of its present level of trading activities or the level of some sophistication of the market. Also, Okereke-Onyiuke (1994), based on the outcome of a conference held by SEC on "Insider Dealing" in 1991, asserted that there have been no recorded cases of insider dealings in the Nigerian capital market. This she said was as a result of the effective supervision and policing of market operators by both SEC and NSE. The problem therefore is that these seminar presentations and write-up are not backed up with empirical evidence.

DATA SOURCES AND RESEARCH METHODS

The quoted stock prices of companies were extracted from the monthly stock market review for the period August 2007 to January 2011 (42 months). Companies that did not have their stock prices quoted for these consecutive 42 months were not included in the stock prices collection. Only 28 companies satisfy this

condition. Also, 5 banks out of the 28 companies were used as case study.

Stock Returns: The monthly stock prices of each of the 28 companies were used to obtain their monthly stock returns over the period August 2004 to January 2006. For a given security, the return is calculated thus:

$$R_{jt} = \frac{P_{jt} - P_{jt-1}}{P_{jt-1}}$$

Where R_{jt} = Return on security of company j in month 't'
P_{jt} = Quoted price of the security of company j for month 't'
P_{jt-1} = Quoted price of the security of company j for month 't'

Stock Market Return: An equally weighted portfolio is used as proxy for the stock market return (R_m). The market return of each month was obtained by taking the average of the 28 companies' security returns.

Model Specification

The residual methodology is employed with residual analysis as a test of efficiency. The market model is used for estimating residuals:

$R_{jt} = \alpha_j + B_j R_{mt} + e_{jt}$
Where R_{jt} = observed amount of security 'j' in month't'
R_{mt} = Stock market return in month 't'
α_j and B_j = OLS estimates from the regression of stock returns on market return over the estimated period.
E_{jt} = AR_t = Abnormal return for month 't'

Statement of Hypothesis

H_o : Professionally managed portfolio insignificantly outperforms the market index.
H_1: Professionally managed portfolio significantly outperforms the market index.

Test of Hypothesis

Student't' test will be used to test if the difference between the professionally managed portfolio return and market return (i.e. Abnormal Return) is significantly different from zero.

H_o: $AR = 0$
H_1: $AR \neq 0$

$$t = \frac{\overline{AR}}{Sd/\sqrt{n}}$$

Where $Sd = \sqrt{[\Sigma d^2 - ((\Sigma d)^2/n))/(n-1)]}$

$$AR_t = \sum_{t=1}^{n} [R_{jt} - E(R_{jt})]$$

AR_t = Abnormal Return for month 't'
$\overline{AR}$ = Average Abnormal Return for the period under study
Sd = Standard Deviation of the AR
R_{jt} = Actual Security 'j' returns for month 't'
$E(R_{jt})$ = Expected Security 'j' returns for the month 't' computed from the OLS regression model ($E(R_{jt}) = \alpha_j + B_j.R_{mt}$)

DISCUSSION OF FINDINGS

From the regression equation, a 1% change in market return will lead to 1.0063% change in the security 'j' return; and when there is no change in the market return, the 'j' return will still change by 0.0052%. Since α_j is positive (0.0052), then after adjusting for risk and for movements in the market index, the abnormal performance is also positive. However, the value of α_j (0.0052) is very near to zero and thus suggesting an insignificant out performance of the professionally managed fund.

The beta of 1.0063, though greater than 1, is very close to 1. This implies that the return on managed fund just slightly varies more than proportionately with the market return.

The coefficient of determination (R^2) indicates that stock return on the average explained 37% of variability in the managed fund returns. The correlation coefficient (r), 0.61, indicates a positive significant but not very strong relationship between the market returns and the managed fund returns.

Testing the significance of 'r' at 16(n-2) degrees of freedom with 5% significance level, the calculated t for r is less than the tabulated t for r (0.3065 < 2.120). The calculated t for r falls within the acceptance region, indicating that 'r' is not different from zero.

Also, testing for the significance of abnormal returns (AR) at 17(n-1) degrees of freedom with 5% significance level, the calculated 't' is found to be less than the critical values of 't' (0.0017 < 2.110). That is, the calculated

't' falls within the acceptance region. This evidence shows that AR is not different from zero. This proves the validity of the Fair Game Model that stated that on the average across a large number of samples, the expected return on an asset equals its actual return.

