INVESTIGATION OF THE EFFICIENCY LEVEL OF THE NIGERIAN CAPITAL MARKET

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CERTIFICATION

This is to certify that this work "**Investigation of the Efficiency Level of the Nigerian Capital Market**" was carried out by **Onyeanwu, Chidi Christian with Reg No:** 20084772618 in partial fulfillment of the requirements of the award of Doctor of Philosophy (Ph.D) Degree in the Department of Financial Management Technology of the Federal University of Technology, Owerri.

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DEDICATION

This thesis is dedicated to God Almighty, the giver of life and wisdom and to my late mother, Ugoeze Justina Chinyere Onyeanwu, who taught me hard work.

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ABSTRACT

This study investigated the efficiency level of the Nigerian Capital Market based on changes in daily stock prices of all the listed companies over 19 years period (January, 2000 to December, 2020). The aim is to test the validity of the efficient market hypothesis and its associated anomalies in the Nigerian Capital market. The study employed descriptive statistics (mean, maximum, minimum, standard deviation, and the Jarque-Bera statistics) and inferential statistics (Augmented Dickey-Fuller (ADF), Phillip Peron (PP) Diagnostic Statistics, ARCH (Auto-Regressive Conditional Heteroscedasticity), G-ARCH (Generalized ARCH) models and the variance ratio test). The study found that stock returns in the Nigerian Capital Market exhibits a random walk (1.20+E09, p value (0.0000) < 0.01); (219.6456, p value (0.0000) < 0.01). Also current returns of stock in the market cannot be significantly predicted based on their previous variations (-28.90509 p value (0.0000) < 0.01). Equally it was found that stock returns and its volatility (σ = -0.386322, p value 0.0309 < 0.05) are negatively and significantly related. Volatility clustering is found to exist in the Nigerian Capital Market ($\alpha + \beta < 1$ ie 0.204820 + 0.748592 = 0.953412). Furthermore, investors do not make abnormal returns on Fridays than on other days of the week (-0.000170, p value 0.3211 > 0.05- variance equation), (-0.002440, p value 0.8967 > 0.05-mean equation). This also applies to Mondays (-0.005443, p value 0.0000 < 0.05- Variance equation), (-0.016034, p value 0.1733 > 0.05 –mean equation). Also the study found that investors do not make abnormal returns on the last day of the month (-0.008503, p value 0.0000 < 0.05 –Variance equation), (-0.019911, P value 0.2592 > 0.05 –mean equation). Investors do not make more profit during the sunny days than during the rainy days. (0.000163, p value 0.0358 < 0.05 –Variance equation), (-0.004424, p value 0.6493 > 0.05 –mean equation). Therefore the study concludes that no arbitrage opportunity can be usurped to make excess profits as all the available information has been discounted into current prices. Also, since the Nigerian stock market follows a martingale, fundamental and technical analyses become futile since prediction is not possible. Based on the above conclusion the study recommended that in order to attain an efficiency level of strong form, the Nigerian Capital Market must minimize the level of insider dealing by adopting the policy of full automation of trading activities in the market.

Keywords: ***ARCH, GARCH, Martingale, Efficiency, Volatility, Arbitrage, Prediction, Fundamental, Automation.***

CHAPTER ONE

INTRODUCTION

1.1 Background Information

The efficiency of the Nigerian Capital Market lies in the examination of its stock price movement, whether it moves independently of each other or otherwise. We note from the position of the efficient market hypothesis that given information set that fully reflect prices in the market, it is not possible for investors to "beat" the market. In other words, investors cannot make abnormal returns.

However, this does not appear to be in tandem with the philosophy behind the concept of capital assets pricing model (CAPM), which stresses a linear relationship between risk and returns. Modern portfolio theory (MPT) is a theory on how even risk averse investors can construct portfolio to optimize or maximize expected returns based on a given level of market risk, emphasizing that risk is an inherent part of higher reward. This underlying concept which is fundamental and central to portfolio theory and hence remains the fulcrum of investment decisions in financial economics, contends that investors can indeed, be adequately rewarded with higher returns if they are willing to assume higher risks. The position of the efficient market hypothesis that no investor can "beat the market" (make abnormal returns) is at variance with the concept of CAPM. Moreso, the efficient market hypothesis (EMH) says, "No investor can make excess over-average returns. In the light of the postulates of the efficient market hypothesis, where then is the concept of risk–return relationship? Do we necessarily need to have arbitrageurs and speculator, who thrive essentially on a game of chance?

Consequently, this study, through analysis and evaluation of empirical data from the Nigeria stock market, aim to assess the efficiency level of the Nigeria capital market. According to Fama (1970), there are three forms of capital market efficiency: (a) The weak form (b) the semi-strong form and (c) the strong form hypothesis. The weak form efficiency hypothesis also known as the "random walk" is where all subsequent price changes represent random departure from previous prices. The logic of the random walk idea is that if the flow of information is unimpeded and information is immediately reflected in stock prices, then tomorrow's price will reflect only tomorrow's news and will be independent of the price change today. News is by definition unpredictable and thus, resulting price changes must be unpredictable and random. The theory states that future securities prices are random and not influenced by past events. Supporters of weak-form efficiency hypothesis believe that all current information is impounded into the stock price and past information cannot be used to determine current market price. The semi-strong form efficiency hypothesis stresses that in an efficient market, all the publicly available information about that particular stock is already embedded in the price of that stock. The strong-form efficiency hypothesis implies that the market is strong if it reflects all information both publicly and privately held in the price of that stock.

Therefore, some of the indices of measuring efficiency of a stock market we laid emphasis on in this research work among others include stock price movement independence.

It is expected that stock price movement moves independently of the other and one cannot use the previous price movement data to predict the current or future prices. Volatility clustering does not exist in an efficient market. This is because it aids prediction. More so, in an efficient market, calendar and weather anomalies do not exist. This is because anomaly makes abnormal returns possible which is not in line with Fama's definition of an efficient market.

This work, therefore, has been distinguished from other works of the same magnitude, as we studied market anomalies like the Monday effect, the Friday effect, the turn-of-the-month effect and the weather effect among others.

1.2 Problem Statement

Observers of the Nigerian capital market has it that some if not all the market makers rely so much on seasonality's like (the rainy season and dry season) and trend analysis like (the Monday, Friday and Turn-of-the-month effect) to trade in the Nigerian Capital market. More so, a little before the global economic recession of 2007 to 2009 which affected the Nigerian capital market negatively which falls within the scope of this present study, the Nigerian capital Market had a full economic circle. These ranged from expansion to the peak period (eg the period when Dangote's shares went up,) contraction and trough (when the market crashed). Could it be that the Nigerian capital market strove on inefficiencies like noise trading, propaganda which stimulated bubbles and reaped investors off their investments?

It is worrisome that there seems to be lack of agreement among researchers about the state or form of efficiency, or otherwise, of the Nigeria Capital Market. For instance, Nneji (2013), in his study of efficiency of the Nigeria Capital Market, 1986-2009 revealed that the speed of adjustment of stock price to stock information was not very high and the market was also found to be inefficient within the period. On the other hand, Ogundina & Omah (2013), observed that the Nigerian Capital Market during 1990-2009 period was efficient based on market capitalization as an index. Arewa (2014), Olowe (1998), Okpara (2010) and Egbeonu (2016) individually found evidences of weak form efficiency of the Nigeria Capital Market. From these studies, there seems to be inconsistencies in results of efficiency investigations of the Nigerian Capital Market, hence the need for further investigations on the efficiency level with focus on pattern of stock returns, prices, volatility, as well as weather and calendar effects on stock returns.

1.3 Aim and Objectives of Study

The aim of this research is to examine the efficiency of the Nigeria capital market.

The specific objectives are to:

1. Investigate the extent to which the pattern of stock returns in the Nigeria capital market exhibit a random walk.
2. Assess the extent to which relationship exists between previous and current stock prices in the Nigerian Capital Market.
3. Ascertain the extent of relationship between stock returns and its volatility in the Nigerian Capital Market.
4. Determine the extent to which volatility clustering exist in the Nigeria Capital Market.
5. Analyse the extent to which calendar and weather affect stock returns in the Nigeria Capital Market.

1.4 Research Hypotheses

Finding answers to the following questions is critical to the realization of the objective of this research work. It hence guided the formulation of the following research hypotheses.

2 To what extent do the pattern of stock returns in the Nigerian Capital Market exhibit a random walk?

3 To what extent do previous and current stock returns relate in the Nigerian Capital Market?

4 To what extent do stock return and their volatility relate in the Nigerian capital market?

5 To what extent do stock returns in the Nigerian capital market exhibit volatility clustering?

6 To what extent do calendar and weather conditions affect stock returns in the Nigerian capital market?

The study set out to validate the following hypotheses:

HO_1: There is no significant evidence of random walk characteristic in the pattern of stock returns in the Nigerian Capital Market.

HO_2: There is no significant positive relationship between previous and current stock returns in the Nigerian Capital Market.

HO_3: Stock returns and their volatility are not significantly related in the Nigerian Capital Market.

HO_4: There is no significant presence of volatility clustering in the Nigerian Capital Market.

HO_5: There is no significant evidence of calendar and weather effects in stock returns in the Nigerian Capital Market.

1.5 Significance of the Study

This research empirically examines the efficiency of the Nigerian capital market. Therefore, it is significant to diverse group of stakeholders, namely: investors, market makers, regulators and academic in the following ways:-

To the investors: This study is timely, especially now that share ownership is thriving to gain increasing awareness again in Nigeria. From the findings of this work, investors and prospective investors will formulate investment strategies for trading in the NSE. If, for example, the market is weak form inefficient, which enables prediction then investors can earn abnormal profit by adopting active investment strategies.

To the regulators: This study will provide evidence that will assist the Securities and Exchange Commission (SEC) and NSE in formulating policies towards improved performance, efficiency and development of the Nigeria Capital Market.

To the Academics/Researchers: This study will contribute to knowledge and the extant literature to be referred to by researchers and students. It will also throw more light on the empirical evidence on weak-form efficiency of the NSE and extend the existing evidence by using recently available data. In addition, it will possibly spur other research works aimed at either sustaining or debunking its evidence.

To the market makers: The outcome of this study will provide empirical model that can be used to have proper understanding of capital market dynamics and stock price movements as opposed the rule of thumb approach to investment decision by market makers and the associate band wagon effects by other market participants.

1.6 Scope of the Study

This study focused on empirical investigation of the efficiency level of the Nigerian capital market within the framework of the efficient market hypothesis. It covered the period of twenty years, starting from January 2000 to December 2020, using daily stock market prices. The unit of analysis includes stock prices, stock returns, and volatility as well as calendar and weather effects.

This research focused on the empirical examination of the weak-form market efficiency evidenced on the Nigerian Stock Exchange within the framework of the efficient market hypothesis. Thus, this study was focused on the capital market segment of the Nigerian financial system. Therefore, no attempts were made to study the other segments of the Nigerian economy.

In addition, the central focus of this study was Nigeria thus, capital markets of the other parts of the world were not considered in this study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Conceptual Framework

2.1.1 The Capital Market: An Overview

By way of simple definition, a capital market is any international or domestic market where banks, companies, governments, and multinational organizations (for example, the World Bank) can go to invest or borrow large volumes of money for a duration. It may be for either medium or long term, according to Self-study Solutions, a division of Euro Books, 2003. A

capital market's role is majorly that of facilitation, in order words, finding the most efficient means of deploying capital by offering opportunities for any of these investors as mentioned above. By this way, capital market makes surplus funds available to borrowers seeking to raise finance. So, we can deduce from the above that a capital market is designed to strategically finance investments by government, and businesses. Financial instruments deployed in any capital market expectedly have original maturities of no less than one year and can be multimillion dollar credits or even small loans (Rose & Marquis, 2006).

A capital market can be grouped either as a primary or a secondary market. Now, a primary market is where new shares are traded. The secondary market is a market where already existing securities are traded. According to Nzotta (2005), capital market institutions in Nigeria can and would expectedly provide Naira loans, can give foreign exchange loans, and also offer consultancy and underwriting services.

2.1.1.1 Significant Role or Functions of the Capital Market

Like the money market, a capital market is equally very important. It plays a very significant role in the economy of any country. A speedy economic growth and development could be achieved by a vibrant and a dynamic capital market. Some of the roles are outlined below:

a. **Formation of Capital:** This is the net addition to the existing capital in an economy. Usually capital markets help in capital conglomeration in that via the mobilization of inactive resources in an economy, it creates massive savings. These savings are then in turn made available to functional economic sectors such as agriculture, industry, mining and other productive areas in an economy.

b. **Mobilization of savings:** A capital market is an important source for pulling together of unused savings domiciled within any economy. It mobilizes funds from individuals for further investments in the most lucrative and productive channels of any economy. This essentially means that it mobilizes ideal monetary resources and puts them in the most appropriate investment opportunities. By so doing, employments are created and infrastructures are developed (Nzotta, 2005).

c. **Provision of investment Avenue:** Another point is that capital market goes a long way to boost productivity in any economy. It does this by making funds available for long durations, thereby allowing the financial needs of business to be met. Also capital market aids research and development. This, consequently, results in increased productivity in the overall economy and by so doing employment opportunities are created, improvement in infrastructure assured (Nzotta, 2005).

d. **Service provision:** At this stage, it is pertinent to know that capital market provides various types of services within an economy. The services could be medium and long term loans to the industries. Others might be export financing, underwriting services, etc. This array of services would then help the all-important manufacturing sector in no small measure.

e. **Constant availability of funds:** A capital market is a place where demand and supply of financial resources for long term ventures are met. In this market, there is so much liquidity. This makes it a right place for investors, who need long term financing sources for funds.

2.1.1.2 Characteristics of the Nigeria Stock Market

It is important to note here that there are distinct ways to characterize any stock market development. Three of them are: institutional, traditional and asset pricing. Simply put, the institutional characteristics deal with the legal and regulatory issues to be dealt with in the market as well as matters of information disclosure, transparency requirements, existent trading costs and market barriers. The traditional characteristics usually measure the basic growth parameters or indices like the number of listed companies and market capitalization available. And lastly, the asset pricing characteristics relate to the efficiency of the market in pricing risk (Nwaru, 2016).

Institutional Characteristics

a) Regulatory Institutions

The main aim of regulating any securities markets is to ensure that there is transparency and fair play in all operations in the market. The major reason for the regulation of any capital market is to attempt to avoid crash. The operating concept of any developed capital market has always been positive supervision, which sees that all market participants are treated equally and fairly. They also seek to groom regulatory institutions that are highly competent and robust in their scope of activities without unduly interfering in a manner that stifles market activities. Examples are UK's SIB and the American Securities and Exchange Commission. These two have the duty of overseeing institutions in the developed capital markets that aim at achieving these objectives.

Over here in Nigeria, the Nigerian Securities and Exchange Commission (SEC) is our own functional regulatory organ. It was established in 1979 following several complaints by the market players of inappropriate valuation of shares of publicly traded companies during the second leg of the program of indigenization. Summarily, the Nigerian Securities and Exchange Commission is responsible for the following:

i. To promote all investors' interests and enhance their confidence in the Nigerian Stock Market,

ii. To ensure a fair, orderly and equitable dealings in all security matters; and lastly,

iii. To promote the overall development and growth of the Nigerian Capital Market.

Some of the numerous activities of Nigerian SEC include the registration of new securities and the overall monitoring and supervision of all activities in the capital market. The SEC also has the responsibility of licensing all market participants such as the dealers and investment advisers. The SEC investigates quoted companies to ensure strict compliance with the rules or conducts governing the capital market. The commendable absence of any major malpractice or fraud in the past thirty-five years of stock market operation in Nigeria is largely attributable to the effectiveness of the Nigerian Stock Exchange in regulating market activities in the country (Nwaru, 2016).

An effective and robust Securities and Exchange Commission usually enhances the quality of supervision and regulation of the capital market. The existence of the institution is an effective means for promoting the development of a capital market.

b) Settlement process/Brokerage Services

It is common knowledge that in most stock markets across the African continent, the sheer process of transacting in shares is unnecessarily arduous to willing investors and the Nigeria market typifies this ineptitude and inefficiency. For primary issues of securities, it takes approximately a period of half a year between the commencement of the offer and approval for post-offer trading. Again, sales of the securities cannot still be done until additional three months period when investors would expectedly receive their share certificates. Then for purchases in the secondary market, share certificates are not given earlier than a six-month period. The common rule is T+3, which usually requires that the completion of all transaction process should be made in three days after the deal is brokered. Another serious issue is the fact that the bonus of scrip share certificates usually starts trickling in three months after the annual general meeting (AGM) of the declaring firm. (Most annual general meetings hold about six months after the end of the particular financial year).

It can clearly be seen, therefore, that selling market shares in African capital markets is rather a herculean task. It is a long process where the seller first liaises with a broker to have the ownership duly verified by the registrar in charge. This usually takes a minimum of fourteen days. This portends that both entry and exit are subject to huge delays. And most fraudulent brokers usually capitalize on the inefficiencies in the systems to rip off unsuspecting and naïve investors. Such brokers, for instance, would firstly lodge all purchases in their own names, and later on re-hedge (resell) in the name of the right buyer after amassing gains in dividend and scrip issues. In this intervening period, the investor is usually made to blame the delayed receipt of share certificate on the inefficient system which unknown to him was manipulated (Nwaru, 2016).

The above scenario, showing gross inefficiency, has been blamed on the following factors: present non-centralization and non-computerization of the market's clearing system, sheer fraudulence of most brokers, the poor quality of personnel and the grossly inefficient Nigerian postal system. This postal system lengthens and therefore delays the remittance of dividend warrants and share certificates to the investors. The truth is that the entire settlement process usually constitutes even a far greater risk element than one could gauge from any volatility of returns or from our unstable macroeconomic indices. It is earnestly hoped that the newly introduced Central Clearing Systems (CCS) will ameliorate these risks and bring them to the barest minimum (Nzotta, 2014). On the issue of the quality of brokers, the admission of foreign brokers could be really contemplated and maybe explored as a means of infusing better brokerage standards and services in share transactions and settlements.

(c) Transactions Costs

Cost of transactions is one of the healthy parameters for measuring the efficiency of any capital market, especially the Nigerian Capital Market (Nwaru, 2016). One of the major transactional costs facing any investor is brokerage fees; another is stamp duty, and in some countries, there could be an additional charge by the relevant regulatory authority. It is common knowledge that Nigeria has both high brokerage fees and stamp duties charges. The brokerage charges are graduated starting from 2.75 per cent downwards.

In addition to the brokerage fees and the stamp duties, the Nigerian Securities and Exchange Commission (SEC) has since the year 1985 been charging investors a fee of one per cent on every transaction in all securities. This is being currently levied only at the buyer's end of the transaction. Now note that an equivalent transaction will only cost two per cent in not-too-far Kenya and 2.35 per cent in Zimbabwe. It is also important to state here that these official costs in Nigeria are minimum expenses since brokers often, would on their own, impose other unofficial charges on the investors.

It is common knowledge that some brokers make additional deductions on the traded price from the seller and mark-up the share price for the buying investor. The mark-up is a common practice particularly for almost all blue-chip, that is, highly valued stocks. Some brokers, especially those outside Lagos state, would also go as far as imposing some compulsory lump-sum charges on most sellers as the cost of verifying the true ownership of the stock with the registrar. This according to them is a pre-condition for selling a share (Nwaru, 2016).

