A Test of Fama's 1991 Efficient Capital Markets II Positions in the Nigerian Capital Market

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Abstract

This paper test Fama's 1991 efficient capital market ii positions in the Nigerian capital market using event study with the aid of non-parametric tests. Using Wilcoxon Signed- Ranks Test, a non-parametric test, this paper investigates the significance relationship between stock prices before August 2010 when the Director-General of the Nigerian Stock Exchange was removed and stock prices after August 2010. This result is consistent with the theoretical postulation that capital market is efficient when the stock prices are capable of reflecting all relevant and publicly available information. The study revealed that the removal of the Director-General of Nigerian Stock Exchange has a significant effect on the stock prices in the Nigerian capital market. The result is consistent with the findings by (Charest, 1978), (Ahrony and Swary, 1980), (Asquith and Mullins, 1983), (Barber and Lyon, 1996) and (Kothari and Warner, 2001)

I. Introduction

The term market efficiency in capital market is used to explain the degree to which stock prices reflect all available, relevant information. Efficiency of equity markets has important implications for the investment policy of the investors. If the equity market in question is efficient researching to find miss-priced assets will be a waste of time. In an efficient market, prices of the assets will reflect markets best estimate for the risk and expected return of the asset, taking into account what is known about the asset at the time. Therefore, there will be no undervalued assets offering higher than expected return or overvalued asset offering lower than the expected return. All assets will be appropriately priced in the market offering optimal reward to risk. Hence, in an efficient market an optimal investment strategy will be to concentrate on risk and return characteristics of the asset or portfolio. However, if the markets were not efficient, an investor will be better off trying to spot winners and losers in the market and correct identification of miss-priced asset which will enhance the overall performance of the portfolio (Rutterford, 1993).

The concept of efficient market hypothesis is based on the arguments put forward by Samuelson (1965) that anticipated price of an asset fluctuate randomly. Fama (1970) presented a formal review of theory and evidence for market efficiency and subsequently revised it further on the basis of development in research (Fama, 1991). The focus of this paper is to test Fama's 1991 efficient capital market II position using event study. Efficient market hypothesis and event study have been studied over the years. A number of studies have examined whether markets are efficient with respect to the announcement of the purchase or sale of securities (Kraus & Stoll 1972), (Grier & Albin 1973), (Kothari & Warner 2001), (Brown & Warner 1980), (Brown & Warner 1985), (Barber & Lyon 1996), (Barber & Lyon, 1997), (Kothari & Warner 1997) and (Dodd & Ruback 1977). In general, these studies find that capital markets are efficient. Other studies carried out by (Pettit, 1972), (Watts, 1973), (Charest, 1978) (Ahrony & Swary, 1980) and (Asquith & Mullins, 1983) have variously found from their study that with dividend announcement as an event in capital market, the capital market was efficient.

Although, studies on event study with political event might exist in Nigeria, but there are no studies that have employed political event study with the aid of non-parametric test using Wilcoxon signed- ranks test. Hence this study is an attempt to fill this gap.

The main objective of this study is therefore to examine the meaning of Capital market efficiency and its forms, review Fama's 1991 efficient capital market II position and to empirically test it in the Nigerian capital market using event study. This paper is divided into five sections including this introductory part, section two reviews some basic literature relevant to the study, section three presents the methodology, section four deals with data presentation and the analysis of results and section five concludes the work.

II. *Literature Review*

The Meaning of Capital Market Efficiency

In an efficient capital market, security prices react instantaneously unbiased to impound new information in a such a way that leave no opportunity to market participants to consistently earn abnormal return (Mahdi, 2006). The primary hypothesis for capital market efficiency is that stock prices accurately and quickly reflect all available information in such a way that no one can earn abnormal return. The time for the adjustment for any new information is considered a critical factor; if the market adjusts more rapidly and accurately, it is considered more efficient. Dyckman and Morse (1986) state "A security market is generally defined as efficient if (1) the price of the security traded in the market act as though they fully reflect all available information and (2) these prices react instantaneously, or nearly so, and in unbiased fashion to new information".