More so, fig. 1 shows that there is linear relationship between R_{mt} and R_{jt} fig. 2 shows that Cumulative Abnormal Return over the period under study. It shows that the security prices adjust to new information. Fig. 3 and 4 show he relationship between Market Return, $E(R_{jt})$ and R_{jt}. The actual security prices slightly outperform the return and expected security return only in 8 months out of 42 months of study. This thus, confirms the strong form efficiency of the Nigerian Stock Market.

Based on the above results, it is discovered that though the professionally managed fund returns slightly outperform the market return, there performance is not statistically significant at 0.05 significance level. The out performance is thus due to chance. This finding supports those of Jensen (1968); and Detzler and Wiggins (1997).

Since, there is little evidence that professionally managed portfolio is able to beat the market index consistently, the strong form hypothesis of market efficiency tends to hold. This suggests at many professionally managed fund have given up the pursuit of superior performance and simply 'buy the index' which maximizes diversification and minimizes the cost of managing the portfolio.

CONCLUDING REMARKS

This study investigates whether the Nigerian stock market is efficient in the strong form. That is whether the quoted securities prices on the Nigerian stock market adjust to all available information. This will implies that no investor will be able to make abnormal return, trading on inside information.

A sample of five banks was used to determine if they outperform the Nigerian stock market index consistently. It was discovered that on the average, these banks are not able to beat the market consistently. Thus, the Nigerian stock market appears to be efficient in the strong form. Therefore, H_o will not be rejected.

This result therefore provides an empirical evidence to the assertion of Osinbanjo (1991) and Okereke-Onyiuke (1994) that there had been no recorded cases of insiders dealings in Nigeria and that is why it does exist in less obvious forms, the magnitude of its occurrence is very minute. This indicates the effectiveness of the supervision and policing of market operator, though various code of conduct and penalties for contravention, by both Securities and Exchange Commission and Nigerian Stock Exchange.

However, the result of this study is not consistent with the findings of Olowe (1999). The question is how can the Nigerian stock exchange be efficient in the strong form while it is not efficient in the semi-strong form? This may be due to the fewness in the number of months that was studied or the technique used. According to Iyiegbuniwe (1999) a major limitation of residual analysis for accessing the impact of information on security price is that it cannot discriminate among the respective information contents of multiple information variables. He thus suggested information theory (IT) as an alternative methodology. Therefore, further research is therefore suggested to validate the finding of this study.

Notwithstanding, based on the empirical findings, this study recommends that more efforts should be geared towards making all investors having timely, quick and instant access to price–sensitive information. This will lead to security pricing efficiency, as security prices will fully reflect all the available information. Nigerian investors also need to be educated about interpreting financial information that may likely affect share prices. SEC and NSE should ensure that the penalties for contraventions are effected on any one who tries to take an undue advantage of the market. Also, the NSE and all the market operators should be fully automated/computerized, this will help to maintain the efficiency of the Nigerian Stock Market.