In view of the foregoing, it is pertinent to note that there are also other implicit costs involved in buying shares in these capital markets. For example, if the bid to buy some publicly offered shares has proved unsuccessful, sometimes it can take between half and a full year to receive any refund of deposited funds. The base cost of going public, canvassing around to raise additional equity or obtaining loan facilities from the capital markets on the part of corporations is also rather exorbitant.

Now let's break it down further: the official fees and brokerage cost alone for raising an equity capital of say USD $1 million in the capital market will amount to 2.5 per cent. This is a brokerage fee of 1 per cent and other official fees totaling 1.5 per cent. It is observed that the fees are usually higher for smaller equity values although slightly less large amounts of money. At this juncture, it is worthy to note, by way of comparism, that the composition of charges for the capital market in Ghana is 0.3 per cent for fees and brokerage; whereas when the sub-costs for advertising, administration and payments to professionals are added, the total cost of raising equity capital of USD $1 million in Nigeria bills up to about 4 per cent of the overall value. Then for loan stocks, the added cost of the compulsory underwriting commission further increases the entire cost profile.

Regardless of the increased levels of transactional costs in the average African capital market, the cost components for issuing corporate securities – issues covering such matters as accounting, underwriting, legal, etc - are ineligible for tax deductions. We noted that in other parts of the world, these deductions are usually admissible as means of lowering the effective and overall cost of corporate financial transactions. Kenya is a worthy role model of such wholesome practices which Nigeria could and should emulate. In Kenya, there is a low brokerage fee of 0.005 per cent on corporate transactions, and this is very commendable.

Another pertinent issue is the operation of multiple trading floors. This could provide a means for reducing brokers' running costs which would otherwise be worsened by poor public infrastructure and necessary utilities such as telephones, transportation systems, etc. It is common knowledge that with nearby trading floors, brokers will not need to spend so much on linking to the central stock exchange for every magnitude of transaction. Given that this is the case, one can begin to really appreciate and understand the peculiar circumstances that justify the high brokerage costs in Nigeria. Surely, it would require a combination of deliberate legislation for downward filing of brokerage rates, and the opening up of the brokerage business to other external, and even international competitors to achieve competitively low brokerage charges.

Traditional Characteristics

(a) ***Market Size***

With only 200 quoted firms and a mere N4 billion capitalization, the size of the Nigerian Stock Exchange is actually small by all international standards of measurement even in the

African capital market space. Compare that to the South African market which has 640 listed companies, and South Korea which has 693 listed companies. The fact is that the scarcity of listed companies on the floor of the Nigerian stock exchange can be explained by the market's recent origin. Operations officially began in the Nigerian capital market only in the year 1960. Another issue is the phenomenon of fear, which has traditionally been explained as the high aversion of our indigenous entrepreneurs to go public due to the fear of losing control of their business entities (Nzotta, 2014). Now, while this is insightful, the problem runs deeper. Nigeria is replete with innate entrepreneurs, no doubt, but the fact remains that the country is still insufficiently blessed with enough seasoned entrepreneurs with adequate resources and requisite experience to float a kind of average quoted company comparable to any in other parts of Africa and the world at large (Nwaru, 2016). It is common knowledge that the market makers in South East Asia, for instance, are quoted indigenous companies that thrive on the region's burgeoning technological breakthroughs and advancement. It is very difficult to imagine any counterpart of Daewoo Corporation of South Korea in Nigeria. It goes without saying that the weak private sector in Nigeria is a serious mitigating factor working against the healthy growth of the capital market. The great idea of the creation of a second-tier securities financial market to help encourage the ease of listing of indigenous firms was a noble attempt to ameliorate this challenge. This move, even though it resulted in a rise in the number of listed companies with the stock market, didn't really effect any commensurate growth in market capitalization. I think the privatization of a lot of public enterprises is one huge opportunity for our government to improve the resource base of the Nigerian Stock Exchange.

(b) *Liquidity*

The underlying concept of the liquidity of any stock market simply relates to the relative ease with which shares are traded in that stock market. As such, the concept of liquidity is very important for a good number of reasons. In the general sense, most investors are very wary of illiquid markets and rightly so because exit cannot easily be made at the desired time frame. The more liquid a stock market is adjudged to be, the more it inadvertently commands investors' interests since the resale of shares is almost very easily guaranteed. It is common knowledge that quoted firms have more access to new issues otherwise known as equity and also debenture or debt in any liquid market. Also, there is the fact that in any economy with a quite liquid stock market status, most shares can become easily acceptable as good collateral for all bank lending operations. This in turn boosts credit and investment potentials (Nzotta, 2014).

It has, however, been noted with dismay that this cherished quality of liquidity is at present not enjoyed in the Nigerian stock market at large. Available data shows that with an average ratio of two per cent per annum (2.4 per cent for the year 1996), the turnover ratio, which is a measure of the value of shares traded relative to total market capitalization is very low across the capital market in Nigeria. A plethora of other African capital markets perform far better in this regard. Reckon the fact that the ratio is 4.6 per cent in Mauritius, 7.6 per cent in Zimbabwe and as high as 10 per cent in Botswana. In the Nigerian Capital Market, the recorded low trading activities result majorly from the ownership structure, among other mitigating factors. Only until recently, the Nigerian Capital Market was restrictedly open to non-resident investors which meant that apart from the original direct investors in foreign firms, other foreign capital had little or no access to this financial market. It does not take rocket science to deduce that the better performance of Botswana, Zimbabwe, and Mauritius is due to the open outlook these markets have employed and thereby enjoyed in the recent past. Also it is good to note that in Asia, using South Korea and Taiwan as examples, their turnover ratios are as good as 97.8 per cent and 174.9 per cent respectively. Now, these are very open markets where outside funds freely move in and out and therefore the system is very robust (Nwaru, 2016).

The Nigerian stock market ownership structure contributes to its illiquidity as the holdings of the original direct investors and the public sector are normally not used in trades except for terminal investment purposes. This, therefore, leaves only a relatively minute proportion of shares held by individuals and institutional investors for use in trading. Another issue of note is the buy-and-hold attitude of investors which further restricts the proportion of their traded shares in the market. Add to these factors are the usual associated delays and high risks involved in trading shares in the Nigerian Capital Market.

Openness and Market Barriers

Since 1960 which marked the inception of the Nigerian Stock Exchange till 1972, all foreign investors had heavy restricted access to this capital market. And then government restricted the scope of foreign investment and so limited the interest of foreigners to a maximum of 40 per cent equity holding in a listed security by the Indigenization Decree of 1972 (amended and reinforced in 1977). The indigenization legislations were again amended in the year 1989 to accommodate larger foreign presence in the market. In this further amendment, the ceiling of 40 per cent holding was albeit retained only for the banking/insurance, petroleum prospecting and mining industries among others (Nwaru, 2016).

On the fifteenth of July 1995, the Federal Government of Nigeria in its wisdom promulgated the Nigerian Investment Promotion Commission Decree (No. 16) whose main thrust was to liberalize and open up the investment climate in the country. That decree duly established the Nigerian Investment Promotion Council and charged her with the responsibility of promoting foreign and domestic investments in the nation. The guidelines for all foreign investments were outlined as follows:

(i) Repealed previous indigenization legislations which limited foreign participation in the Nigerian Capital Market;

(ii) Allowed unrestricted foreign interest in Nigerian-owned and quoted companies;

(iii) Accorded all residents as well as all foreign investors the same privileges, rights and opportunities to invest in the Nigerian Capital Market;

(iv) Allowed for free repatriation of dividends, capital, capital gains, and other interests from investment in securities.

(v) Established an over-the-counter (OTC) market through which any interested foreign investors can purchase shares of unlisted companies; and lastly,

(vi) Authorized foreign investors to purchase any number of shares of Nigerian companies in any convertible currency.

Down the line again, another legislation known as the Foreign Exchange (Monitoring and Miscellaneous Provisions) Decree No. 17 of January 16, 1995 further eased up the mechanism for foreign investment inflows and outflows. This then repealed the Exchange Control Act of 1962 and made some major enactments. For instance:

a) It established an autonomous foreign exchange market,

b) It allowed for free transactions in the foreign exchange floors at market rates, and

c) It went ahead and permitted the unrestricted importation and exportation of foreign exchange.

These measures would undoubtedly go on to contribute to the development and relevance of the capital market as it is today.

Taxation

In any capital market, it is a known fact that the operating tax policies have serious implications on the supply of, and demand for any array of financial assets. Also, depending on its nature and structure, taxation could either enhance or retard capital market development in any economy (Nwaru, 2016). Therefore, the use of tax instruments in promoting the development and growth of emerging capital markets assumes growing importance as investment capital becomes more and more internationally fluid and more sensitive to the investment climates in the host nations. On the positive divide of taxation issues, the removal of onerous levels of taxation stimulates financial intermediation and investment, particularly when the measures are conceived to be a permanent policy change. On the other hand, as is frequently the common complaint here, tax becomes rather vexing to investors when it is high and levied at multiple stages. It also generally becomes investment retardant for the instruments for which the tax burden is discriminatory and heavier.

The amazing role of well-regulated taxation systems in the promotion of investments in any capital market seems to have recently been recognized by many African countries like Kenya, Namibia, Ghana, Botswana, Swaziland and Mauritius among other countries that are already in the bandwagon. Few African countries still impose capital gains tax on securities, among them are Zimbabwe (10 per cent) and Nigeria (20 per cent). We also have Trinidad and Tobago (20 per cent), Hungary (20 per cent), Chile (10 per cent) and Venezuela (10 per cent) as the other countries that impose capital gains tax on securities among some other 42 emerging markets.

This issue of capital gains tax is more annoying because of its imposition on nominal returns in the face of generally high rates of inflation. A simulated resultant effect of taxing real capital gains shows that the effective tax rate on real equity returns could have been reduced to 30 per cent (a 50 per cent reduction). In Zimbabwe, only about ten per cent of the capital cost of a security usually is allowed per annum as inflation adjustment for capital gains tax as in most other countries. Also, capital gains of anything less than Zim $1,000 are tax exempt. This is a very positive way to go and good for emulation should Nigeria insist on taxing capital gains on equities. However, in reality, the tax legislation should be able to restrict the tax base to capital gains in real terms.

It is noted that withholding taxes on all dividend income appears to be a worldwide practice. Taxation of pay-outs has been known in part to be aimed at encouraging investments by discouraging payouts, and this accounts for its more general application than capital gains tax. Nevertheless, the reduction in its rate to *5* per cent, as has already been done in Kenya, provides amazing incentives for equity investment.

It is common knowledge that Nigerian equities have for a long time been subjected to multiple taxation at the following stages:

Stage 1: Corporate income tax

Stage 2: Dividend with-holding tax

Stage 3: Personal income tax on dividend

This third stage usually applies because the personal income tax still encompasses some part of received dividend income. Yet, incomes of Nigerians earned abroad in all forms are usually tax-exempt.

It goes without saying that the taxation of equities at both the corporate tax and dividend withholding levels is a veritable area for reform in most parts of Africa. I believe that this calls for corporate and personal tax integration. In the recognition of and the subsequent pursuit of the classical separate entity status of firms and shareholders, company taxes and personal taxes which hitherto are imposed independently of each other without recognition that income originating from companies are taxed twice at the firm and shareholders levels. These reforms could be done in terms of full-scale or partial integration.

Under the full-scale approach, the company tax would appear as a withholding tax which, in whole is then credited to the various shareholders to offset their varying personal income taxes due on their shares of company's profits irrespective of whether the profits are distributed as dividends or not. While in partial integration reform, tax relief is to be offered either at the firm level or at an individual shareholder level against possible double taxation at - corporate and personal levels. This is operationalized either at the company or personal levels. Integration at the firm level usually involves a split system which excludes dividends from corporate income taxes or that which taxes the dividend components at a much lower rate. Then at the personal level, integration here would imply giving tax credit to a shareholder for part of the corporate tax of the company.

The working and tested practices in most developed countries' markets may be very useful for Nigeria. In the United Kingdom, for instance, through the advanced corporate tax system, individuals are given tax reliefs at the corporate level for distributed earnings. The advanced corporate taxes were introduced to correct distortions which the existing double taxation was having on investment. In France and Canada for, instance, they practise the partial integration system which takes effect at the shareholder level. Investors are offered tax credits as against corporate taxes paid at the company level so that like the application of Germany's "split-rate" system, corporate distributions are then taxed than retained earnings.

It is important to note at this juncture that a number of developing countries like Mexico, Indonesia, Colombia, and Jamaica now have one form of tax integration or the other. Unfortunately, Nigeria has not yet taken any notable step in this worthy direction. The truth is that full corporate-personal tax integration is what is desirable, but even partial integration would be very helpful at this stage of the country's capital market development calendar (Nwaru, 2016).

One of the problems that will arise in implementing the corporate-personal income integration is the conflict of continuous interests between the federal and other tiers of government. We know that the federal government collects most corporate taxes while state governments usually only have jurisdiction over personal income taxes. Hence, the integration policy and implementation would not be exclusively undertaken by the federal government alone, rather it would, for harmony sake, be a constitutional or inter-tier affair. But even in the face of such an imbroglio, the federal government which is burdened with the responsibility for capital market development and control of corporate taxation, could at least start with tax integration at the corporate level and let it trickle down to the state governments.

And then apart from corporate-personal income tax integration, there are various other forms of tax incentives that have been used by some developing countries for the purposes of capital market development. For example, in Korea, tax policies have been used not only as incentives for the supply of and the demand for securities, but also as penalties for companies that were reluctant to go public. Similar measures employed in Brazil include: provision of tax fund shares, stock acquisition, tax incentives, and dividend tax exemptions or reductions among others. These measures, when deployed here, would surely be useful in the Nigerian Capital Market.

Asset Pricing Characteristics

Trading Rules and Asset Pricing

It is common knowledge that in the Nigerian stock market, trading is by the call-over system. By this trading rule or system, we mean that various stocks are called up in turns during which various brokers bid for or offer to sell any stocks of interest to them. The resultant effect is that trading time in the Nigerian capital market is thus restricted for only two hours each day from Mondays to Fridays. Conversely, in developed markets, stock trading is a continuous process throughout the working hours and consequent upon this, prices can change several times in a day.

Now, add to the restricted trading periods the fact that price movements are officially controlled although a five per cent fluctuation limit is still enforced. The rationale for the controlled price variation is to prevent any and every speculation and ensure that prices are driven by accepted market fundamentals in order to achieve an orderly and a healthy market development. Another fact worthy of note is that the various regulatory processes in place may lend a helping hand to explain the poor sensitivity of equity prices to macroeconomic conditions such as: interest rate, exchange rate, inflation, money supply, etc., hence the frequently noticed insufficient compensation in the market for all forms of systematic risks (Nwaru, 2016).

2.1.2 The Concept of Capital Market Efficiency

The concept of efficient market hypothesis as proposed by Fama (1970) stresses that all available information with regards to any investment security is already embedded in the price of such stock or security. Therefore, if this holds true, no other investor can have an advantage over the other given his analytical powers. This is because of the speed at which information is transformed or factored into the securities prices.

Efficient market hypothesis, EMH, is of three forms. These are:

1. The weak form level of efficiency. This relates to the individual movement of stock prices given the historical prices. Therefore yesterday's stock price cannot be used to determine today's prices and also follows that today's prices cannot be used to determine tomorrow's security prices. In other words, there is no pattern as regards securities price movement. This seriously implies that no fundamental analysis of securities will be able to furnish information that brings abnormal returns other than the average returns in such a market. This weak form level of efficiency is mostly often referred to as the random walk hypothesis.
2. The semi-strong form level of efficiency. This states that neither technical nor fundamental analysts can make use of semi annual reports and or statements will be able to beat the market. This is because any new information is instantly priced into securities.
3. The strong form level of efficiency. This states that all information both publicly and privately held (insider information) cannot be of help to an investor to fetch abnormal profits.

2.1.2.1 Calendar and Weather Anomalies

Monday Effect: This anomaly occurs when the average returns on Mondays is significantly higher than the average returns on other days of the week.

Friday Effect: This anomaly occurs when the average returns on Fridays exhibits enormous returns compared to the rest of the days of the week.

Turn-Of-The-Month Effect: Turn-of-the-month effect is a situation whereby stock returns are relatively higher on the last day of the month and the first three days of the succeeding month. Therefore, with the presence of this anomaly, the trading rule will be to buy stocks within the month when it is cheaper and offload them at the end of the month and the first three days of the succeeding month when the return will be high.

Weather Effect: Weather affects people both negatively and positively depending on the prevailing weather condition. It has been documented that people have more optimistic looks to be when the weather is brighter than when the weather is grey or dull, which affects their choices. Saunders (1993) and Kathiravan, Kasilingam, Selvam, & Venkateswar, (2018) provided evidences to this effect.

2.1.3 Risk Return Trade-Off

The concept of risk-return relationship is as old as financial management. Investors will like to make extra returns by taking extra risks. This is why Omisore, Muniral, and Nwufo (2012), described returns as the basic motivating force and the principal reward in any investment process. Glysels, Santa–Clara and Valkanov (2005) also stated it clearly that the concept of risk-return tradeoff is so essential in financial economics that it could be described as the first fundamental law of finance. Ordinarily, higher risk brings about the probability of making higher returns, and lower risk brings about the probability of making lower returns.

The Capital Assets Pricing Model, the Arbitrage Pricing Model, the Modern and Post-modern Portfolio Theory as stated in my background information are all about the risk-return relationship of assets.

2.1.4 Volatility Clustering

Volatility clustering refers to the situation whereby in a high frequency price data movement, small price changes are followed by small price changes and big price changes are followed by big price changes. This stylized fact makes prediction to be possible thereby enabling abnormal returns. This is not congruent with the position of Fama (1970) about efficient markets.

2.1.5 Fundamental and Technical Analysis Concept

The equity market is surrounded with the process of stock selection, which involves knowing the right kind of stock to purchase. The above statement presupposes that a lot of stocks are available leaving the investors the options of choice. According to Renu and Christie (2018), the two decision-making tools are the fundamental analysis and the technical analysis. These tools are used widely in terms of stock assets selection.

The fundamental analysis set out to study economic analysis and industry analysis of the stock intended for purchase.

The technical analysis is anchored on the use of several mathematical and statistical tools like the moving average of the past stock market prices.

The main study of the technical analysis is to determine trends which make predictions possible, while the fundamental analysis believes in the calculation of the intrinsic value of stocks using economic and individual factors. The fundamentalists make use of financial statements while the technical's chart only the price movement of stocks.

The fundamental analysts study companies analysis by investigating the position of the return on equity, earnings per share, debt/equity ratio, price/earnings ratios, market capitalization, return on assets, price/sales ratio and price/book ratio, Renu and Christie (2018).

The technical analysts forecasts the trend movement through simple moving average, exponential moving average, relative strength index, moving average divergence and on-balance volume.

The whole concept of fundamental and technical analysis is to predict trends which aids in making abnormal profits but Fama (1970) in his position asserts that it is a waste of time and energy. This is because information has already been embedded into the price of stocks beck r they start their calculations and predictions.

2.1.6 The Leverage Effect

This is an economic concept that refers to that generally negative correlation between an asset's return value and its changes of volatility. A natural estimate would usually consist of using the empirical correlation got between all the daily returns and the changes of daily volatility as gotten from high frequency data. Therein lies the fact that the puzzle from such an intuitively natural estimate yields nearly zero correlation for almost all assets tested, despite the many economic biases and reasons we have for expecting the estimated correlation to be negative.