The securities prices have been observed to move randomly and unpredictably. This randomness of security prices may be interpreted to imply that investors in the capital market take a quick cognizance of all information relating to security prices, and that the security prices quickly adjust to such information. Thus the efficiency of security prices depends on the speed of price adjustment to any available information. The higher the speed of adjustment, the more efficient the price is. Capital market efficiency may therefore be defined as the ability of securities to reflect and incorporate all relevant information in their prices (Pandy, 2004). According to Chandra (2004), an efficient market is one in which the market price of a security is an unbiased estimate of its intrinsic value. Market efficiency is also defined in relation to information that is reflected in security prices. According to Reilly and Brown (2000) an efficient capital market is one in which security prices adjust rapidly to the arrival of new information and therefore, the current prices of securities reflect all information about the security. Similarly, Samuels and Wikes (1980) defined an efficient market as one in which prices of traded securities always fully reflect all publicly available information concerning those securities. Reilly (1980) defined efficient market as one in which security prices adjust rapidly to the infusion of new information, and current stock prices fully reflect all available information including the risks involved. In addition, Brockington (1980) sees an efficient market as one that assimilates and responds to new information so rapidly that there is no source of information which will enable an individual investor to gain permanent advantage over others.

Forms of Capital Market Efficiency

The phrase "efficient market" used to describe the market price that fully reflects all available information was coined by Fama (1970). Furthermore, he classifies the market efficiency into three levels on the basis of the information; weak, semi- strong and Strong forms.

Weak Form Market Efficiency

The security prices reflect all past information about the price movements in the weak-form of efficiency. It is, therefore, not possible for an investor to predict future security price by analyzing historical prices, and achieve a performance (return) better than the stock market index such as the Bombay Stock Exchange Share Price Index or the Economic Times Shares Price Index. It is so because the capital market has no memory, and the stock market index has already incorporated past information about the security prices in the current market price.

How does one know that the capital market is efficient in its weak form? To answer this question, we can find out the correlation between the 'security prices over time.' In an efficient capital market, there should not exist a significant correlation between the security prices over time. Most empirical tests have shown that there exists serial independence between the security prices over time. An alternative method of testing the weakly-efficient market hypothesis is to formulate the trading strategies using the security prices and compare their performance with the stock market performance.

The capital market will be inefficient if the investor's trading strategy could beat the market. Researchers have studied a large number of trading rules, and have concluded that it is not possible for investors to outperform the market.

Several studies address the issue of whether stock price behaviour is a random walk or not. Robert (1959) and Osborne (1959) found that stock price behaviour is a random walk." The random walk hypothesis simply states that at a give point in time, the size and direction of the next price changes is random with respect to the knowledge available at that point in time (Dyckman and Morse, 1986). The argument that stock price change is random does not mean that stock price changes without any reasons; there is a reason for such movement, which has been the subject of empirical research for over a decade.

Semi-Strong Form Market Efficiency

The market is efficient in semi strong form if the security prices reflect not only the information that contains the past time series of stock prices but also all publicly available information. This means that the stock price is adjusted rapidly and in an unbiased way to all public announcements in newspapers, journals corporate forecasting and annual reports (Abeyratana, Lonie, Power, & Sinclair (1993). This implies that investors will not be able to outperform the market by analyzing the existing company-related or other relevant information available in, say the annual accounts, or financial dailies/magazines (Business Times). In fact, such publically available information is already impounded in the current security prices. For example, if a company increases its dividend rate, one can study the speed with which the price of the company share is adjusted to this information. The semi-strong efficient market hypothesis implies that the share price reflects an event or information very quickly, and therefore, it is not possible for an investor to beat the market using such information.

How can we establish that capital market is semi-strong efficient? Researchers have employed event studies to study the semi-strong form of the market efficiency. One can study the effect of events such as the earnings/dividends announcements, bonus issues, rights issues, changes in accounting policies, political event. The tests for semi-strong market efficiency were performed by examining the market reaction towards financial accounting report and accounting announcements or non-accounting announcements.

Strong-Form Market Efficiency

The strong form of market efficiency occurs if the stock price reflects all public and private information. This form is the most comprehensive case and testing efficient market hypothesis in strong form is very difficult, because private information is difficult to observe. In the USA there is an official document by the Security Exchange Commission (SEC) which contains an official summary of insider trading, giving a record of trading transactions by officers, directors and major stockholders using private information. If these trades result in abnormal return, then the market is not efficient in strong form.