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APPENDIX

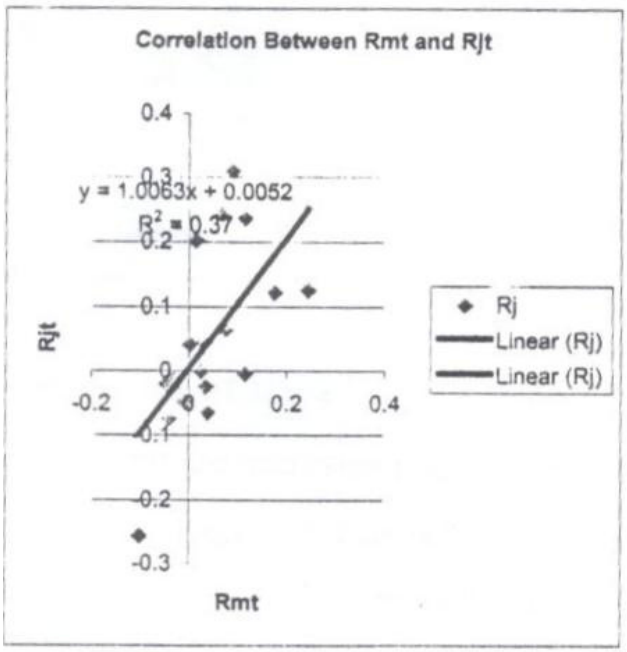

Fig 1

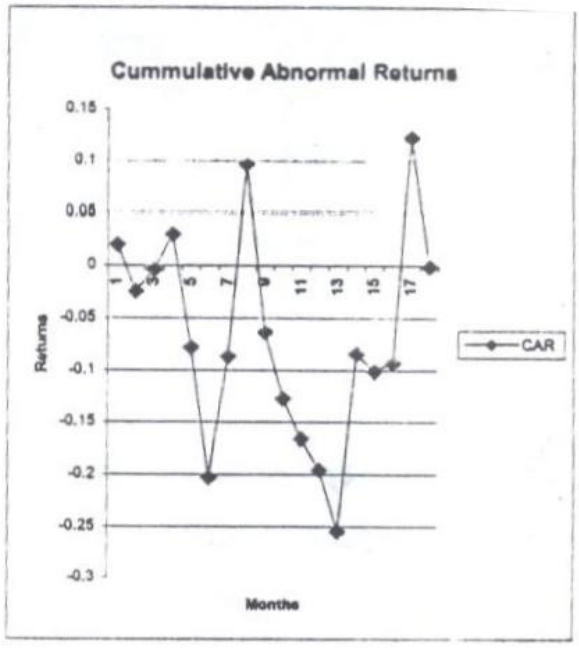

Fig 2

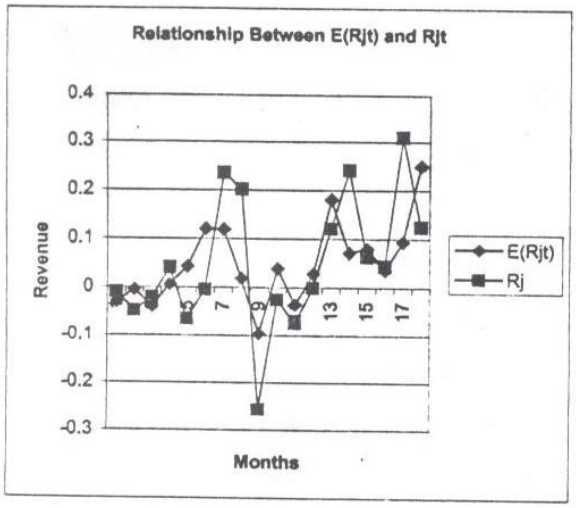

Fig 3

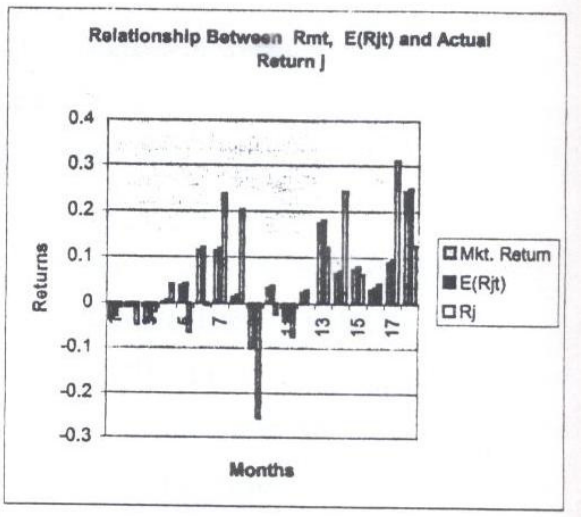

Fig 4

EMPIRICAL RESULTS

Summary of Results

$R_{jt} = 0.0052 + 1.0063\ R_{mt}$

$\alpha_j = 0.0052$

$B_j = 1.0063$

$R^2 = 0.37$

$r = 0.61$

Calculated t for r = 0.3065, tabulated t for r = 2.120

Calculated t for AR = 0.001676, tabulated 't' for AR = 2.110