To better understand the sources of the puzzle we have in mind, we analysed and deliberately decided to use the different asymptotic biases that are mostly involved in high frequency estimation of the leverage effect, including smoothing errors in estimating spot volatilities, to biases due to discretization errors, to market microstructure noise, and to estimation error. This deliberate decomposition helps us to then propose novel bias correction methods for estimating the leverage effects.

In other words, the leverage effect refers to the observed propensity of any asset's volatility to be negatively correlated with the asset's returns (Choi & Richardson, 2016). Typically, all rising asset prices are usually accompanied by declining volatility, and vice versa. The word "leverage" used here refers to one possible economic interpretation of this phenomenon. This was developed by Black (1976) and then further annotated by Christie (1982) who explained leverage as follows: as an asset's price goes on a decline, companies become mechanically more and more leveraged since the relative value of their debt rises compared to that of their equity.

As a result, it is natural to expect that their stock becomes more risky, hence more volatile in the same vein. While this concept is only a hypothesis, this simple explanation given above is sufficiently prevalent in the literature that the term "leverage effect" has been adopted to describe and explain the statistical regularity in question. According to Nelson, 1991 and Engle and Ng, 1993, it has also been well documented that the effect is generally asymmetric - meaning that other things being equal, any and all declines in stock prices are accompanied by larger increases in volatility than the decline in the volatility that accompanies rising stock markets. There are various discrete-time models with a leverage effect that have been estimated by Yu (2005).

The result, therefore, is that the magnitude of the effect seems too large to be attributable solely to an increase in financial leverage. Among other findings noted by Figlewski and Wang (2000) is the fact that there is no apparent effect on volatility when leverage changes because of a change in debenture or number of shares, only when stock prices are seen to change, which then raises questions of whether the effect is linked to financial leverage at all or not. As we have always said, correlation does not always imply causality. A lot of alternative economic interpretations have already been brought forward: an anticipated increase in volatility requires a higher rate of return from the asset, which can be produced only by a fall in the asset price (see, e.g., French, Schwert, and Stambaugh (1987); and Campbell and Hentschel, 1992). The leverage explanation seems to suggest that a negative return should make a firm more leveraged, hence making it riskier and therefore leading to a higher volatility. The volatility feedback effect is then seen to be consistent with the same correlation but reverses the causality: increases in volatility have been seen to result in future negative returns.

Bekaert and Wu (2000) show that these different schools of thought and interpretation have been severally investigated and compared. Even at the daily and lower frequencies, the direction of the causality may be difficult to ascertain since both of them appear to be instantaneous at the level of daily data (see Bollerslev, Litvinova, and Tauchen, 2006).

Using higher frequency data analysis, namely the five-minute absolute returns to construct a realized volatility proxy over a period of longer horizons, Bollerslev *et al.* (2006) found a significant negative correlation between the volatility and the current and lagged returns, which was noted to have lasted for several days at any given time, also low correlations between the returns and the lagged volatility, and then strong correlation between the high frequency returns and their absolute values.

Their findings strongly lend support to the dual presence of a prolonged leverage effect at the intra-daily level, and an almost instantaneous volatility feedback effect was lastly observed. The major differences between the correlation measured using stock-level data and index-level data have been equally investigated by Duffee (1995). Also, Bollerslev, Sizova, and Tauchen (2012) developed a representative agent model based on recursive preferences in order to generate a volatility process which exhibits fractional integration, clustering, and has a risk premium and also a noticeable leverage effect.

We observed also that whatever the explanation(s) or source(s) for the presence of the leverage effect correlation; there is significant broad agreement in the general literature that the effect should be present in the foregoing. In going further to use the standard estimation techniques and high frequency data, the data deployed stubbornly would not just conform to these otherwise appealing explanations. It is observed generally that at high frequency and over short horizons, the estimated correlation ρ between the asset returns and the changes in its volatility is close to zero, instead of the strong negative value that was expected to be arrived at.

At longer horizons, or especially using option-implied volatilities in place of historical volatilities, we, however, observed that the effect is visibly present. It is worthy of note to state that it is accepted that the true correlation is indeed in the negative, then this is especially striking since a correlation estimator relies on second moment, or quadratic (co)variation, and quantities like those should be estimated particularly well at very high frequency, or instantaneously seen, using standard probability limit results. This noticeable disconnection is popularly known as the "leverage effect puzzle."

At first reading, this observable behaviour of the estimated correlation at high frequency is very reminiscent of the *Epps Effect* which started with Epps (1979). He inadvertently recognized that the empirical correlation between the returns of two assets tends to decrease as the sampling frequency of observation increases in number. One very important issue that arises in the context of high frequency estimation of the correlation coefficient between two assets is the asynchronicity of their trading, since two different assets will generally trade in their respective abilities; hence generate high frequency observations, at different times. Now, the asynchronicity of all these observations has been shown to have the potential to generate the not so popular Epps Effect.

Against the foregoing backdrop, the problem of asynchronicity is not really an issue here since we are focusing on the estimation of the correlation between an asset's returns and its (own) volatility. Because the volatility estimator is constructed from the asset returns themselves, the two different sets of observations are by construction synchronous. On the other hand, however, while asynchronicity is not a concern, one issue that is very essential to the problem is the fact that one of the two variables entering the correlation calculation is rather silent, namely the volatility of the asset returns. Relative to the Epps Effect which we have taken an interest in, this gives rise to a different set of issues, specifically, the need to use any available preliminary estimators or proxies for the volatility variable, such as realized volatility (RV) for example, in order to come up with its correlation with asset returns. We will furthermore be showing convincingly that the latency of the volatility variable is partly responsible and no huge measure for the observed puzzle.

Another pressing issue that is common at high frequency between the estimation of the correlation between the two asset returns and the estimation of the correlation between an asset's return and its volatility is that of the market microstructure noise. It has been observed that when sampled at sufficiently high frequency, asset prices tend to incorporate some noticeable noise that reflects in the mechanics of the trading process, thereby affecting such issues as the different price impacts of different types of trades, limited liquidity, the bid/ask bounces, or other types of frictions. To address this issue, we will analyse the effect of using noise-robust high frequency volatility estimators for the purpose of estimating the leverage effect.

There is an abundance of related studies which include the changes in volatility in Bandi and Reno (2012) and the development of nonparametric estimators of the covariance between asset returns in Wang and Mykland (2009). These two sources seem to propose nonparametric estimators of the leverage effect and seem to care to develop the asymptotic theory for their respective estimators. Our focus by contrast is on understanding the source and quantifying the bias (es) that result from employing what is otherwise a natural approach to estimate that correlation.

In the univariate volatility case, there are many estimators that have been developed to produce consistent estimators despite the presence of the observed noise. These include but are not limited to Two Scales Realized Volatility (TSRV) of Zhang, Mykland, and Ait-Shalia (2005), the Multi-Scale Realized Volatility (MSRV), a modification of TSRV, which achieves the best possible rate of convergence proposed by Zhang (2006), Realized Kernels (RK) by Branddorff-Nielsen, Hensen, Lunde, and Shephard (2008), the Maximum-Likelihood Estimator (MLE) of Ait-Sahalia *et al.*, (2005) shown to be robust to stochastic volatility by Xiu (2010), and the Pre-Averaging volatility estimator (PAV) by Jacod and Ait-Shalia (2009). Other related works on this subject matter include Ait-Sahalia, Mykland, and Zhang (2011), Delattre and Jacod (1997), Bandi and Russell (2006), Fan and Wang (2007), Gatheral and Oomen (2010), Hansen and Lunde (2006), Li and Mykland (2007), Kalnina and Linton (2008), and Li *et al.* (2009).

We know that to estimate the correlation between any two given assets, or any other two chosen variables that are observable, as Zhang (2011) proposed, a multivariate Pre-Averaging estimator, a consistent Two Scales Realized Covariance estimator (TSCV), a Multivariate Realized Kernel (MRK), Kinnebrock and Podolskij (2008), Barndorff-Nielsen *et al.* (2011), A¨ıt-Sahalia *et al.* (2010), and a multivariate Quasi-Maximum Likelihood Estimator (QMLE) could be deployed.

There are at least four biases involved in the estimating of the correlation between returns and changes in volatility, when a sequence of progressively more realistic estimators is employed. We shall proceed rather incrementally, in such a way that we can isolate the sources of the expected bias one at a time. We can start with the spot volatility, which is an ideal but unavailable estimator since volatility is unobservable, and we will see that the leverage effect parameter ρ is already estimated with a bias that is due solely to discretization. This bias is observably small when the discretization step is also small, but we will soon see that the optimal discretization step is not really small when more realistic measures of volatilities are deployed. The unobservable spot volatility is frequently estimated using a local time-domain smoothing method which essentially involves integrating the spot volatility over time, locally.

We can go further and replace the spot volatility by the (also unavailable) true integrated volatility. The bias for estimating ρ is very large, but would remain rather quantifiable. This incremental bias is due to what we can refer to as smoothing. And by replacing the truly integrated volatility by an estimated integrated volatility, the bias for estimating ρ becomes so large that, when calibrated on realistic parameter values, we find that the estimated ρ becomes almost essentially zero. This is indeed what we find empirically from our observations. This subtle but noticeable incremental bias represents the effect of the estimation error in the forgoing analysis. We can then examine the effect of using noise-robust estimators of the integrated volatility, and compute the resulting additional bias term, which can make the estimated leverage effect to go in the reverse direction.

2.2 Theoretical Framework

We shall delve into the concept of efficient market hypothesis (EMH) which was formally known as the random walk theory. The term “random walk” was first mentioned and originated from correspondence columns of the journal Nature of 1905 which attempted to vividly describe how to go about looking for a drunken man who had for some reasons been left in a large and empty field. At first thought, it is generally expected that the drunken man due to his drunken state of stupor would stagger and walk at random and move aimlessly. So, theoretically, the best way to search for him and seek him out, therefore, would be to start out from the spot where he was left, that place being the least estimate of his actual location

(Akujuobi, 2006). Earlier in 1900, Bachelier had in his all enlightening publication and study of commodity prices observed that those commodity prices he took a critical look at showed some random walk characteristics, even though that is not exactly the term he used.

Bachelier in that groundbreaking work furthermore stated that the commodity price activity in the country of France then was a fair game because according to him, neither the sellers nor the buyers could expect to make profits unduly. This, he said is actually because the difference between the actual and expected prices of commodities, if continually added up together for a long period of time, would eventually get to zero.

The approach described above later came to be known as the efficient market hypothesis theory.

2.2.1 Development of Efficient Market Theory

It is Eugene Fama who is most often believed to be the modern father of the concept of efficient market hypothesis, beginning with his novel Ph.D thesis. It was in a ground-breaking article found in the May 1970 issue of the Journal of Finance, entitled "Efficient Capital Markets: A Review of Theory and Empirical Work," that Fama in no surreptitious way proposed two crucial concepts that have defined the conversation on efficient markets ever since.

First was his article in 1970 where he propounded that there are three types of efficiency: he called the first one the strong-form, named the second type the semi-strong form and described the last one as weak-form efficiency. All three types of efficiencies are explained in the context of what information is factored into any price. In the weak-form efficiency, he explains that the information set is just historical prices, which can be easily predicted from any available historical price trends; thus, it is seemingly impossible to profit from it. He went ahead to say that the semi-strong form requires that all public information is reflected into the prices already available, such as companies' regular announcements or annual earnings figures. Then finally, in the strong-form type of efficiency, he gives us the insight that both publicly and privately held information are all incorporated into the prices of stock. There, he states that he expects that no monopolistic information can entail profits, in other words, even with insider information, one cannot make abnormal profit in the strong-form market efficiency world.

The Nobel laureate further demonstrated and opined that the then nascent notion of market efficiency could not be rejected outright without an accompanying rejection of the already established notions of model market equilibrium like the price-setting mechanism. This concept, also known as the "joint hypothesis problem," had for ages posed a problem for researchers. It is understood that market efficiency simply denotes how information is factored in prices. Fama (1970) again proposed that the hypothesis of market efficiency must be thoroughly tested in the context of what returns we expect. Then there is the problem of joint hypothesis, which states that when a model yields a return, which is significantly different from the actual return rate, one can never be certain if there exists an imperfection in the model or if the market is inefficient, and so must be investigated further.

Researchers very well know that they can actually modify their models by adding in varying factors to eliminate any anomalies, with the hope of fully explaining the return within the model. Now, this anomaly, also known as alpha in the modelling test, thus functions as a signal to the model maker whether or not it can perfectly predict returns by the prevailing factors in the chosen model. However, for as long as there is the existence of an alpha, neither a conclusion of a flawed model nor a market inefficiency can be drawn according to the joint hypothesis theory. It is expected that in an efficient market structure, the future flow of news is random and unknown in the present. Hence, the statement that efficient market hypothesis is the basis of efficient market theory (Fama, 1970).

The concept of efficient market hypothesis is all about informational efficiency, and can also be described to a lay man as a market's ability to process available information into prices. As has been stated above, the burgeoning idea of efficient market hypothesis emerged as early as the beginning of the twentieth century in the all-important theoretical contribution of Bachelier (1900) and the deep further empirical research of Cowles (1933). As noted by Dimson and Mussavian (1998)'s work, whilst Bachelier (1900) can be said to have first modelled the formulation for a random walk in his study of security prices, it was not until the early 1960's that the theoretical framework for the random walk was developed by none other than Samuelson (1965).

Early century empirical studies by the following: Working (1934), Cowles and Jones (1937), Kendall (1953), Cootner (1962), Osborne (1962), Granger and Morgenstern (1963), Fama (1965), among other great economists showed that several tests were performed on the random walk hypothesis and found substantial supportive evidence of the random walk hypothesis that highlights the fact that successive price changes are all independent. Together with these empirical findings as combined with the theory of Samuelson, published in his very influential paper "Proof that Properly Anticipated Prices Fluctuate Randomly", led to the formulation of the efficient market hypothesis.

According to this hypothesis, in an informationally efficient market, price changes must be unforecastable, which means that the market prices are fully incorporated into the expectations of all market participants. This is because, in an efficient market, it is not possible to exploit any information set to predict future price changes (Campbell, Lo, & McKinley 1997).

Fama further reviewed a host of the theoretical and empirical literature on efficient market hypothesis available at the time and formalized the hypothesis further. He intelligently indicated that a market should be called efficient if prices "fully reflect" all available and useable information. Findlay and Williams (2000) and Fama (1970), in their respective studies graciously determined three sufficient condition sets for the existence of the concept of capital market efficiency.

First, there were to be no transactional costs. Second, all relevant information must be available to all market participants without additional cost. And third, the current price of security should do well to "fully reflect" all available and useful information. These conditions are supposed to ensure that investors having available information cannot earn above competitive returns and a violation of any of the conditions stated above does not necessarily imply market inefficiency. The market may be said to be an efficient one if sufficient number of investors have ready access to available and useful information (Fama, 1970). The violations of these conditions, however, may suggest impeding efficient adjustment of market prices to information (Ball, 1994).

The works of Fama (1970) and Roberts (1959) also distinguished between those propounded three forms of the efficient market hypothesis we have reeled out above. They made us understand that a market can rightly be designated weak inefficiency, if all the information regarding past price movements is reflected in the current stock prices in the market. Under this form of efficiency, it is thought that the information set available is just historical prices that should offer no prediction of future changes in prices. In this case therefore, it is expected that there are no charts or analysis, or anything based on past prices that can help to achieve abnormal profits. In other words, it is safe to say that no profits are left unexploited. Consequent on this, the result is expected to be a fair game in the end.

The second consideration is this: a market is called semi-strong efficient if all publicly available information is reflected in the stock prices; thus abnormal profits cannot be made using publicly known information. Finally, a market is designated strong-form efficient if on the basis of all available information, including even any form of insider information, it is not possible to forecast future price movements in the market.

Recall that a semi-strong efficiency implies weak-form efficiency while a strong efficiency implies semi-strong and weak efficiency. So, if the weak-form of the efficient market hypothesis (EMH) can be rejected, then the semi strong and strong-form can also be rejected (Campbell *et al.,* 1997; Fama, 1970); and this is because the precondition for testing either the semi-strong or strong form efficiency lies on whether the market is weak-form efficient or not.

2.2.2 Development of the Concept of Capital Market Efficiency into Modern Form

The theoretical and empirical findings so far represent varying stages in the development of the efficient market hypothesis concept, and they reflect various views of a myriad of great researches. In the long process of the development of the concept of capital market efficiency into its modern day form, it is possible to recognize two different and distinct approaches. Fama's approach is popularly referred to as the "empirical" tradition of Chicago school, where it developed earlier formal foundations of the efficient market hypothesis (Findlay and Williams, 2000). Then there is the "information" economics approach which was followed carefully in the works of Rubinstein (1975), Beaver (1981), and Latham (1986), who introduced alternative definitions and concepts to the efficient market hypothesis.

The empirical tradition as seen in the writings of Chicago school by Fama concentrated much on explaining how the capital market makes use of information or establishes market prices, whereas the "information economics" school have attempted to formalize the efficient market hypothesis taking into consideration individual investors and their relation to prices. It was Beaver in 1981 who skilfully defined a market as being efficient with respect to information signal. He said a market is efficient if it generates security prices identical to those that would be generated where each individual investor knows the correct signal given that preferences and endowments are identical in both markets. Then Latham in 1986 went ahead to describe market efficiency relative to some information set that if revealed to all investors would not enable them change prices and portfolios.

As summarily pointed out by Ball (1994), there are more formal definitions over Fama's approach, and they are of limited use for empirical researches. He came up with the idea that an "identical world" where all investors assumed costless possession of all available information is not realistic. However, he propounds that in the real world it is almost impossible to expect all information to be costless and all investors fully informed about all information available. Therefore, any good test of market efficiency has to assume what he called an equilibrium model, which was proposed by the "empirical school". Leroy (1989) criticized Fama's proposition that in an efficient market, prices "fully reflect" available information. He said it was almost as good as empty and sounds tautological. He convincingly argues that it is rather unclear to him how the market correctly uses all relevant information in determining security prices, if investors have heterogeneous information all across.

Also, beside the "information economics approach", a certain Grossman (1976) also noticed what he called a paradox in Fama's definition of the term "fully reflect". He opined that when prices fully reflect all available information in a market, there is then no reason for any savvy investor to search for more information in his/her decision-making of buying or selling of his or her different shares/stocks. How could the prices fully reflect the information if no one searched for relevant information?

Grossman and Stiglitz (1980) further analyzed this seeming paradox and presented to the world a model where the market prices partially do reflect the available information that arbitrageurs have in their possession. Their school of thought was based simply on two types of investors: the informed and the uninformed ones. They felt that if the market is said to be efficient, where available information is associated with a cost, the informed individuals would then not be able to get any compensation over the uninformed set of individuals, since the information will be fully reflected in the stock prices in the market.

They also said they found certain noise in this model, and this implied that stock prices in the market could not possibly reflect all available information. They felt that if the market prices were perfectly informative as claimed, there would be little or no incentives for investors to search and pay for additional information for their decision-making in the market (Oludoyi, 1999). Malkiel (1992) extended Fama's definition by including two more new dimensions: first, he proposed that in efficient markets, security prices would be unaffected by revealing that information to all participants; and second, he thought it was impossible to make profit by trading on this set of available information.

Therefore, to him, market efficiency can only rightly be judged by measuring profits made by trading on available information. This view is closely related to the definition of market efficiency provided by Jensen (1978), Timmermann and Granger (2004) and Campbell *et al.,* (1997). However, their definitions were concerned more with transactional and information costs, which do not really involve testing joint hypothesis. However, after all propositions, Fama's assertion on the efficient market remains the most commonly used standard and benchmark for efficient market testing in modern times.