Review of Fama's 1991 Efficient Capital Market II Position

This is the second review work on market efficiency (hence II). The first was written in 1970. Any investigation of market efficiency has at least two problems: 1.Information and transaction costs and 2 the joint-hypothesis problem. Fama (1970) defines Market Efficiency as the state where "security prices reflect all available information". After giving the definition, Fama immediately introduces the problem of information costs: "A precondition for this strong version of hypothesis is that information and trading costs, the costs of getting prices to reflect information, are always zero (Grossman & Stiglitz, 1980). "As there are surely positive information and trading costs, the extreme version of market efficiency is surely false". However, this extreme view has an advantage in that it is "a clean benchmark". Fama then says he will use the extreme view and let traders decide on the information and transaction costs.

Main Areas of Research

In the 1970 paper, Fama used the terms weak-form, semi-strong form, and strong form efficiency. In this paper, he focuses on

1. Tests for return predictability.
2. Event studies
3. Tests of private information

1. When looking at return predictability, Fama points out the change in focus in this area. Formerly it was just testing short-run return predictability from past returns. Now it includes other variables such as "dividend yields (D/P), earnings/price (E/P), and term-structure variables" as well as for longer horizons. Lo and MacKinlay (1988) find positive autocorrelations (especially in small stocks). These results exist even after Conrad and Kaul (1990) attempt to correct for the no synchronous-trading problem.

French and Roll (1986) reported that "stock prices are more variable when the market is open." This has been interpreted by some as noise and an indication of market inefficiency. However, the size of the autocorrelations is small for short-run autocorrelations.

For long-term horizons, Shiller (1984) and Summers (1986) presents a view that "stock prices take large slowly decaying swings always from fundamental values, but short-horizons… have little autocorrelations". Tests of this model have been "largely fruitless." There has been some evidence of negative autocorrelations in the 3-5 years horizons but as Fama and French (1988) show these largely disappear when the 1926 – 1940 periods is dropped. Note that as the number of periods is small, these tests suffer from lack of power.

Fama and French (1988) emphasize that...irrational bubbles…are indistinguishable from rational time-varying expected returns: Contrarians: DeBondt and Thaler (1985) and others have reported that there are large reversals in winners and losers (Market overreactions). However this may be caused by the small firm effect (Zarowin 1981) or a distressed-firm effect (Chan & Chen 1991). Fama and French (1989) "argue that the variation in the expected returns…is consistent with modern intertemporal asset-pricing models". Keidon (1988) points out that seasonal are not necessarily "embarrassments for market efficiency" since there may be underlying reasons for the deviations and the size of the variations are small relative to transaction costs. Further he warns that some of these anomalies are expected with "mining" of CRSP data.

Cross-sectional return predictability: Any test of asset pricing models runs into the joint-hypothesis problem. Thus we can never know whether the market is inefficient or the model is wrong. Obviously, the choice of model may influence the findings. Most of the early tests used the Capital Asset Pricing Model (CAPM). These tests were largely successful but there were some shortcomings. For example, the Sharp-Lintner-Black model (CAPM) failed the zero-beta test (zero beta portfolios had a return higher than RF rate) but passed most tests. However, Roll's 1977 criticisms casts doubt on early tests as the "market portfolios" used for the testing did not test the actual market portfolio. Fama falls back to the position that CAPM is a good model as it has increased our understanding in spite of the many anomalies.

Fama and French (1991) show that for US stocks the relation between Beta and expected "returns is feeble even when beta is the only explanatory variable". This is less so when the data is expanded to include bonds (Stambaugh 1992). As CAPM seemed to be failing, new models were suggested. These have not been met with the widespread adoption that faced CAPM. However, some do show promise result.

Multifactor Models:

- APT-Tests by Roll and Ross (1980), Chen (1983), and Lehmann and Modest (1988) find that even after controlling for "up to 15 factors" the size anomaly still exists. Fighting over the number of factors is a problem with testing these models. Additionally "it leaves one hungry for economic insights about how factors relate to uncertainties about consumption and portfolio opportunities". Further the flexibility inherent in these models is a double-edged sword as it can lead to the equivalent of data dredging.
- Consumption Based Pricing Model Rubinstein (1976), Lucas (1978), and Breeden (1979) are the "most elegant of the available intertemporal asset pricing models". In Breeden's model "a security's consumption B[eta] is the slope in the regression of its return to the growth in per capita consumption". Tests of this are generally done both in a cross-sectional and time series manner "using the path-breaking approach (Hansen & Singleton 1982). Estimation is with Hansen's (1982) generalized methods of moments. The results are summarized in a chi-square number that usually rejects the test but provides no insight thus "failing the test of usefulness".