2.2.3 Models for Testing Market Efficiency

The various models of efficient market hypothesis rely on the efficient exploitation of available information, whether public or not by key economic actors. An asset market is generally said to be efficient if the asset price fully reflects available information. Fama (1970) suggested five models for testing market efficiency solely based on the definitional statement of an efficient market, and they are: the Expected Return or Fair Game Model, the Submartingale model, the Random Walk Model, and Capital Asset Pricing model (CAPM) and the Market Model. We are working on the premise that an asset market is efficient if the asset price fully reflects all the available information.

2.2.4 The expected return or fair game model

It is a well-known and accepted fact that for a market to be efficient, it is expected that prices will fully reflect all available information. So far, this fact has no testable empirical implications whatsoever, but in other to make this model testable, the price mechanism process must be specified in more details such that the term “fully reflect” would usually be x-rayed thoroughly and completely.

It is worthy to note that generally, the empirical tests and theoretical models of capital market efficiency have never been this specific as almost all the revised and available works are firmly anchored on the strong assumption that the conditions of market equilibrium can be stated in terms of expected returns (Sharpe, 1964 and Lintner, 1965). To put it more elaborately, using the two-parameter model, the theory simply states the conditions based on some relevant information set, the equilibrium expected rate of return on a particular security is a function of its level of “risk”. And primarily, different sets of theories are on different pages as to how risk can be defined. All the relevant members of this school of thought of such "expected return theories" can be referred as follows (Fama, 1970):

$$E\ (B_i, t+1/Zt) = [1 + E\ (r_i, t+1/Zt)]B_i, t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..2.1$$

Where E represents the expected value operator; B_it being the price of security i at time t; $B_i, t+1$ can be said to be the price at t + 1 (with reinvestment of any intermediate cash income from the security): $r_i,\ t+1$ is the one-period percentage return, and $(B_i, t+1 - \ B_i\ t)\ /B_i, t; Zt$ is a general symbol for whatever set of information that is assumed to be "fully reflected" in the price at time t. We will take $B_i, t+1$ and $r_i,\ t+1$ as stochastic variables at t.

Any particular expected return theory usually determines the assumed value of the equilibrium expected return $E\ (r_i,\ t+1\ /Zt)$ on the basis of all the available information Zt. The conditional expectation symbol of equation (2.1) implies that whatever expected return model is assumed to apply, the information in Zt is fully utilized in determining equilibrium expected returns. And this is the sense in which Zt is "fully reflected" in the formation of the price B_i, t.

The general assumption that market prices "fully reflect" all available information depends to some extent and mainly on its validity as well as on the issue of efficiency of the capital market (Fama, 1970).

These assumptions are those deduced from the work of Fama (1970), where the conditions of market equilibrium can be stated in terms of expected returns and where also the equilibrium expected return rates are formed on the basis of (and thus "fully reflect") the information set Zt have a major empirical implication on the market. By this, the possibility of having trading systems solely based on information in Zt that have expected profits or returns in excess of equilibrium expected profit or returns is completely ruled out. Thus we can now say, let

$K_i, t+1 = B_i, t+1 = E(B_i, t+1 \,/Zt)$................................ 2.2

Then, $E(K_i, t+1 \,/Zt) = 0$ 2.3

By definition, the sequence (K_i, t) is a "fair game" which, by definition, the sequence (K_i, t) is a fair game with respect to the information sequence (Zt) or equivalently.

Let

$D_i, t+1 = ri + 1 - E(r_i, t+1 \,/Zt)$ 2.4

Then, $E(D_i, t+1 \,/Zt) = 0$ 2.5

This also implies that the sequence denoted as (D_i, t) is also a "fair game" with respect to the information sequence seen in Zt.

Therefore, $K_i, t+1$ can be said to be the excess market value of security *i* at time $t+1$. This right here is the major difference between the observed price and the expected value of the price that was projected at t on the information basis of Zt. The same can be applicable for $D_i, t+1$ which is the return at t + 1 in excess of the equilibrium expected return projected at t on the basis of information at the point of Zt. Also in the same vein, $D_i, t+1$ is the return at t + 1 in excess of the equilibrium expected return projected at t.

$\lambda\ (Zt) = [\lambda_1(Zt), \lambda_2(Zt) \ldots, \lambda_n(Zt)]$ can be easily described as any trading system based on information Zt which helps to tell an investor the amounts of λ_1 (Zt) funds available at time t which are to be and can be invested in each of the number of securities available.

Thus we can say that in totality that the excess market value at t + 1 that will be generated by such a system is

$$m_i, t+1 = \Sigma\ \lambda_1(Zt)[r_i, t+1 - \mathrm{E}(r_i, t+1/Zt)]$$

which is from the "fair game" property that we see in equation 2.3, and it has expectation which is denoted as

$$\mathrm{E}\ (m_i, t+1/Zt) = \Sigma\ \lambda_1(Zt)\Sigma(D_i, t+1/Zt) = 0$$

In summary, we can say that it should be noted that the "fair game" properties of the model are all implications of the assumptions that: (a) the market equilibrium conditions can be stated in terms of expected returns on the investment, and (b) the information denoted as (Zt) is fully utilized by the market in forming equilibrium expected returns and thus affecting current prices in the market.

The first recorded scholars who rigorously studied the role of "fair game" are Mendelbrot (1966) and Samuelson (1965), and they are models in the theory of efficient markets.

2.2.5 The Submartingale Model

Let's assume for example that in equation (2.1) for all t and (Zt),

$\Sigma(B_i, t+1/Zt) \geq B_i, t,$ or equivalently, $\Sigma(r_i, t+1/Zt) \geq 0$ …… 2.6

Equation (2.6) above shows that the price sequence denoted as (B_i, t) for security i follows a submartingale model with respect to the information sequence (Zt). Also, the expected value of next period's price, as projected on the basis of information (Zt) is equal to or greater than the current price of the stock. If equation (2.6) holds as an equality (so that expected returns and price changes are zero), then the price sequence can be said to follow a martingale model (Fama, 1970).

The martingale series or sequence, therefore, implies that the expected price of any next period, given all the available information should be equal to or greater than the current price. This then further implies that the expected return of any next period, given all the available information should be sufficiently greater than or be equal to the value of zero.

It goes without saying that the empirical implication of a Submartingale in market prices cannot be in any way over emphasized. Let us now consider the set of "one security and cash" mechanical trading rules by which we mean systems that concentrate on individual securities and that help us to define the conditions under which any investor would hold a given security, sell it short or simply hold cash at any time t.

The assumption of equation (2.6) will then be that expected returns conditional on information (Zt) are really non-negative and this directly implies that such trading rules based only on the information in (Zt) cannot have greater expected profit over or more than a policy of always buying-and-holding the security during the projected period in question. Testing of such rules will be an all important part of the empirical evidence on the efficient markets model (Fama, 1970).

2.2.6 The random walk model

The popular statement that the current price of any security "fully reflects" all available information simply implies that successive price changes or successive one period returns are assumed to be fully independent. More so, it is assumed that successive price changes (or returns) are all identically distributed. Therefore, what constitutes the random walk is anchored on these hypotheses: (a) that the current price of any chosen security fully reflects available information, and (b) that successive price changes are independent. Putting this quite formally, the model posits that

$$f\ [(r_i, t+1/Zt)] = f(r_{i,}\ t+1) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2.7)$$

Now, this constitutes the statement that the conditional and marginal probability distribution of any independent random variable is identical. Again, the density function denoted as f must be the same for all t (Fama, 1970). Equation (2.7), therefore, explains much more than the general expected return model as shown in equation 2.1. And if, for instance, we restrict equation (2.1) for example by assuming that the expected return on security i is constant over, time, then we have

$$\Sigma(r_i,\ t+1/Zt) = E(r_i, t+1) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2.8)$$

This then allows us to suggest that the mean of the distribution of $r_i, t+1$ is independent of the information available at a time denoted as t, whereas the random work model shown in equation (2.7) posits that the entire distribution is independent of Zt, Fama (1970). It then further argues that it is best to regard the random walk model as an extension of the general expected return or “fair game” efficient markets model in the simple sense of making a more detailed statement about the economic environment of the market.

The “fair game” model lays little emphasis on the details of the random process that generates returns. But then, on the contrary, the “fair game” model approximates the conditions of market equilibrium that can be stated in terms of expected returns. A random work model usually operates within the confines of such a model when the economic environment is seen to be unpredictable or unpremeditated, such that the evolution of an investor’s tastes and the process of generating fresh information combine to produce some form of equilibrium in which return distributions, repeat themselves through time.

Renown economist Fama in his 1970 work further extended the understanding of efficient market hypothesis, using his illustration about the expected probability of “one security and cash” trading systems vis-à-vis buy-and-hold, which is not ruled out by the general expected return or “fair game” efficient markets model. Here he stressed that it is quite possible for some securities to have a negative equilibrium expected returns.

For instance, in the works of Lintner (1956a, 1956b) and Sharpe (1964) model, which is actually a natural extension of the portfolio models of Markowitz (1959), the expected equilibrium return on a security depends on the extent to which the dispersion in the security's return distribution is in turn related to dispersion in the returns on all other securities. It isn’t new information that a security whose returns on average move opposite to the general market is particularly valuable in reducing dispersion of portfolio returns, and therefore its equilibrium expected return may well be in the negative.

In addition, the fact that prices would only follow a random walk if price changes are adjudged to be independent and identically distributed. The random walk model does not in any form or fashion suggest or mean that all past information is of zero value in assessing distributions of or for future returns. Indeed since distributions of returns are assumed to be stationary through time, all past returns are the best source of such information. The random walk model, therefore, means that the sequence (or the order) of the past returns is of no consequence in assessing distributions of future returns.

2.2.7 Capital Market Efficiency

The detailed study of market efficiency is a very essential aspect of security evaluation. We can say that a capital market is efficient if it helps, facilitates or enhances the optimal allocation of available capital resources among an array of competing investors. The general concept, therefore, is that for a market to achieve its intermediation roles in any nation's economy, the capital market must have the ability to allocate its relatively scarce resources amongst the myriad of competing users or investors. This should be in a way that is consistent with their different probability of returns and their levels of risk profiles.

A capital market in other words can be said to be allocationally efficient when prices are determined in a way that equates the marginal rates of returns (Nzotta, 2005). This condition, therefore, connotes that there must of necessity exist enough buyers and sellers and also there must be the availability of all participants in the market who should expectedly have reasonable access to all available information to enable them effect good decisions. In other words, capital market efficiency means that investors are able to sell, buy, or execute securities with the most minimum delay. Finally, we can safely say that efficiency means that there is the absence of any restraining influence on the price-making mechanism.

On one hand, efficiency which is based on an investor's behaviour assumes first that all investors must have adequate knowledge of the market conditions or can secure enough advice to appreciate the significance of relevant and available information. Second, investors are generally presumed to be risk averse and quite rational, thus, all their investment decisions are assumed to be based on a good judgment of the risk profile. Third, we assume that investors must have homogenous expectations about current and future trends on the present worth of every security traded in the capital market (Okafor, 1983).

A market is adjudged to be allocationally efficient when the prices of stocks are determined in a way that equates the marginal rates of return adjusted for risk for all producers and savers in the system (Nzotta, 2005). The ripple implication herein is that in an allocationally efficient market, financial resources are allocated to the most productive users in an efficient manner according to needs and demand. It is very important at this juncture to summarily compare an efficient capital market with a perfect capital market. The comparism throws up the following:

a.) First, perfect markets are adjudged to be frictionless; by this, we mean that there are no taxes or transactional costs. There is also noticeably the absence of constraining regulations and legislations.

b.) Second, perfect competition is also noticeably available and there is free entry and free exit.

c.) Third, in a perfect market, information is said to be costless and can be received simultaneously by all individuals and investors in the market.

d.) Fourthly, all individuals are said to be rational expected utility maximizers.

When and where the above conditions prevail, then we can say that a perfect capital market is existent.

Capital market efficiency on the other hand is much less a restrictive system than the notion of perfect capital markets. In an efficient capital market, prices fully and instantaneous reflect all available and relevant information, Nzotta (2005). In any market described as efficient capital market, prices can be seen to be accurate signals for capital allocation amongst competing users. When we compare the perfect capital market and the efficient capital market, we can summarize the following:

a.) It is possible that we can have an efficient capital market without a perfect market if markets are frictionless. And in spite of the availability of brokerage fees, prices will still fully reflect all available information.

b.) It is possible that we can still have an efficient capital market with imperfect competition in the market. This implies that if a firm is judged to have reaped monopoly profits in the product market, the efficient capital market will aid in determining security prices that fully reflect the present value of the anticipated stream of monopoly profits.

c.) It is usually not necessary to have information that is costless in an efficient capital market.

Efficient capital markets can be said to summarily imply operational efficiency; and operational efficiency here deals basically with the cost of transferring funds in the market. With that said, capital markets are operationally efficient if intermediaries such as financial institutions which provide funds in the market do so at a return for their services.

According to Okafor (1983), capital market efficiency can be equated to the efficient market model. This model states that in an efficient market, the prices of stocks can adjust so quickly to new information such that:

a.) security prices will fully reflect all available information about the affected securities in question.

b.) all successive changes in the security prices are relatively independent.

c.) all security prices will always adjust rapidly to new available information.

We note at this juncture that three specifications of the model have been identified, and they are: the weak form, also known as the Random Walk Hypothesis, the semi-strong form and then the strong form.

2.2.8 The Principal Features of each of the three Forms of Market Efficiency

2.2.8.1 Weak Form Efficiency

i.) The current share price here reflects all available useful information contained in past price movements in the market.

ii) There is almost no point in predicting future price movements less randomly around the true or intrinsic share value of a stock.

iii.) Any notable departure from randomness would be too expensive to determine in the market.

2.2.8.2 Semi-Strong Form Efficiency

i) Here, we note that current market prices not only reflect all past price movements, but also reflect all publicly available and useful information, including such documents as interim company publications and annual reports.

ii) There is usually no foreseeable benefit in analyzing existing information (for instance, that given in published accounts after the information has been released). We note that current share prices reflect already captured information.

2.2.8.3 Strong- Form Efficiency

i) We see that the current market prices reflect all relevant and available information even if they are privately held.

ii.) The market prices reflect the true or intrinsic values of the shares in the market based on the underlying future cash flow anticipated.

iii.) No one can possibly consistently beat the market and earn abnormal profits over a long period of time.

2.2.9 Implications of the Market Efficiency Form

Dike (2011) posits that to an investor:

a.) It is of no useful purpose paying for investment research in the market.

ii.) The art and science of studying published accounts and stock market tips will not in any way generate abnormal returns.

iii.) That there are no bargains to be found in any way on efficient stock exchange.

To the financial managers:

i) They should focus on consistently making good financial decisions thereby increasing their shareholders' wealth base since these decisions will be correctly interpreted by the market and share price will adjust accordingly.

ii) The cosmetic manipulation of any accounting information, for example, through window dressing of periodic financial statements or by massaging earnings per share values will not mislead the market.

iii) The timing of new issues and right issues is not usually that important since capital market securities are never priced in an efficient stock market.

Our study so far on the a priori has helped us come up with the fact that the Nigerian Stock Exchange (NSE) could be safely classified as semi-strong because prices of shares in the market reflect not only all past price movements but all publicly relevant and available information.

Today, it honestly feels like the field of financial market research is at the exciting stage where past results are being queried and questioned, and new solutions are being constantly proposed. There also seems to be growing dissatisfaction among most interested academic researchers with the available body of literature developed on the assumption of the capital market's level of efficiency. Keynesian ideologies on speculative phenomena, which have been hitherto ignored, are being resurrected to explain the volatile nature of the Nigerian Stock Market.

The truth is that while only time will tell whether or not the present crisis will eventually lead us to a revolution in thought and development of a coherent theory of stock market behaviour, it seems only appropriate at this point to stock of the current literature in the area of market efficiency and to identify the emerging new lines of thought and delve into research.

2.2.10 Arbitrage Pricing Theory

The arbitrage pricing theory (APT) and the capital asset pricing model (CAPM) have only recently emerged as the two models that have tried to scientifically measure the potential for assets to generate a return or loss. It is common knowledge that both of them are based on the efficient market hypothesis, and are important parts of the modern portfolio theory. The efficient market hypothesis (EMH), according to Fama (1965), summarily states that at any given time, security prices would always fully reflect all available information. If an asset is said to be overpriced, then arbitrageurs would shop for the asset, until reduced demand for purchasing it causes the price to fall (Jecheche, 2012) while the opposite holds true for the underpriced securities.

Ross in 1976 intelligently introduced the concept of arbitrage pricing theory (APT) as an alternative to the capital asset pricing model. The arbitrage pricing theory has the potential to overcome all of the capital asset pricing model's weaknesses. It requires less and yet more realistic assumptions to be generated by some simple arbitrage arguments and its explanatory power is said to be potentially better since it is a multifactor model. The arbitrage pricing theory always attempts to relate the expected rate of return on a sequence of primitive securities to their factor sensitivities, suggesting that the risk factor is of a massive critical importance in asset pricing (Gilles & Leroy, 1991).

According to Akujuobi (2006), as with other factor models, in the arbitrage pricing theory, it is usually expected that portfolios or securities that have equal sensitivities will be affected equally the same way except for non-factor risks. Consequent upon this, the same returns are expected from portfolios or securities with the same factor sensitivities. And if there are any differences, the implication is that "almost arbitrage" opportunities exist. It is commonly seen that investors will usually keep going for the opportunities until they are seen to no longer exist.

Sure there are major or pervasive factors that affect many firms in varying degrees in any economy. How the investors expect these factors to affect the companies directly affects the prices of the securities of the companies sensitive to these important factors, in relation to their varying degrees of sensitivity. In investment analysis, we try to identify these salient factors in the economy. What we also do is to ascertain how sensitive prices of securities are to them, identify them as well as the expectations of the investors as regards the future occurrence of the noted factors. A factor model of security returns is a statement showing these relationships.

2.2.10.1 Factors Model

The analysis of the arbitrage pricing theory starts off by assuming that a security's return is usually affected by an unknown number of unknown factors (Ross, 1976). However, for the sake of our present illustration, we will go on and assume that only one factor affects a particular security's returns and that factor is the interest rate. In this case, the security return is related to only this factor in the following one-factor model.

$$R_i = a_i + b_i f_i + e_i \qquad \text{………………………..……. (2.9)}$$

Where: R_i = rate of return on security i

a_i = the zero factor

f_i = the value of the factor, which in his situation is interest rate

e_i = random error term (security specific return).

In equation (2.9) above, bi is known as the sensitivity of security **i** to the factor. It can also be called the factor loading for security **i** or the attribute of security **i**.

What we do is that as many of the pervasive factors as possible should and would be identified. In this case, a general equation for all the factors can be stated as follows:

$$R_i = a_i + b_{i1} F_1 + b_{i2} F_2 \ldots b_{im} + e_i \text{ …………………………….. (2.10)}$$

Where M is the number of factors with assumptions that the expected value of each security-specific return is zero. We assume that all the security-specific returns are uncorrelated with each other.

We can now assume that N pervasive factors have been identified and are stated as can be seen in equation (2.10). We will also assume that there are very many securities with many degrees of sensitivities to the factors. Consequent upon this, many investment strategies become open for onward exploitation. With the many securities with different characteristics, an investor can construct a portfolio that is:

a. Sensitive to factor 1
b. Not affected by very other factor
c. Diversified so well that security–unique returns are eliminated.

The trick is to combine both the long and short positions to hedge out sensitivities to factors 2, 3 ---- N and to hold up a large number of securities so that as many will experience good security-specific returns as will experience bad ones, Sharpe (1985).

.2.2.10.2 Arbitrage Portfolio

Following the laid down principles of the arbitrage pricing theory, any investor can construct what we call an *arbitrage portfolio* so as to help him increase the expected return of his or her current portfolio, without necessarily increasing the current risk level. By implication then, an arbitrage portfolio does not really require additional funds from an investor willing to invest. In addition, the arbitrage portfolio is not sensitive to every other factor or has zero factor exposures. As a matter of fact, the arbitrage pricing theory assumes that an arbitrage portfolio should also have non-factor risk value of zero because any such non-factor risk would be so small that it could be ignored. So it is clear for all to see that arbitrage is desirable to any investor who wants high returns and is not worried about the non-factor risk. In addition, the investment does not require additional funding and yet it has a positive return (Akujuobi, 2006).

2.2.11The Capital Asset Pricing Model: An Overview

The simple yet profound fact is that no matter how much we diversify all our investments, it is impossible to get rid of all the risks. As investors, we know will deserve a rate of return that compensates us for taking on risk and this is where the capital asset pricing model helps us to calculate investment risks and what returns on investment we should look forward to receiving.

2.2.11.1 Birth of a Model

The financial economist and later Nobel Laureate in economics, William Sharpe developed the capital asset pricing model which he set out in his 1970 book, *Portfolio Theory and Capital Market.* His model basically starts with the idea that individual investments contain two types of risks, viz:

a. Systematic risks: These are the risks in the market that cannot be diversified away, and they include, but are not limited to recessions, interest rates and wars.
b. Unsystematic risks: These are also known as specific risks. These risks are specific to individual stocks and can be diversified away as the investor gradually increases the number of stocks in his or her portfolio. In more technical terms, it represents the component of a stock's return that is not correlated with the general moves in the market.

The capital asset pricing model has its sights on identifying the prices of assets and does not seem to lay emphasis on the portfolio of assets. It also uses risk return rule of assets and shows how the expected return of an asset is related to a measure of its risk known as beta (Akujuobi, 2006).

Sharpe based the capital asset pricing model on the following assumptions:

1. That there is a noticeably high level of aversion on the part of market participants, meaning that most investors tend to maximize the expected utility of their end of period wealth.
2. That there is unlimited opportunity for investors to borrow or lend at a risk–free rate of return. Here, investors are presumed to have the choice.
3. That there are really no taxes, transaction costs, no monopoly control over information flows, and no restrictions on short selling.
4. That all attributes of capital market imperfections are presumed to be totally absent.
5. That investors are rational beings and that they seek to hold portfolios which are efficient to the best of their knowledge and ability.
6. That investors have similar expectations about opportunities representing the risk-return characteristics of available securities.
7. That there is a risk-free asset and/or risk-free portfolio with a rate of return designated as $\mathbf{R_f}$.
8. That asset markets are frictionless and information is costless and simultaneously available to all willing-to-know investors (Nzotta, 2003).

From these set of assumptions, what the capital asset pricing model does is that it reduces an otherwise difficult investment to a simplified extreme case. With this, every investor can basically have the same information and agree about the future prospect for securities which then means that the investors are free to analyze and process information the same way. Note also, that if securities markets are adjudged to be perfect, it means that investments are carried out freely devoid of taxes and other encumbrances.

The potential imperfections such as taxes, transaction costs, finite divisibility and different risk-free borrowing and lending rates are also assumed not to exist in the capital asset pricing model. With these assumptions, therefore, the capital asset pricing model shifts our emphasis to what would be the security prices if all investors in the market behave in exactly the same way. As we can see and deduce, it is this detailed examination of the general behaviour of all investors in the security market that enables the capital asset pricing model to develop the resultant equilibrium relationship between each securities risk and return (Akujuobi, 2006).

2.2.12 The Capital Market Line

2.2.12.1 The Separation Theorem

Consequent upon the above assumptions, all investors would be expected to analyze securities and determine the composition of what may be called a tangency portfolio to be the same for all investors across board. Now, this is so because one of the above assumptions states that all investors have homogenous expectations, meaning that they have just about the same perceptions with regard to the standard deviations, covariances of securities, and expected returns. Also the assumption says that the linear efficient set is the same for all investors because what it does is that it combines the determined tangency portfolio with either risk-free lending or borrowing.

We tend to believe that all investors have the same set of efficient portfolios and that their investment options can only vary according to their utility preferences of return and risk. This is what we call their indifference curves. But in reality, each indifference curve shows an investor's level of utility satisfaction of particular levels of risk and returns. With this, we tend to observe wherever a particular indifference curve touches the straight line, linear efficient set we designate it as the equilibrium or optimal portfolio.

Investors, for instance, who are risk-averse will be seen to have their indifference curves located more around the risk-free rate sides while those that love risk would have theirs above the point of tangency because they may not even borrow at the risk-free rate in order to make more profits (returns). So, basically each investor would invest his or her funds in risky securities in the same relative proportions and only add risk-free lending or borrowing to suit his or her position on the risk and return preference. This feature of the capital asset pricing model is well known as the *separation theorem.*

Sharpe's theorem states that the optimal combination of risky assets for an investor can be determined without any knowledge of the investor's preferences toward risk and returns. This theorem is based on the fact that all portfolios are assumedly located on the linear efficient set which involves an investment in a tangency portfolio combined with varying degrees of risk-free borrowing or lending. Now, with the capital asset pricing model, all investors can go in and invest, using a combination of efficient risky portfolios. Additionally, an investor can comfortably invest in certain amounts of either risk-free lending or borrowing depending on his or her risk and return preference. This then means that the risky portion of all investors' portfolios would more or less end up being the same.

2.2.12.2 The Market Portfolio

Each security must be represented in the composition of the tangency portfolio when in equilibrium; and this means that each security must have a non-zero proposition in the composition of the portfolio. This, you would observe, is a follow-up to the separation theorem that implies that in every investor's portfolio, the risky part is independent of the investor's risk-return preferences. The fact that the risky parts of any investor's portfolio are investments in the tangency portfolio, it is, therefore, part of the justification for the separation theorem.

The working of this concept is logical. For instance, if every investor buys only those securities that are not represented in the portfolio, the prices of these securities with zero proportions in the portfolio would fall. If their prices fall, their expected returns vis-a-vis their low prices would ultimately attract investors to buy and include them to the tangency portfolio, thereby clearing the outstanding securities in equilibrium.

On the other hand, a situation may arise where some investors may decide to include a certain proportion of a particular security to the tangency portfolio, but then there is just not enough of it to meet the demand at the current price of the security in the market. This situation inadvertently would lead to higher prices for such a security. This higher price would in turn lead to a noticeable fall in the expected return of the security thereby causing the security to be less attractive to the interested investors. This would then result in a reduction of the proportion of the security in the tangency portfolio to a great extent such that the number of shares being demanded now equals the number of shares outstanding.

As the market is brought to a state of equilibrium, the illustrated situations now mean that ultimately everything would have to balance out. In the first instance above, each investor in the market would hold on to a certain positive amount of each risky security. A level will come where the number of securities demanded will equal that outstanding market price of each security. Also in addition, the rate of risk-free securities will come to a level where the total amount of money borrowed will equal the total amount invested.

It is worthy to note that at equilibrium, the proportions of tangency portfolio would certainly correspond to the proportions of what is known as the market portfolio. We can define a market portfolio as a portfolio made up of all the securities in which the proportion invested in each security directly corresponds to its relative value in the market. The aggregate market value of any security divided by the sum of the aggregate market values of all securities is what we describe as relative value of the security (Sharpe, Alexander & Bailey, 2004).

Now, this market portfolio is very important in the capital asset pricing model because its efficient set is made up of an investment in the market portfolio and a desired amount of either risk-free borrowing or lending which represents the tangency portfolio. This tangency portfolio is often referred to as market portfolio and denoted in the graph with M. And even though it consists of bonds, real assets, preferred stocks, and also some common stocks, a lot of people erroneously restrict M to just common stocks.

2.2.12.3 The Efficient Set

In the capital asset pricing model, the determination of the relationship between risk and expected return is simplified; and figure 2 below shows the linear efficient set of the capital asset pricing model.

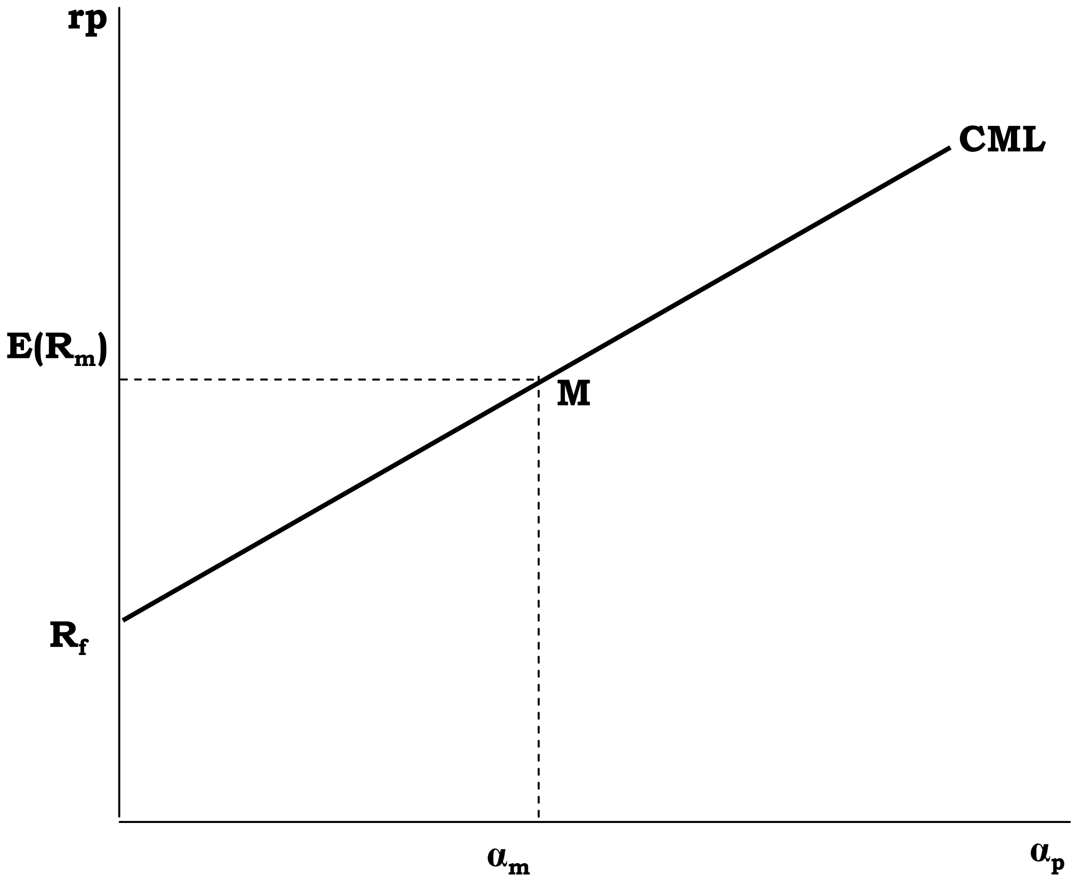


Figure 2.1: The Capital Market Line (*Source*: Akujuobi, 2006)

The Capital Market Line (CML). Every portfolio that does not combine the risk-free lending or borrowing and the market portfolio lie below the capital market line. The slope of the capital market line is the difference between the expected return of the market portfolio and that of the risk-free security (R_m - R_f) divided by the difference in their corresponding risks (R_m - O), that is

R_m - $R_f/_m$. And because the Capital Market Line has R_f as its intercept on the y-axis, it has the following equation as seen from figure 2.1 above

$$R_p = R_f \left[\frac{E(R_m) - R_f}{\alpha_m}\right]\alpha_p \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots . (2.11)$$

Where $\mathbf{R_p}$ and $\mathbf{R_p}$ refer to the expected rate of return and the standard deviation (risk) of an efficient portfolio. Note that the equilibrium in the security market is characterized by two variables:

1. $\mathbf{R_f}$. This is the reward for just holding one's money or what may be called the pure time value of money.
2. $\mathbf{E (R_m) - R_f}$. This is the slope of the Capital Market Line and is known as the reward for bearing risk.

This means that the security market can be very correctly described as a place where time and risk can be compensated and the intercept, $\mathbf{R_f}$ is the price of time, the slope is the price of risk (Akujuobi, 2006).

2.2.12.4 The Security Market Line

Implications of CAPM for Individual Risky Assets

The equilibrium relationship between the expected returns and standard deviation of efficient portfolios, and not just that of an individual asset are shown on the capital market line. The treatment is slightly different for the individual security. Recall that each investor holds the market portfolio under capital asset pricing model. This is because this affects the slope of the Capital Market Line and hence, the magnitude of his or her investment in the market portfolio is dependent on the size of its covariance with the market portfolio.

Consequent on the above, most investors believe that the relevant measure of risk for a security is its covariance with the market portfolio, $\beta_{\mathbf{im}}$. This then implies that securities with the larger values of β_{im} would be seen as necessarily contributing more risk to the market portfolio. And also, securities with larger standard deviations should not be seen as necessarily contributing more risk to the market portfolio than those with smaller standard deviations. From the analysis also, it implies that securities with larger values of β_{im} have to provide proportionately larger expected returns so as to interest investors in purchasing them.

The risk-return equilibrium can be written as follows:

$$R_i = R_f + \frac{R_m - R_f}{\alpha^2{}_m}(\alpha_{im}) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2.12)$$

This is the straight line with intercept $\mathbf{R_f}$ and a slope of $\mathbf{(R_m - R_f)}$. Since the slope is positive, the equation shows that securities with larger covariances with the market (β_{im}) will be priced so as to have larger expected returns, $\mathbf{R_i}$. The security market line (SML) tells the story of the relationship that exists between the expected return and the covariance of securities. It should be noted that a risky security with $\beta_{im} = \alpha^2{}_m$ will have an expected return on the market portfolio, $\mathbf{R_m}$. It is also expected that such a security contributes an average amount of risk to the market portfolio.

Another form of showing the Security Market Line is as follows:

$$R_i = R_f + (R_m - R_f)\beta_{im} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2.13)$$

Where the term $\boldsymbol{\beta_{im}}$ is defined as:

$$\beta_{im} = \frac{\alpha_{im}}{\alpha^2{}_m} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2.14)$$

The term $\boldsymbol{\beta_{im}}$ is known as the *beta coefficient* for security **i** which is another way of showing the covariance of a security. This beta coefficient is a measure of the risk of a portfolio or asset relative to the risk of the market portfolio. The formula for beta above can be represented thus:

$$\beta_i = \frac{C_{ov}(R_i, R_m)}{var.(R_m)} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2.15)$$

Where,

β_i = beta coefficient of asset or portfolio,

Cov (R_i, R_m) = covariance of asset or portfolio, **$_i$,** and the market portfolio.

Var (R_m) = variance of the market portfolio, α^2_m.

As shown earlier in the section on risks, we see that the expected return of a portfolio is duly the weighted average of the expected returns of its component assets and the proportions invested in the securities are the weights.

Because all the assets in the capital market must plot on the Security Market Line, so too must a market portfolio made up of those assets, according to Ross et al (1998). And to determine where the capital market plots on the Security Market Line, we need to know the beta of the market portfolio, **β**. Also, since this portfolio is a general representative of all the assets in the market, it has a beta value of 1. This then means that the *slope* of the Security Market Line could be written as follows:

$$SML\ slope = \frac{E(R_m) - R_f}{\beta_{im}} = E\ (R_m) - R_f \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2.18)$$

The term **$E(R_m) - R_f$** has already been shown to be the *market risk premium* because it is the risk premium of a market portfolio. If we further assume **$E(R_i)$** and **β_i** as representing the expected return and beta respectively, on any asset in the market, the asset must also plot on the Security Market Line. Consequent upon this, its reward-to-risk ratio is the same as that of the overall market.

$$\frac{E(R_i) - R_f}{\beta_i} = E\ (R_m) - R_f$$

$$E(R_i) - R_f = [E\ (R_m) - R_f] \times \beta_i$$

$$E(R_i) = R_f + \left[E\ (R_m) - R_f\right] \times \beta_i \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots..(2.19)$$

Equation **2.19** is the equation for Security Market Line and is identical to the capital asset pricing model and it shows that the expected return of any asset depends on $\mathbf{R_f}$, the price of time, $\mathbf{E(R_m) - R_f}$ which is the price of risk and $\boldsymbol{\beta_i}$ which is the amount of systematic risk present in a particular asset, relative to that in the average asset. This equation shows the equilibrium price of an asset which comes into existence through the combined effects of investors' adjustments in holding of securities and the resulting pressures on security prices.

Like in any other competitive market, at equilibrium price, the quantity desired ultimately equals the number of wanted securities available.

The capital asset pricing model says that the expected return on any investment asset, i, denoted by E (R_I) depends on the risk free rate, the security's beta and the market risk premium.

$$E\ (R_i) = R_f + \beta_i\ [E(R_m) - R_f \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\ (2.20)$$

The beauty of the capital asset pricing model is that it stands as one of the most important ideas in all of finance today. Almost all financial managers in nearly all large firms understand and use the model's key predictions, and they continually use the capital asset pricing model to establish required rates of return on all the types of investment projects having different risk levels.

This knowledge, therefore, significantly improves the quality of corporate investment decisions. As useful as it is however, the capital asset pricing model is not to be used as a crystal ball of some sort. We must reckon the fact that the capital asset pricing model is merely a theory and not a talisman; and so like all other theories, it is an abstraction from reality. It gives us some reliable insights about expected returns, but then it is not the same thing as predicting how the future will unfold.

2.2.12.5 Capital Asset Pricing Model Approach to Project Selection

Let us assume a firm intends to finance any sort of project solely with equity, the criterion for acceptance would then be to invest in the project if its expected return met or exceeded the required return. We can consequently illustrate the acceptance criterion for projects, using this concept of capital asset pricing model.