Out of the consumption based tests have come the "equity-premium puzzle" (Mehra-Prescott 1986) which suggests investors must be extremely risk averse to explain the spread on stocks over treasuries. Fama believes this risk aversion is possible as people are afraid of a reduced cost of living. He uses the fear of recessions as evidence.

"The central cross-section prediction of Breeden's (1979)…model is that expected returns are a positive linear function of consumption betas. On this score the model does fairly well (Breeden, Gibbons, & Litzenberger 1989).

When Chen, Roll and Ross (1986) test the consumption betas and other factors in the same model, they found that the consumption betas do not add explanatory power and are thus dropped.

Conclusion on predictability section…we really do not have a pricing model. Not surprisingly multi-factor models work better (not surprising because researcher can look until they find something). Moreover, it is possible that all of the models are capturing the same risk factor but we do not recognize it yet.

2. Event Studies

Event studies got their start in the year 1969 by Fama-French- Jensen and Roll paper on dividend splits (FFJR 1969). Interestingly, the author conceded the motivation for the paper had been to warrant continued funding of CRSP data. Event studies have since been done on many topics and provide the best evidence that the market incorporates new information very quickly and usually correctly. There are some studies showing exceptions (for example Ball and the time it takes for the market to incorporate all information from earning surprises).
The basic ideas of any events study is that the event is question is investigated in "event-time" which allows many similar events to be looked at simultaneously. This allows the impact of the event to be isolated from market wide events that also impact stock prices.

3. Tests for Private Information

Several different ways of investigating this:

(a) **Insider trading:** Insiders do beat the market: Jaffe (1974) and Seyjun (1986).
(b) **Security analysts:** Value line and other anomalies suggest that analysts do provide some information. This is inconsistent with Efficient Markets If you assume no information costs, but is perfectly consistent if information is costly to obtain (Grossman & Stiglitz 1980).
(c) **Professional portfolio management:** Results largely consistent with the idea that on average people do not beat the market. There are some conflicting stories, but most agree with this conclusion.

Empirical Studies on Event Studies

The original event study (of stock splits) by Fama, Fisher, Jensen and Roll (1969) is a good example of serendipity the paper was suggested by James Lorie. Event studies are now an important part of finance, especially, corporate finance. In 1970 there was little evidence on the central issues of corporate finance. Now we are overwhelmed with results, mostly from event studies. Using simple tools this research documents interesting regularities in the response of stock prices to investment decision, financing decisions, and changes in corporate control. The results stand up to replication and the empirical regularities, some rather surprising, are the impetus for theoretical work to explain them. In short, on all counts, the event-study literature passes the test of scientific usefulness.

Some of the Main Results of Event Study

One interesting finding is that unexpected changes in dividends are on average associated with stock-price changes of the same sign (Charest, 1978), (Ahrony & Swary, 1980), (Asquith & Mullins, 1983). The result is a surprise, given that the Miller-Modigliani (1961) theorem, and its refinements (Miller & Scholes, 1978), predict either that dividend policy is irrelevant or that dividends are bad news because (during the periods of the tests) dividends are taxed at a higher rate than capital gains. The evidence on the response of stock prices to dividend changes leads to signaling models (Miller & Rock 1985) and free-cash-flow stories (Easterbrook, 1984), Jensen (1986) that attempt to explain why dividend increases are good news for stock prices.

Another surprising result is that new issues of common stock are bad news for stock prices (Asquith & Mullins, 1986), Masulis & Korwar (1986), and redemptions, through tenders or open-market purchases, are good news (Dann, 1981), Vermaelen (1981). One might have predicted the opposite, that is, stock issues are good news because they signal that the firm's investment prospects are strong. Again, the evidence is the impetus for theoretical models that explain it in terms of (1) asymmetric information (managers issue stock when it is overvalued (Myers & Majluf, 1984), (2) the information in a stock issue that cash flows are low (Miller & Rock, 1985), or (3) lower agency costs when free cash flows are used to redeem stock (Jensen, 1986).

Like financing decisions, corporate-control transactions have been examined in detail, largely through event studies. One result is that mergers and tender offers on average produce large gains for the stockholders of the target firms (Mandelker, 1974), Dodd & Ruback (1977), Bradley (1980), Dodd (1980), Asquith (1983). Proxy fights Dodd and Warner (1983), management buyouts Kaplan (1989), and other control events are also wealth-enhancing for target stockholders. The political pressure to restrict the market for corporate control is strong, but without the barrage of evidence that control transactions benefit stockholders, the pressure would be overwhelming.