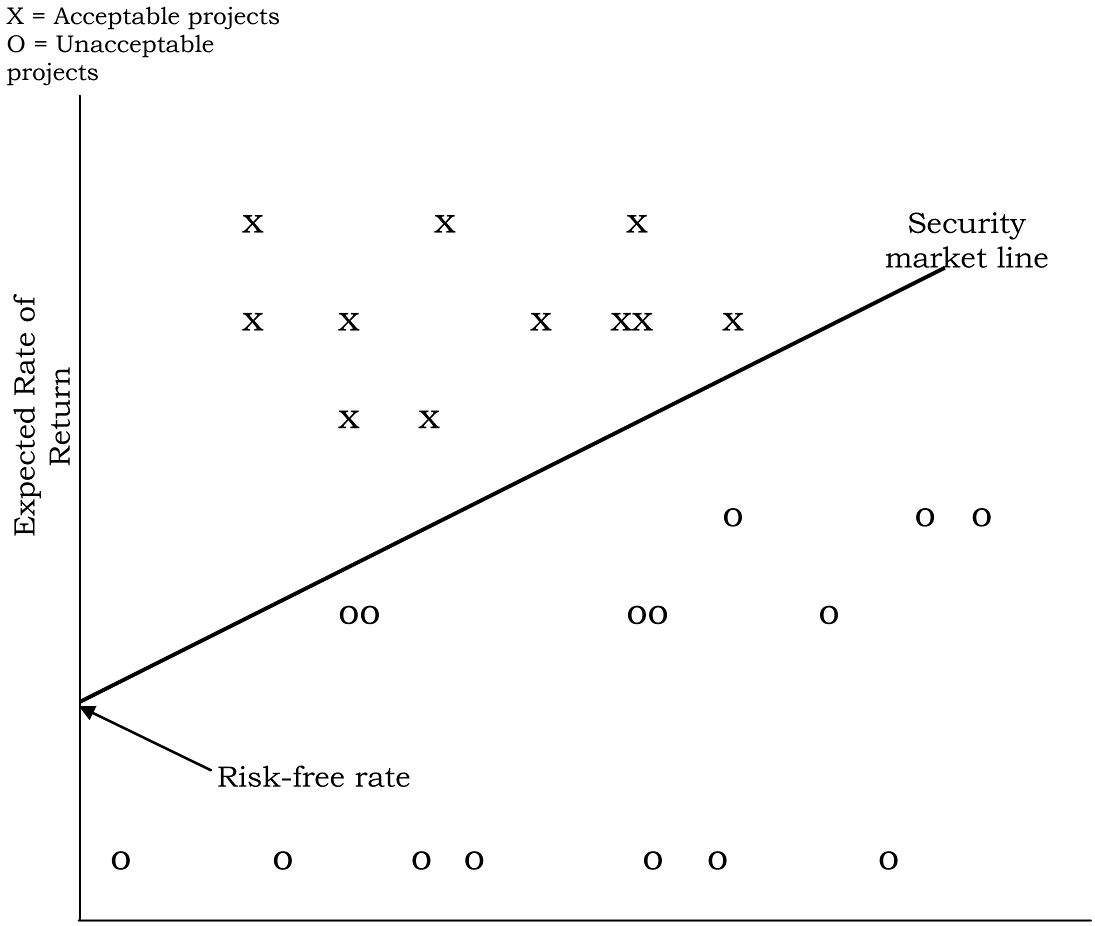


Figure 2.2: Security Market Line. (Nzotta, 2005)

In fig 2.2 above, the (thick) line in the graph represents the security market line and it shows the market–determined relationship between systematic risk and required rate of return. All the projects with internal rates of return lying on or above the line would be accepted because they are expected to provide returns greater than or equal to their respective required returns.

All acceptable projects are depicted by X's on the graph while all projects lying below the line shown by the O's would consequently be rejected. We must note that the greater the systematic risk, only the risk-free rates would be required. So, for projects with more risks however, a risk premium is demanded, and it increases with the degree of systematic risk of the planned project. This in turn means the goal of the firm in this context is to search on for investment opportunities lying above the line (James, Von, James, & Wachowicz, 2008).

The capital asset pricing model shows the expected return for a particular asset and we observe that it depends on three things:

a. The pure time value of money: This value is measured by the risk-free rate, $\mathbf{R_f}$., and it defines the reward for merely waiting for your money, without taking any risks with it.
b. The reward for bearing systematic risk: This value is measured by the market risk premium, $\mathbf{\{E(R_m) - R_f\}}$; this component is the reward the market offers all investors for bearing an average amount of systematic risk in addition to waiting.
c. The amount of systematic risk. This is measured by the value denoted as $\mathbf{B_i}$. This can be explained as the amount of systematic risk present in a particular asset, relative to an average asset (Ross, 1976).

2.2.12.6 Limitations of Capital Asset Pricing Model

1. Beta is known to be difficult to measure accurately for any individual firm.
2. Beta values may be unstable over a period of time.
3. Beta which can easily be estimated from available historical data might not be very appropriate when considering future investments.
4. The capital asset pricing model is strictly a one-period model and as such should be used with caution, if at all for the appraisal of multi-period projects.
5. There may be problems in determining the appropriate risk-free rate of return.
6. Truth be told, in the real world, there is no prefect market in existence.

7. This model only seeks to examine investments from the point of view of shareholders, in order words, this model is based solely on shareholders' valuation of risks and does not consider the effect on any other interested party in the market.
8. The model also is flawed in that it only considers a systematic risk which assumes that investors must hold a set of balanced portfolios thereby eliminating unsystematic risks and smaller firms may not hold fully diversified portfolios.
9. The model only considers the level of return as being quite important to investors and not the way in which that return is received, hence, dividends and capital gains are deemed equally desirable and with differential tax rates, the packaging of return between dividends and capital gains may be important.

2.2.13 Lintner's Model

The subject matter of dividend policy is one of the most researched areas in the world of corporate finance especially over the past few decades as mentioned by Cristea (2017). The dividend policy is simply explained as a set of guidelines a firm uses to determine how much of its financial resources will payout to its shareholders when it is not required by law. Dividend policy has two major parameters as outlined in the Lintner's model, namely: (1) the target payout ratio, and (2) the speed at which current dividends adjust to the target.

John Lintner in 1956 developed this theory based on two important issues that he observed about dividend policy:

a) Most companies tend to set long-run target dividends-to-earnings ratios according to the amount of positive net-present-value (NPV) projects they have available.
b) Earnings increases are not always sustainable. As a result, dividend policy is not changed until managers can see that new earnings levels are sustainable.

Lintner's model, sometimes referred to as the partial-adjustment model, summarily assumes that firms adjust their dividend payouts slowly over time and further provides another explanation for a firm's dividend policy. In this Lintner's model, a firm is assumed to have a desired level of dividends that is based on its expected earnings. When earnings are seen to vary, a firm will be able to adjust its dividend payment to reflect the new level of their earnings. However, rather than doing this immediately, a firm will choose to spread or partially adjust all these variations in earnings over a number of time periods, Lintner (1956).

A group of 28 management teams were interviewed, and based on that, Lintner reportedly found a 50% target payout ratio. Now, most of the companies had a set standard with respect to the speed at which they would move toward their targets' payout; all these adjustments were seen to range from one-sixth to one half.

Now, we can assume a 50% target payout and the speed of adjustment factor of 25%, when we use these as parameters. If earnings per share was made to increase from N2 to N3, the first year dividend increase would then be (N1)(0.50)(.25) or N0.1250.

The calculation above represents the earnings increase multiplied by the target payout ratio and then multiplied again by the adjustment factor. Note that the full N0.50 dividend increase (gotten by multiplying the Earnings per share change by the target payout ratio) might take several years to achieve assuming the new EPS level remains constant. If there was any sudden or unexpected increase in earnings firms adjusted their dividends slowly.

We have noticed that most companies were always reluctant to cut down on their dividends. The companies would usually set their dividend policy first and then other policies are then set, taking dividend policy as that given. This model developed by Lintner was thus able to explain 85% of dividend changes in his sample of companies.

$D^{*}it = \alpha_i E_{it}$

$D_{it} - D_{i(t-1)} = \alpha_i + C_i\{D^{*}{}_{it} - D_{i(t-1)}\} = U_{it}$ .... (2.21)

From equation (2.21)

D^{*}_{it} = desired dividend payment during period 't'

D_{it} = Actual dividend payment during period 't'

α_i = Target payout ratio

E_{it} = Earnings of firm during period 't'

a_i = a constant related to dividend growth

c_i = partial adjustment factor

u_{it} = error term

The constant $\mathbf{a_i}$ would be valued at zero for some firms but would generally have a positive value which would reflect the greater reluctance to reduce than to raise dividends which was commonly observed. Added to the above is the influence of the specific desire for a gradual growth in dividend payments found in about a third of the companies visited. The variable $\mathbf{u_{it}}$ is a simple representation of the discrepancy between the change observed, denoted as $\mathbf{\Delta D_{it}}$' and that expected based on the other terms in the equation.

This model has further been simplified in the form of a multiple regression equation and then given as follows:

$D_{it} = D_{i(t-1)} = \alpha_i + C_i\{D^{*}{}_{it} - D_{i(t-1)}\} + U_{it}$

$$D_{it} = D_{i(t-1)} = \alpha_i + C_i\{\alpha_i E_{it} - D_{i(t-1)}\} + U_{it}$$

$$D_{it} = \alpha_i + \alpha_i C_i E_{it} + (1 - C_i) D_{it(t-1)} + U_{it} \quad \text{.............................. (2.22)}$$

Messer Lintner in 1956, while propounding his model gave some important results. The three he reeled out are as shown below:

a. Stabilization of dividends with gradual, sustainable increase whenever possible.
b. Establishment of an appropriate target payout ratio.
c. Avoidance of dividend cuts, if it is at all possible.

Till date, this Lintner's model remains one of the best descriptions of dividend setting process available in the study of markets so that even after 5 decades, his research remains the definitive study of management behaviour – a finance "classic". One area where it still falls short is its inability to explain why companies pay dividends.

2.2.14 The Post-Modern Portfolio Theory (PMPT)

Over fifty years ago, the authors of Modern Portfolio Theory in their work Sumnicht (2008), had stated that they clearly understood that there were limitations on how risk is defined and computed. The Harry Markowitz's Modern Portfolio Theory expectedly did not make use of any downside movement measurement of risk factors, because using modern day technology to calculate mathematical functions as these calculations were impossible to be done manually at the time.

In 1959, Harry Markowitz dubbed the "Father of Modern Portfolio Theory" as seen in the work of Swisher (2005), made a publication on Portfolio Selection, which showed that most investors were expected to be compensated for taking additional risks, and also that there is an unknown number of resourceful portfolios existing along a curve defined by three variables namely: correlation coefficient, return, and standard deviation. In Fishburn (1977), there is indication that the efficient-frontier curve consisted of those portfolios with the maximum value of return given with increased risk taken by the investor or lesser returns with reduced risk.

Markowitz (1959) then formalized what other savvy investors already knew, which was that profitability level corresponds to the level of risk. He was also the first person to mathematically establish that the total risk of a portfolio was in no measure compared to the sum of the individual risk for each element of any chosen portfolio. Harrington, CFA (2002) also made mention that by taking periodical analysis of performances as random variables, it could very well be possible to calculate standard deviations, performance expectations, and correlations.

In another detailed study by Sumnicht (2008) it is shown that Markowitz's fantastic work on Modern Portfolio Theory earned him a share of a Nobel Prize. Then we see where Chopra and Ziemba (1993) opined that it was an essential assessment of errors on performance expectations that had led to the setting up of Post-Modern Portfolio theory, which supports the diversification of investors' portfolios. The errors in assessment on variances and co-variances clearly had a decreased impact on the study.

The great strides made on the researches carried out by portfolio advisors over a period of time have really exhibited a good assessment of the overall performance. In the year 1993, an article was published on the Post Modern portfolio Theory in the "The Journal of Investing" by Brian M. Rom and Kathleen W. Ferguson. The introduction of the Sortino ratio gave rise to new avenues for refining of the average-variance model taking into consideration the minimum asset return, risk loss, and other parameters.

The concept of the post-modern portfolio theory basically gives investors fresh options and opportunities that were not previously made available by the traditional modern portfolio theory. We can say that the post-modern portfolio theory availed market managers some leeway and flexibility in their decision making in terms of asset classes without having to resort to an alternative portfolio of investments as it could subsequently cover most of the portfolio's assets and notably contribute to their cumulative return. As demonstrated by Kaplan and Siegel (1994), the Post-Modern Portfolio theory was based mainly on very important assumptions such as:

- No brokerage, zero transactional costs in selling and buying of securities, zero spread and no taxes. This implies that only "risk" was the important factor to be considered when purchasing securities.
- Given that the availability of funds were unlimited, any sensible investor can easily make decisions on any security in the market.
- Investors can very well take a well-informed stand based on the level of risk and returns for accepting greater volatility because they are sensible and well aware of all the risks entailed.
- All investors had the same knowledge of risk-return relationships over the same time horizon and regardless of the volatility.
- All investors were primarily concerned about how they would manage and measure risks and they also wanted information such as knowledge of when to buy or sell based on similar assessments of the investments and because they wanted the same returns from their investment portfolios.
- Investors would normally want to control the factors of risk by skillfully diversifying their portfolios. They also assumedly have the requisite knowledge that any number of

assets could be sold and bought in the market and that similarly, also that all investors could borrow or lend at the same risk-free rate and sell without any major restrictions.

2.2.14.1 Features of Post-Modern Portfolio Theory

It is most often observed in the post modern portfolio theory that the most likely of outcomes are not necessarily the most anticipated ones. That the volatility and the tracking error are not full-blown risk measures is what is explained in the Post-modern portfolio theory. The post-modern portfolio theory in the end leads us to attempt to review the diversification notion principle of the currency risk internationally, which has made allocations very manageable.

Further discussions on the rightness of the varied application of the results among classic researchers such as Rom and Ferguson (1994), who had in their previous works indicated that Harry Markowitz introduced the structure of what we now know as (MPT). Markowitz (1952) showed us that this concept helped investors to make better investment decisions using the genius mathematical concept of diversification in making investing decisions. Here, the aim was solely to select a portfolio of investment assets that had collectively reduced the risk of any other distinct asset portfolios.

Swisher and Kasten (2005) in their works also indicated that there are many useful parameters that are included in the data such as: the Sharpe ratio, alpha, r^2, and beta, which are highly necessary in any investment decision analysis. Yet each of these parameters relied on simple standard deviation which was flawed where the post-modern portfolio theory had alternatively offered the better substitute. This is summarily illustrated in Table 2.3 below which clearly reflects a study conducted by Swisher & Kasten (2005).

Table 2.1: PMT versus MPT Measures

Purpose	Risk Measure	Outperformance vs Benchmark	Risk Compared to Benchmark s' risk	Excess Return per Unit of Risk
MPT Version	Standard Deviation	Alpha	Beta	Sharpe Ratio
PMPT version	Downside risk (DR)	Omega Excess; Also Excess Return (Above MAR)	DR vs Benchmark DR (Though various Betas could be calculated using DR Components)	Sortina Ratio (Excess Return DR)

Source: Swisher and Kasten (2005). Contributions to Post-Modern Portfolio Theory, JFP.

Many researchers have found that there are quite some significant restrictions to the traditional type modern portfolio theory calculation. The mean-variance using the Devinaga Rasiah approach can be seen to lead to very unsatisfactory predictions of stock behaviour. Markowitz suggested to this end that a new model based on the semi-variance would be more desirable to overcome these challenging computational problems and he also anchored his important empirical analysis on the variance and standard deviation methods.

As indicated by Bean (2009), the modern portfolio theory is not a very good measure of return and risk as it does not really show the reality of the investment market. Satchell and Sortino (2001) in their work stated that this theory had somehow overcome the problems noted above and hence it was better for it to be known as the post-modern portfolio theory.

The asymmetrical return distribution and the downside risk are the two major contributions offered up by the post-modern portfolio theory formulation as indicated by Rom and Ferguson (1994).

Post-modern portfolio theory seems to have made analysts a lot more flexible and also more accurate in terms of creating efficient portfolios, which was not hitherto attainable under the original Markowitz mean-variance methodology. The illustration of policy decisions, using the two methods as used by Rom and Ferguson (1994) showcased how Mean Variance Optimization could help produce illogical and counter-intuitive results and foist the potentiality of post-modern portfolio theory to overcome these problems.

It is said that three variables had given rise to the basic framework of the modern portfolio theory, and these are: the study and better understanding of behavioural science, the study of portfolio management and the advancement in computer technology. These giant stride advances in investment management are of course being challenged by other economists. The modern portfolio theory is required to create asset allocation models, which can be factored into economic factors, assets allocation, extra capital, and lastly re-balancing decisions.

The post-modern portfolio theory has been a great contribution to the technologies and applications that can help ameliorate investment results and transfer the modern portfolio theory principle to a greater level of remarkable usefulness (Sumnicht, 2008). It is useful to note at this juncture that all of these improvements were made available for the investment advisors to go on and apply in order to help investors to attain to their overall investment goals.

2.2.14.2 Total Variability of Return

In applying the modern portfolio theory, risk was duly referred to as the total variability of returns around the mean return and all uncertainty are handled the same way. It is noted that risk was not in any way symmetrical, it was severely skewed with the greatest concern being that it was downside as indicated by Rom & Ferguson (1994).

The necessity of skew is anchored on the sheer fact that non-normal return series was its true risk which was stopped by modern portfolio theory measures. In another very important research by Harlow (1991), he found and hence stated that with the introduction of the post-modern portfolio theory, he was able to capture more accurate information leaning towards the returns under consideration. He also went ahead to say that the post-modern portfolio theory very well recognized that all investments' risks should be linked to each investor's specific goals and that any achievements beyond this goal did not represent any tangible financial or economic risk (Rom & Ferguson, 1994).

In the post modern portfolio theory, an investor's target rate of return was simply referred to as the minimum acceptable return, which summarily represents the rate of return that must be earned to achieve some important financial objectives (Rom & Ferguson, 1994). It is a known fact that the minimum acceptable return is usually investor specific, and this means that there are an unending number of efficient frontiers where one can reach minimum acceptable return; this means that the post-modern portfolio theory more accurately reflected the reality that there are different inclinations and aims for risk by the different array of investors.

2.1.14.3 Management of Returns and Risks

Ray Dalio who is the brilliant founder of Bridgewater Associates in his publication entitled "The Traditional Application Of Modern Portfolio Theory (2005)'' was the first to marry the various asset classes derivable based on their risks factors, expected returns, and correlation. Based on this, the asset allocation mix was, therefore, determined and the optimal risk/reward relationship then easily identified.

The post-modern portfolio theory by contrast differs in three main ways: first, the sizes are altered to more desirable levels; second, returns from alpha and beta are separated; and then finally, far more diversified portfolios of each are uniquely derived. We then deduced from the study conducted by Leibowitz and Langeteig (1989) which showed that the post-modern portfolio theory not only based its findings on returns and risks, but also hinged on investors' objectives. Satchell and Sortino (2001) in their work had also discussed the three basic building blocks: first, the returns in alpha, second the risk-free returns, and finally, the returns in beta; and then they went ahead and really described how these could be expertly incorporated and resultantly produce a more diversified beta and alpha portfolios calibrated and measured to one's targeted returns, where investors can dramatically improve on their predetermined investment objectives as mentioned by Sortino and Forsey (1996) and Dalio (2005).

2.2.14.4 Downside Risk Optimization

The post-modern portfolio theory also can be seen to represent a new system of asset allocation that seeks to optimize portfolios based on returns versus downside risk which is then called downside risk optimization instead of the former mean-variance optimization.

According to Swisher (2005), by using the downside risk formula, three of these elements were established, and they are as listed below:

1. Downside frequency – This is the frequency, expressed as a percentage value, of returns below the minimal acceptable return rate.

2. Average downside deviation – This explains the average size of the deviation below the minimal acceptable return.

3. Downside magnitude – This represents the most possible worst-case scenario, which is shown by the return below the minimal acceptable return at the 99th percentile point.

However, these three statistical methods had all been fused into one downside risk measure and each of these measures has been defined with reference to any investor’s specific minimal acceptable return as shown to us by Swisher (2005). The result of this was then expressed as a percentage value much like in a standard deviation, and the values themselves might even be similar thereafter.

$$LPM_n = \int_{-\infty}^{T} (T - R)^n df(R) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2.23)$$

T = the annual target return, originally termed the minimum acceptable return, or MAR.2

R = the random variable representing the return for the distribution of annual returns $f(R)$

n = degree of the moment

This can be put in this way, *n* =2, LMP.2 is called a semi-variance and the square root of semi-variance is known as the semi-deviation. Downside risk, therefore, is a carefully worked out estimation of any security's potential to endure a drop in price when conditions in the market are seen to get worse, also, it can be seen as the estimation of the potential losses that may occur on any portfolio of investments in the market (Cheng, 2001).