III. Methodology of the Study

Data Collection

The data obtained for the study was obtained from the Nigerian Stock Exchange daily trading list. The event identified for the study is August 6th 2010: this is the day the Director General of the Nigerian Stock Exchange was removed. This might influence the local and international investors' perception about the capital market. The data collected was on daily basis: this is because daily data allow precise measurement of the speed of the stock price response – the central issue for market efficiency (Fama, 1991). Another powerful advantage of daily data is that they can attenuate or eliminate the joint hypothesis problem that market efficiency must be tested jointly with an asset-pricing model (Fama, 1991). The daily data collected was three month to the event day and three months after the event day. That is sixty working days before and after the event day.

Sample of the Study

The sample for this study consists of twenty companies draw from thirty three industries classification of the two hundred and seventeen companies quoted on the Nigerian Stock Exchange as at December 31st, 2010. The technique of judgmental sample was adopted for selection. The twenty companies selected were the companies with the highest market capitalization as at December 31st, 2009. This is because they are the most active stock in the market; therefore they are more likely to be affected by any events.

Statistical Analysis

Previous studies on event study have shown that abnormal returns distributions show fat tails and are right skewed. Parametric tests reject too often when testing for positive abnormal performance and too seldom when testing for negative abnormal performance. When the assumption of normality of abnormal returns is violated, parametric tests are not well specified (Ana, 2002). Non-parametric tests are well-specified and more powerful at detecting a false null hypothesis of no abnormal returns (Ana, 2002). Among the non-parametric tests that can be used in event study includes, Generalized sign test, Wilcoxon signed – ranks test, Corrado (1989) Rank test and Bootstrapping procedure (Ana, 2002). The non-parametric test was adopted for this study-Wilcoxon signed- ranks test. Wilcoxon signed- ranks test was chosen among the non-parametric tests because it has the ability to use more information (direction and magnitude) about the data.

The Wilcoxon signed- ranks test formulae is given as

$$Z = \frac{T - \frac{N(N+1)}{4}}{\sqrt{\frac{N(N+1)(2N+1)}{24}}} \qquad - \quad - \quad - \quad - \qquad (1)$$

Where

       N = Number of pairs will nonzero differences
       T = the computed value of T-statistic

The Null hypothesis is stated as

       H_0: $R_1 - R_2 = .50$
       H_1: $R_1 - R_2 > .50$
       H_1: $R_1 - R_2 < .50$

IV. Presentation of Data and Analysis of Result

The data for the study is the daily stock prices of the companies before and after August, 2010.

Analysis of the Result

Since the t-calculated (6.663) is greater than t-test (1.96), we therefore reject Ho and accept Ha. This means that there is a significant difference between stock prices before August 2010 and after August 2010. This shows that stock prices respond to the removal of the Director General of the Nigerian Stock Exchange. The responds indicates that the Nigerian capital market is information efficient, that is it the stock prices is capable of reflecting all available and relevant information. This is consistent with the theoretical postulation that capital market is efficient when the stock prices reflect all relevant and publicly available information.

This study is consistent with other findings such as (Charest, 1978), (Ahrony & Swary, 1980), (Asquith & Mullins, 1983), (Barber & Lyon 1996), and (Kothari & Warner 2001).

V. Conclusion

This paper reviews Fama's 1991 efficient capital market II position and empirically applies it to the Nigeria context using event study. Efficient capital market was described as one that assimilates and responds to new information so rapidly that there is no source of information which will enable an individual investor to gain permanent advantage over others. Various forms of efficient capital market were also examined this include weak form of efficiency where security prices reflect all past information about the price movement; semi-strong form efficiency is when the security prices reflect all publicly available while strong-form of efficiency is when security prices reflect all published and unpublished public and private information.

Among the non-parametric test involves in event study, Wilcoxon signed- ranks test was used. The result revealed that there is a significance difference between stock prices before August 2010 when the Director-General was removed and after August 2010. This indicates that the Nigerian capital market is information efficient. In short, some event studies suggest that stock prices do not respond quickly to specific information. Given the event-study boom of the last 20 years, some anomalies, spurious and real, are inevitable. Moreover, it is important to emphasize the main point- event studies are the cleanest evidence we have on efficiency and with few exceptions, the evidence is supportive.

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