2.2.14.5 Several Ways to View Downside Risk

The way of viewing the downside risk is using the annualized standard deviation of returns below a set target; another way is using the square root of the probability-weighted squared below the target returns.

We observe that the squaring of the below-target returns has this effect of penalizing failures at an exponential rate.

Below we show that there are two formulae usable for determining the values of any downside risk.

Continuous form

$$\sqrt{\int_{-\infty}^{t}(t-r)^n df(r)}$$

t = annual target return

Source: Swisher (2005)

r = random variable representing the return for the distribution of annual returns *f*(*r*).

f(*r*) = normal or three parameter lognormal distribution.

$$3.464\sqrt{\frac{E(t-r)^n}{n}}$$

Discrete Form

3.464 = the square root of 12, the factor used to annualize the monthly downside risk.

E = mathematical expectation operator

t = monthly target return

r = random variable representing operator monthly return

n = total number of monthly returns observed

As we can deduce from the two form types, the continuous form is generally more preferable because it allows a calculation to be made using the parameter called annual returns, which then helps any investor to specify his or her investment targets.

We shall further require monthly returns to get more distinct formulas, and then in return, we expect investors to change their annual targets into smaller monthly targets as indicated by the work of Satchell and Sortino (2001).

In 2001, Forsey showed us that it is much more efficient using the variance optimization in modern portfolio theory than using the downside risk optimization model in the post-modern portfolio theory; and this is because the downside risk optimization method produces a portfolio combination, which is more pragmatic and accurate to corporate investors in terms of the distribution of an investor's real estate portfolios. He also showed that the downside risk optimization method was a reliable means of measuring variance optimization portfolio with an investor's risk conceptions which further encouraged investors who feared all the possible downside risks. Not only that, it also aids in developing a portfolio's performance with higher median returns as shown to us by Cheng (2001).

2.2.14.6 Volatility Skewness

Among economic researchers, it is a generally acceptable fact that not all distributions are normal and that normal distribution is what is stressed in the modern portfolio theory. In using the normal distribution to model the pattern of an investment's return, we can see that it creates investments that result in more upsides than downside returns which then looks as if they are riskier than they actually are, and vice versa for returns with much more prevalent downside returns. We can conclude then that by using the traditional modern portfolio theory for the measurement of portfolios, investments realities are often stalled. But with the timely introduction of the concepts of derivative strategies and hedging, asymmetry is designed and used in post-modern portfolio theory. Another grand concept that was introduced by post-modern portfolio theory enthusiasts is called volatility. In 2006, Mewasingh indicated in his work that he believed that the post-modern portfolio theory was able to capture significantly more true information than otherwise known. He went on to examine the ratio of allotment's percentage of total variance from returns above the mean, to the percentage of the allotment's total variance from returns below the mean as indicated by Rom and Ferguson (1994) and shown in Table 2.2 below.

Table 2.2: Skewness of Major Asset Classes and Inflation

Asset	Periods Ending 31 December 1982		
	10 Yrs	20 Yrs	30 Yrs
Large-Cap Stocks	1.80	1.23	0.89
Small-Cap Stocks	1.07	1.22	1.14
Foreign Stocks	0.92	1.10	NA
Bonds	0.83	0.94	0.97
Cash	0.64	1.25	1.11
Inflation	0.82	1.35	3.03

Source: Brian M. Rom, (1994).

Table 2.2 above shows an array of several asset classes over different time periods and their skewness ratios. On close observation, we see that if the ratio is greater than 1.0, which denotes a positive skewness, it implied that the distribution had more proceeds above the median return. In contrast, a ratio of less than 1.0 denotes a negative skewness. The Table also shows that the skewness ratio is different from 1.0 over the time periods.

In 2001, Forsey showed us that sample standard, sample mean, and deviation are the three lognormal parameters that can be estimated using the extreme value basic mathematical formula.

$$f(x) = 1 - \frac{erf_c(In(x - \tau) - \mu}{2\sqrt{2 \cdot \sigma}}$$

$$f(x) = 1 - \frac{erf_c(In(\tau - x) - \mu}{2\sqrt{2 \cdot \sigma}} \dots \dots \dots (2.24)$$

- Formula for the lognormal curve f(x):

If the extreme value is a minimum and x is greater than the extreme value:

$$f(x) = \frac{\alpha}{x - \tau} exp\left(\beta \cdot (In(x - \tau) - \mu)\right) \dots \dots \dots (2.25)$$

If the extreme value is a maximum and x is less than the extreme value then

$$f(x) = \frac{\alpha}{x - \tau} exp\left(\beta \cdot (In(\tau - x) - \mu)\right) \dots \dots \dots (2.26)$$

- Formula for the lognormal cumulative distribution function F(x):

2.2.14.7 Sortino Ratio

In 1994, the Sortino Ratio was introduced by Sortino and Price and it has been used to measure risk adjusted returns for any downside risk and target. It is simply an advanced version of the Sharpe ratio. What it does is that it assists investment managers or investors to estimate any portfolio's risk. It is common knowledge that the Sharpe ratio, which is instrumental in measuring the risk adjusted performance, was developed by and named after the Nobel Laureate economist William Sharpe. Loth (2010) shows us that the theory measured the excess return called risk premium per unit for an investment stock per strategy and it also quantifies the return (alpha) over the volatility (beta) that is assumed in any chosen portfolio of assets.

Table 2.3: Sortino and Sharpe ratio

Sortino Ratio	Sharpe ratio
$S = \frac{R-T}{DR}$ R = annual rate of return for the investment T = required rate of return DR = downside risk, square roof of the target semi-variance.	$S = \frac{E(Rp)-E(Rp)}{std.dev.[E(Rp)-E(Rp)]}$ R = asset return Rf = return on a benchmark asset, such as risk free rate σ = Standard deviation of the asset.

Source: Rom and Ferguson (1994)

According to Modigliani and Modigliani (1997), the Sharpe ratio is interpreted as the risk premium per unit of total risk and it is often used in practice as well as in theoretical research because it can be computed and interpreted easily. Based on this we see that the modified version called the Sortino ratio only comprised downside risk as a deviation from the norm of the minimum acceptable return. Compared to the Sharpe ratio which faulted both upside and downside volatility equally, the Sortino ratio only faulted those returns that fell below a user-specified target, thus, we can say that the measured risk adjusted return treats risks more realistically than the Sharpe ratio.

2.3 Empirical Framework

2.3.1 Downside Risk and Mean-Variance Optimization

In their work in 1999, Grootveld and Hallerbach showed us that the main reason behind the downside risk is that the left hand side of a return distribution relates to risks while the right hand side holds better outlay opportunities. The work of Neil (2001) proved that the main advantage of using downside risk over standard deviation is that it allows for different perspectives of risk which is a good observation. He also showed that the first study of the concept of portfolio optimization relates to downside risk instead of the traditional mean-variance optimization that was earlier introduced to the field of real estate research by Sivitanides in 1998 and, Sing and Ong in 2000.

Working assiduously, Sivitanides analyzed the return to a downside risk profile of a set of portfolios based solely on some four property types: research, development, office, and retail; and how to warehouse direct real estate investments in various portfolios while Sing and Ong had x-rayed the mixed asset portfolio allocations which, contained stocks, bonds, and direct real estate. The study summarily illustrated how investors' risk aversion could be incorporated into the downside risk asset optimization model. These set of researches were mainly focused on the comparison between portfolios appreciated by the downside risk framework or mean-variance.

Another study conducted in 2001 by Cheng also examined the downside risk optimization as well as the mean-variance optimization as illustrated by superior portfolios, which had the best trade off within their own risk-return spaces. Among these two approaches, a measurement was determined, which created a portfolio that consequently provided higher returns. To further compare these two distinct approaches, in 2001 Cheng used bootstrapping procedures which showed that downside risk optimization produced the portfolio combination that was adjudged to be more accurate and realistic compared to the practice of most institutional investors in terms of their real estate allocation. As a result, the outcome from the downside risk optimization method was in high demand to those investors who gladly welcomed every bit of downside risk deduction (Cheng, 2001).

As used in the post-modern portfolio theory, the concept of downside risk had been proposed as a worthy alternative approach which had been hitherto used in the traditional mean variance optimization used in modern portfolio theory. In 2005, Swisher indicated in using standard deviation, the traditional mean variance optimization gave answers to these myriad of nagging questions whereas downside risk optimization had disparity in the definition of risk.

According to Alenius (2008), “standard deviation had some short comings and therefore was not the best replacement of risk.” And we also saw Eling and Schuhmacher (2007) say: “however, standard deviation assumed the returns of the funds to be normally distributed, which had been misleading when interpreting the result”. We see also that downside risk optimization was used in their estimation instead of the general practice of using mere standard deviation. In 2005, Swisher and Kasten’s work indicated that standard deviation generally leads to inaccurate results when used as a risk proxy, whereas, variance downside risk captures results much more closely. And even if volatility were seen to be a perfect representation of a portfolio’s risk, it still would not work perfectly because financial assets return does not follow a normal distribution.

When we put downside risk optimization and mean-variance optimization head-to-head and compare their portfolios, downside risk optimization takes the lead. We can say specifically, downside risk optimization outputs make more intuitive sense than mean-variance optimization outputs. And again, mean-variance optimization outputs frequently reach risk conclusions almost opposite those of downside risk optimization. Downside risk is, therefore, seen to be more efficient than standard deviation and is more used in mean variance optimization because it supplies different views of risk (Neil, 2001).

According to Kamil and Ibrahim (2005), “The popularity of downside risk in post-modern portfolio theory amongst investors had increased and mean-return-downside risk portfolio range of models seemed to have subjugated the mean-variance approach.” Sing and Ong

(2000) in their work indicated that the model had yielded more results because of how it separated return fluctuations into upside potential and downside risk. In the mean-variance model, upside potential is basically the same as downside risk, so this leads to what Markowitz proposed which is that the downside risk measured semi-variance to replace variance as the risk measure. Anton had in his work, also compared the returns of the optimal portfolio to the performance of a model with some other models. The result of comparisons shows that the performance of the model with downside risk optimization is much more efficient than the mean-variance optimization model.

In their work in 2006, Ang, Chen and Xing took out ample time and studied downside risks premium in a cross section of stock returns and what they found out is that the cross section of stock returns reflected a premium for downside risks. They said that "stocks that co-varied strongly with the market, being conditional on market declines had higher average returns" (Ang, Chen and Xing, 2006).

2.3.2 Modeling Volatility: A Brief History

The deep research and studies of heavy weight economists such as Mandelbrot (1963), Fama (1965) and Black (1976) highlight the concepts of leptokurtosis, volatility clustering, and leverage and how these affect characteristics of stock returns. Engle (1982) also introduced the now very popular autoregressive conditional heteroscedasticity model, also known as the ARCH to model the concept of volatility by relating the conditional variance of any disturbance term to the linear combination of the squared disturbances in the very recent past. In 1986, Bollerslev then generalized the ARCH model by modelling the conditional variance to show that it depends on its lagged values as well as squared lagged values of disturbance.

After the works of Engle (1982) and Bollerslev (1986), more interesting variants of the ARCH model have been developed to model volatility. Some of the models include: EGARCH which was originally proposed by Nelson in his work in 1991, then we also have the GJR-GARCH model which was introduced by Glosten, Jagannathan and Runkle in their fine work in the year 1993, and last but not the least, we have the Threshold GARCH (TGARCH) model credited to Zakoian (1994). The ARCH family models were very successful in their ability to capture the behaviour of volatility. Stock returns volatility has received a great attention from both the world of the practitioners and the academics as a measure and control factor of risk both in the emerging and the developed financial markets.

Hsieh (1989) found that relating to the effectiveness of the ARCH family models in capturing volatility of financial time series, the GARCH (1,1) model worked well to capture most of the stochastic dependencies in the time series. Based on much tests of the standardized squared residuals, he went on to find out that the simple GARCH (1,1) model did far better at describing data than a previous ARCH (1,2) model which was also estimated by Hsieh in his previous work in 1988. Conclusions quite similar to these were reached by Frimpong and Oteng-Abayie (2006), Taylor (1994), Olowe (2009), and Brook and Burke (2003). Similarly, Bekaert and Harvey (1997) and Aggarwal, Inclan, and Leal (1999) in their commendable studies of the emerging markets volatility, seemed to confirm the ability of asymmetric GARCH models in capturing asymmetry in stock return volatility. Thus, we can say that the ARCH family models are good candidates for modelling and estimating volatility in emerging stock markets. In similar literatures also, studies like Braun, Nelson, and Sunier (1995), Campbell and Hentschel (1992) provide hard enough evidence that most stock returns have time-varying volatilities.

Although the GARCH model has been amazingly successful in capturing the important aspects of most financial data, particularly the symmetric effects of volatility, it has been observed to have unexpectedly had far less success in capturing extreme observations and skewness in stock return series. The traditional portfolio theory assumes that most of the logarithmic stock returns are independent and identically distributed (IID) for normal variables which show that they do not exhibit moment dependencies, but a vast amount of empirical evidence suggest that the frequency of large magnitude events seems much greater than is predicted by the normal distribution according to the works of great economic researches like Harvey and Siddique (1999); Verhoeven and McAleer (2003); and diBartolomeo (2007).

According to his work in 1963, Mandelbrot shows us that extreme events are far too frequent in financial data series for the normal distribution to hold and then he further argues for a stable Paretian model, which has the adjudged uncomfortable property of infinite variance. Messer Fama in his 1965 work provides empirical tests of Mandelbrot's idea on some daily US stock returns and there he finds fat-tails. It is common knowledge that investors view upside and downside risks differently, with a heavy preference for positively skewed returns which implies that more than the first two moments of returns may be priced at equilibrium (see Lai, 1991 and Satchell, 2004). This has in turn led to the popular use of non-normal distributions such as: GED Student-t, asymmetric Student-t, and asymmetric GED to try to model the empirical distribution of conditional returns (Theodossiou, 1998; Olowe, 2009).

The outstanding and recent work of Lee, Kim, Song and Chang (2018) examined the asymmetric efficiency for various countries' stock indices, using the index-based asymmetric – MEFDA. What they did was to divide the market based on its trend within certain sub-periods. From a period spanning between January 1, 2003 and July 31 2007, daily stock market data were got from a mixture of 34 developed and emerging markets; then measuring the asymmetric market efficiency of the different countries from different time periods, they found that most of the markets can be judged as being efficient. However, when the markets are classified based on their asymmetric market efficiency, the sources of asymmetry was found to be period-independent.

Over here in Nigeria, the few published studies on modelling volatility of stock returns include those of Jayasuriya (2002), Ogum, Beer and Nouyrigat (2005), Uguanyi and Nwaocha (2019), Okpara and Nwezeaku (2010). Jayasuriya (2002) used the asymmetric GARCH methodology to examine the effect of stock market liberalization on stock returns volatility of fifteen emerging markets, including the Nigerian market, for the period December 1984 to March 2000.

The study reports among other things that positive or negative change in prices has always been followed by negative or positive changes indicating cyclical way of behaviour in stock price changes rather than volatility clustering in the Nigerian scenario. In contrast to Jayasuriya (2002), Ogum, Beer and Nouyrigat (2005) investigated the emerging market volatility using the Nigerian and Kenyan stock return series and the results of the exponential GARCH model indicate that asymmetric volatility found in the U.S. and other developed markets is also present in the Nigerian market, but that of Kenya shows evidence of significant and positive asymmetric volatility, suggesting, therefore, that positive shocks increase volatility more than negative shocks of an equal size. Also, the results show that while the Nairobi Stock Exchange return series indicate some negative and insignificant risk-premium parameters, the Nigerian Stock Exchange return series exhibit a significant and positive time-varying risk premium.

Finally, their works show as reported that the GARCH parameter (β) is statistically significant, indicating volatility persistence in the two African markets studied. Okpara and Nwezeaku (2009) then went on to study the effect of the idiosyncratic risk and beta risk on the returns of some randomly selected 41 companies listed on the floor of the Nigerian Stock Exchange from the year 1996 to the year 2005.

They employed a two-step estimation procedure, where firstly, the time series procedure was used on the sample data to determine the beta and idiosyncratic risk for each of the companies; and then secondly, a procedure involving the cross–sectional estimation was used employing EGARCH (1,3) model to help in determining the impact of these risks on the stock market returns.

The result of their elaborate work revealed among other things, that volatility clustering is not quite persistent but there exists asymmetric effect in the Nigerian stock market. Therefore, they concluded that any unexpected drop in price which is bad news results in increases in predictable volatility more than unexpected increase in price which is good news of similar magnitude in the Nigerian scenario.

Very recently, the work of Herbert, Ugwuanyi and Nwaocha (2019) shows the availability of "leverage effects, volatility clustering, and Risk Return Trade-off in the Nigerian stock market". They used daily All Share Index data pulled from the Nigerian Stock Exchange during a 7-year period, covering 4th January, 2010 through 2nd August, 2016. They employed the Generalised Autoregressive Conditional Heteroscedasticity (GARCH1,1) model and the Glosten Jagannathan and Kunkle Autoregressive Conditional Heteroscedasticity (GJR-GARCH 1,1). The results gotten then strongly affirmed the presence of significant leverage effects of stock returns and volatility clustering in the Nigerian Stock Market.

From the brief review of several amazing and painstaking researches and their accompanying literatures above, it is very glaring that the various ARCH family of models has extensively been used to model volatility. While the otherwise simple GARCH (1,1) is good enough to capture data regarding volatility clustering, it unfortunately cannot capture fat-tails and asymmetry. Meanwhile, asymmetric models such as the EGARCH and then the GJR-GARCH have been specifically developed to capture asymmetry. Conclusively, while we can say that there is disagreement on volatility clustering in Nigeria, we can all see and agree that the leverage effect exists.

2.3.3 Empirical Review of the Random Walk Theory

Detailed studies suggest that the prices of stocks could be predicted with a fair degree of reliability and two compelling yet competing explanations have been offered for such behaviours. We see that the proponents of the efficient market hypotheses such as Fama & French (1995), maintain that such predictability usually result from time-varying equilibrium expected returns generated by rational pricing in a market judged to be efficient, which then compensates for the level of risk undertaken. The very vocal critics of the efficient market hypothesis such as Haporta, Lakonishok, Shliefer and Vishny (1997) argue the fact that the predictability of stock returns reflects the social movements, noise trading, psychological factors, and fashions or "fads" of the irrational investors in a speculative market. The question about whether predictability of returns represents rational variations in expected returns or not arises due to irrational speculative deviations from theoretical values have provided the impetus for fervent intellectual inquiries and hot debates in most recent years.

The efficiency of the Gulf Corporation Council (GCC), which is the UAE, Saudi Arabia, Kuwait, Bahrain and Oman joint stock market was examined in the work of Jamani and Roca (2015). In doing this, they collected daily stock market data from December, 2003 to January, 2013, and what they found is that past price movements cannot correctly be used to predict the current price, hence they support the random walk hypothesis theory.

Rounagh and Zadeh in their 2016 work, using auto-regressive movement average (ARMA) method critically looked at the existence and dynamics of the long memory nature of the S&P 500 and London stock exchange using data of a yearly and monthly frequency; and what they discovered is that using auto-regressive movement average for the S & P 500 gave them better output than for the London stock exchange. From the results computed and compared, both markets were seen to be weak-form efficient and have good financial stability.

The work of Urquhart, Andrew, McGroarty, and Frank (2016) raised this very important and thought-provoking question: Are stock markets really efficient? Then based on the evidence of the adaptive market hypothesis, they examined the following markets: EURO STOXX 50, NIKKE1225, S & P500, and FTSE100, and by testing for stock return predictability using daily data they collected from January, 1990 to May, 2014. They made use of three boot-strapped versions of the variance ratio test to the raw stock returns and also whiten the returns through an AR-GARCH process to study the non-linear predictability after accounting for conditional heteroscedasticity through the BDS test.

The result revealed that there were periods of statistically significant predictability and also there were periods of no statistically significant predictability in stock returns. They also found out that certain market conditions are statistically related to predictability in some markets, but overall each market interacts differently with the different conditions prevalent in the market. Their findings, therefore, suggest that return predictability in stock markets does vary over a period of time in a manner consistent with the adaptive market hypothesis and also that each market adapts differently to certain market conditions.

Gil-Alana, Sittu, Gupta and Yaya in their work done very recently in the year 2018 studied the efficient market of some Baltic countries comprising of Latvia, Estonia and Lithuania using some historical data covering the period January, 1^{st} 2000 to January, 22^{nd} 2016. Then they made use of the usual classification of bull and bear phases, and applied the fractional integration approach, afterwards, they found that Baltic markets do not follow the random walk hypothesis model.

Nwidobie (2014), in his study which he dubbed “The Random Walk Theory: An empirical test in the Nigerian Capital Market”, made use of the All Price Index (API) data for shares of listed firms in the Nigerian Stock Exchange for the period ranging from January, 2000 to December, 2012. He employed the augmented dickey fuller (ADF) test and discovered that share price movements in the Nigerian Stock Exchange do not follow the random walk pattern as described by Fama’s work in 1965.

Others, such as Obayagbona and Igbinosa (2015), carried out investigations on the weak-form market hypothesis in the emerging capital market of Nigeria for a period starting from January, 2006 to December, 2011. In doing so, they used the test of randomness based on autoregressive technique to check for the presence or otherwise of auto correlations in daily stock prices and returns from the Nigerian Stock Market and their result shows that the Z-statistics for both stock prices and their returns are serially dependent, hence there is no occasion of randomness.

Ajayi (2017), in his work entitled “Testing The Semi-Strong Form of Efficiency Theory in the Nigerian Capital Market: The Input and Output Index” where he used only secondary data collected for the period 2005-2013, the study population encompassed all the companies that traded in the period from January 1, 2013 to December 31, 2015. All the selected companies were ranked according to their capitalizations and a random sampling technique was employed to select the companies that had the capitalization values above the average values, thus, only about 80 companies qualified for the sample size.

The study made use of the transfer function model to estimate the market index which is represented by the output index and the computed-selected securities represented by the input which is equivalent to available published information. He found out that those publicly published information captured by the input index all had a significant effect on the stock market represented by the output index hence he concluded that the Nigeria Stock Market is semi-strong inefficient.

And then Egbeonu (2016), in his paper captioned, "Random Walk Hypothesis of Security Prices in Nigeria Stock Market," summarily employed cross-sectional security prices from selected quoted companies in the Nigerian Stock Market. In performing his analysis, he used the following econometric tools: EGARCH model, Variance Ratio, Forecast Error Technique, Box Jelking Q Statistics, and Jarque-Berra Normality. However, the test results for linear dependency shows the absence of auto-correlation among the stock prices which is a strong indication of the presence of random walk hypothesis. Then when he tested for randomity, using variance ratio, he saw and accepted the presence of random walk in the stock market, which according to him, implied that the Nigerian Stock Market is in a weak-form level of market efficiency.

In his work which is entitled, "Analysis of Weak-form Efficiency of the Nigerian Stock Market: Further Evidence from Nigeria," Okpara (2010) employed the Runs test, GARCH, and the correlogram or partial autocorrelation function over the data he chose to work with from the year 1984 to 2006. The results of these three alternative tests revealed that the Nigerian Stock Market is weak form efficient, and therefore follows a random walk process. Agwuegbo, Adewole, and Madueguna (2010), in their study, "A Random Walk Model for

Stock Market Prices”, revealed that the Nigerian Stock Market is not efficient; not even in the weak form but rather that the Nigerian Stock Exchange follows the random walk model.

Ayakeme (2014) showed the pattern of stock price movements in the four major sub-sectors of the Nigerian Capital Market namely the automobile, the banking, the agricultural, and then the beverage sectors. These were according to him thoroughly investigated, using the Runs and GARCH techniques for the chosen period spanning from January, 2006 to December, 2011. The runs test results showed us that the stocks of the selected sectors do not move at random, which further indicates that stocks in these sectors do not manifest any stochastic behaviours. In other words, according to him, these few selected major sectors in the Nigerian economy demonstrate the weak-form inefficiency. Looking further at the results of the GARCH in mean model at large so as to further amplify his finding, he discovered that with the exception of the agricultural sector, stocks returns fully demonstrate a lot of volatility clustering.

In another study titled Week-Form-Efficiency Market hypothesis in the Nigerian Stock Market; an empirical investigation by Andabai (2019), with a view to investigate whether it is Weak-Form or otherwise for the period 1990 to 2017. The secondary data from the Central Bank of Nigeria statistical bulletin All-Share-Index (ASI) were collected and then converted to stock returns. He employed time series econometric techniques. The study revealed that the Nigerian stock exchange was not efficient in the weak-Form for the period 1990 to 2010, and became efficient from 2011 to 2017.

Ogbonna, Okpara and Ejem (2020), who studied “efficient market hypotheses controversy and the Nigerian relations” revealed, using the daily data from the all share index (ASI) for the period of second January 2014 to May twenty, 2019 and Annual data from 1985 to 2018. Three analytical test statistics were employed. They are GARCH model, Unit root model and

Autocorrelation cum partial Autocorrelation model. Their result revealed that a significant relationship exists between the price series and their lagged values. This simply means that the Nigerian stock exchange is not efficient even in the week-form. Therefore one can predict the return series using the previous prices.

We also see Arewa and Nwakanma (2014) who in their study entitled "Re-validating The Weak-form hypothesis in the Nigerian Capital Market: A comparative Analyses", made use of secondary data which they lifted from the Central Bank of Nigeria Statistical Bulletin covering the periods from January, 1985 to December, 2012; they then ran statistical tests such as the LM serial correlation tests, Portmanteau autocorrelation, Jarque-Bera, and the Box Jenkin model specification. The outcome of the result of the analyses showed that the behaviours of stock returns follow the pattern of a random walk.

2.3.3.1 Evidence against efficient market hypothesis and Alternate Theories of Market Behaviour

Portfolio theory and the concepts that surround it are only anchored on risk-return relationship of assets. Investment theory holds that in every investment decision, investors are supposed to calculate the risk and return profile that adequately compensates the amount of resources being invested. Therefore, it is deduced that for every level of risk, there is a corresponding level of returns. Higher risk is compensated with higher returns and lower risk is equally compensated with lower returns.

Hence comparisons between the efficiency of the modern portfolio theory of Markowitz (1952) and the post-modern portfolio theory of Rom and Ferguson (1994) are all about risk and returns.

The study carried out by Cheng (2001) reviewed mean-variance optimization, downside risk-optimization and explained superior portfolios, which had the best reward within their own risk-returns spaces. This assessment was carried out between these two approaches, which created a portfolio that provided higher returns. The down side risk concept used in post–modern portfolio theory had been suggested as an alternative approach to the tradition mean variance optimization used in modern portfolio theory. Swisher (2005) stated that the traditional mean variance optimization strived to respond to these questions, using standard deviation. On the other hand, downside risk optimization had disparity in the definition of risk, standard deviation had some limitations and was not the best replacement of risk, Alenius (2008). Moreso, standard deviation assumed the fund to be normally distributed, which gives a mis-guide when interpreting the result. Swisher (2005), in another study, stressed that standard deviation does not lead to an accurate result when used as a proxy for risk, while variance downside risk captures more closely, even if volatility were a perfect representation of risk.

In the seminal work of Markowitz (1952), “portfolio selection” drawing from the theory of maximum utility asserts that investors can maximize their expected returns by undertaking the “right kind” of diversification. He stressed that by the operation of the law of large numbers, an infinite number of “efficient” portfolios exist to ensure that there is an efficient combination, which gives both maximum expected returns and minimum variance, compensating investors for the level of risk they take.

Sharpe (1964), inspired by the work of Markowitz, argued that an investor would only obtain a higher expected rate of return by incurring additional risk, stressing that every investment is influenced by two parameter: its expected value (returns) and the standard deviation (which is the measure of risk).

It is a well-known fact that there are risk seekers and risk adverse behaviours. These are anchored on the role of uncertainty and lack of concrete knowledge about specific outcomes in investment, which are important components of risk-related decision making. Risk-averse behaviour is associated with low returns as well as high risk is rewarded with high returns. It is in furtherance of this known fact in finance theory that led Omisore *et al*. (2012) to describe returns as the basic motivating force and the principal reward in any investment process.

Fama (1970), in his efficient market hypothesis, postulated that it is impossible for any investor in the market to make excess returns because all the prices in the market reflect available information, which is accessible to all investors. He defines an efficient market as "a market where there are large number of rational profit maximizers actively competing with each trying to predict future market values of individual securities, and where important current information is almost freely available to all participants."

In agreement to the above, Mauboussin (2002) notes that the stock price of any company is strictly an unbiased estimate of its intrinsic value and, therefore, investors cannot develop a system that earn excess returns overtime.

If the argument of the proponents of the efficient market hypothesis (EMH) is sustained, it is curious where the capital assets pricing model (CAPM) as in, modern and post-modern portfolio theory lies because beyond ensuring that an investor picks the optimal portfolio of stock as integral in the concept of modern portfolio theory (MPT), as Mankiw and Shapiro (1986) put it, a primary implication of any version of CAPM is that assets with high systematic risk earn high average returns. Similarly, Glysels, Santa–Clara, and Valkanov (2005) opine that the risk return trade-off is so essential in financial economics that it could be described as the "first fundamental law" of finance. Hence, investors commonly ask, “What extra returns would I require to compensate for undertaking a risky investment?” Under the presumptive conditions of EMH, such a question is unnecessary and irrelevant as there is no basis for extra returns. Expected returns, however, are predicted on a study of past stock prices as a basis of predicting future prices (Malkiel, 2003; Fisher & Jordan, 2008).

The efficient market hypothesis has over time become controversial, especially after the detection of certain anomalies in the capital market. Some of the studies like those of Olowe (1998) and Okpara (2010) claim that the Nigerian Capital Market possesses certain abnormalities or anomalies like the existence of possibilities of investors making abnormal returns, asymmetry of information, volatility clustering, week-end effects, month-end effects, and seasonal effects. Anomalies by definition are simply the inefficiency or failure of any of the theories of pricing models to hold. Other studies submit that precise irregularities such as the presence of volatility, normality, linear dependence, serial correlation, autocorrelation and absence of randomity in stock prices or in their first differences are common evidence of anomalies (Arewa, 2014; Ayakeme, 2014). Anomalies make prediction, speculation and arbitraging possible which indicate additional earning in an investor at the detriment of others. These are seen as evidence of inefficiencies, or at best, weak-form efficiencies. Some of the main anomalies that have been identified are listed as follows:

2.3.3.2 The January Effect

The first to document evidence of higher mean returns in January as compared to other months, using NYSE stocks for the period 1904-1974 were Rozeff and Kinney (1976). They found out that the average return for the months of January was 3.48 per cent as compared to 42 per cent for the other months. Eventually, later studies documented that the January effect persists in more recent years. This effect has also been found to be present in other countries as well (Guitekin & Gultekin, 1983). The January effect has also been documented for affecting bonds by Chang and Pinegar (1986). Maxwell (1988) shows that the bonds effect is strong for non-investment grade bonds, but not for investment grade bonds. More recently, Bhabra, Dhillion and Ramicez (1999) have documented what they called a November effect, which they observed only after the Tax Return Act of 1986. They also found out that the January effect has been stronger since 1986. Put together, their results support a tax-less selling explanation of the effect.

More so, Xiao (2016) in his study which he called "The Monthly Effect and the Day of the Week Effect in the American Stock Market", made use of daily data from the Kussell 3000 Index over the 2000–2015 period. In doing so, he examined the recent evolution of the week effects and the monthly effects and also investigated the seasonal patterns in what he called the economically favourable and unfavourable times. The UCM and ARCH models were employed and evidence of fixed seasonality with some positive and significant good monthly effect was found. The study confirms what he always thought which is that January and December has effects on the values of the Russell 3000 index but no evidence of the day-of-the-week effect was found eventually.

2.3.3.3 The Weekend Effect (Or Monday Effect)

French (1980) analyzed the daily returns of some selected stocks for the period covering 1953-1977 and found out that there was a tendency for returns to be negative on Mondays whereas they would be positive on the other days of the week. He notes also that these negative returns are caused only by what he later termed the weekend effect and not by a general closed market effect. A trading strategy, which he thinks would be very profitable in this case, would be to buy up as many stocks as possible on a Monday and sell them on a Friday. Kamara (1997) in his work then goes further to show us that the S and P 500 has no significant Monday effect after April, 1982, yet he found out that the Monday effect remained undiminished from the years 1962-1993 for a portfolio made up of smaller US stocks. Internationally also, Agrawal and Tandon (1994) found significantly negative returns on Monday in the nine countries they studied. However, Stechey (2001) researched and found out that the weekend effect in the UK had disappeared in the 1990's.

2.3.3.4 Other Seasonal Effects

A lot of what we call holidays and turn-of-the-month effects has been well-documented over time and across several countries. Lakonishok and Smidt (1988) showed us that US stock returns are significantly higher at the turns of the month, which periods he defined as the last and first three trading days of any chosen month. Ariel (1987) shows us that returns tend to be higher on the last days of a month while Cadsby and Ratner (1992) also found similar turn-of-the-month effects in some other countries which are not found in others. Ziemba (1991) found evidence of a turn-of-the-month effect for the Japanese market in which case turn-of-the-month is defined as the last day and first two trading days of a month. Hensel and Ziemba (1996) and Kunkel and Compton (1998) went further to show how some abnormal but good returns could be earned by exploiting this anomaly. Lakonishok and Smidt (1988), Ariel (1990), and Cadsby and Ratner (1992) all provide sufficient evidence to show that returns are on the average higher the day before a holiday, than on other trading days. Their paper showed this for countries other than the U.S. Brockman and Michayluk (1998) described the pre-holiday effect as one of the oldest and most consistent of all seasonal regularities.

2.3.3.5 Small Firm Effect

According to Banz (1981) in one of the earliest articles he wrote on the 'Small Firm Effect', also known as the "Size Effect", he carefully analysed the data from 1936-1975 periods. The result of his work revealed that excess returns would have been earned by holding stocks of low capitalization firms. More supporting evidence was provided by Reinganum (1981) who reported that risk adjusted annual return of relatively small companies was greater than 20 per cent. If the market were efficient, one would expect the prices of stocks of these companies to go up to a level such that the risk adjusted returns to future investors would be seen to be normal.

2.3.3.6 The Earnings-To-Price Effect

Sanjoy Basu (1977) in his groundbreaking work showed that stocks of firms with a low P/E ratio earned a premium for investors during the period 1957-1971. And also the investor who held the low P/E ratio portfolio received higher returns than one who held the entire sample of stocks. It is worthy to note that this result is against the Efficient Market Hypothesis. Campbell and Shiller (1988b) in their research showed that P/E ratios have really good and reliable forecast power. Fama and French (1995) also found out that market and size factors in earnings help to clearly explain size and market factors in returns. Dechow, Hutton, Meulbroek and Sloan (2001) also documented that most short-sellers in the market would usually position themselves in stocks of companies with low earnings to price ratios. This is because they are generally known to have lower future returns.

2.3.3.7 Over/Under Reaction of Stock Prices to Earning Announcements

There are avalanche of research evidence anchored on both over and under reaction to earning announcements. De Bondt and Thaler (1985-1987) posited overwhelming evidence which is consistent with stock prices over reacting to current changes in earnings. They reported both positive and negative estimated abnormal stock returns for all investment portfolios that had previously generated superior or inferior stock prices and earnings performance. According to Bernard (1993), this could be constructed as the prior period stock price behaviour overreacting to earnings developments. It is worthy to note that such an interpretation has been openly challenged by Zarowin (1989) but supported by De Bondt and Thaler (1990).

Bernard (1993) in his work further provides evidence that is consistent with the initial reaction being too small, and being completed over a period of at least six months. Other economists such as OU and Penman (1989) have also argued that the market underutilizes financial statement information.

Accordingly, Bernard (1993) further stated that such anomalies are not due to research design flaws, or in appropriate adjustment for risk or transaction costs, thus, the abundance of overwhelming evidence suggests that information available is not properly impounded in prices instantaneously as the EMH would ordinarily predict.

2.3.3.8 Standard and Poor (S and P) Index Effect

Harris and Gurel (1986) and Shleifer (1986) find a surprising increase in share prices (up to 3 per cent) on the announcement of a stocks inclusion into S and P 500 index change prices, the positive stock price reaction appears to be contrary to the EMH because there is no new information about the firm other than its inclusion in the index.

2.3.3.9 Pricing of Closed–End Funds

The investment company Act of 1940 summarily designates all investment portfolio funds that do not regularly and continuously issue and redeem their shares as closed-end funds. Unlike open–end funds, closed–end funds on the other side of the divide do not stand ready to sell or repurchase their securities at the net asset value per share. What they do is to float a fixed number of shares in an initial public offering after which, investors wishing to buy or sell shares of a closed–end funds type must then do so in the secondary markets. The market forces of demand and supply determines the prices in the secondary markets which may not be directly linked to the funds' fundamental or net asset value. Malkiel (1977) further opined that the market valuation of close-end investment company shares usually reflect huge mispricing. He notes that the pricing of closed-end funds does then seem to only but provide an illustration of a market's imperfection in capital-asset pricing.

In general, we can clearly see that all the funds have been shown to trade at a discount rate relative to their net asset values (see Malkiel, 1977, Brickley and Schallheim, 1985, Lee, Shleifer and Thaler, 1991). Between the period of 1970 and 1990, the average discount on closed-end funds ranged somewhere between 5 to 20 per cent. Therefore, this existence of discounts clearly contradicts the value additives principle of what we would like be known as the efficient and frictionless capital markets. Some reports from the popular financial analytical press have also commented on mispricing in the closed-end funds market. As Laderman notes in the Business Week of March 1, 1993, "America's financial markets are the most efficient in the world. But there is one corner where pockets of inefficiency still exist, and that is close-end funds".

2.3.3.10 The Weather Effect

Only very few persons would take the stance and argue that sunshine puts people in a good and jolly mood and we know for a fact that people in good moods make more optimistic financial choices and judgments. Saunders (1993) keenly observed and found out that the index in the New York Stock Exchange tends to be negative when the weather is cloudy. Hirshliefer and Shumway (2001) analyzed data for some 26 countries from the year 1982 to 1997 and found that stock market returns are positively correlated with sunshine in almost all the countries studied. Interestingly also, they found that the other weathers such as snowfall and rainfall have no actual predictive power.

These phenomena have rather and rightly been referred to as anomalies because they cannot just be explained within the existing paradigm of the Efficient Market Hypothesis. This clearly suggests that information alone is not moving the prices in markets (Roll, 1984).

In another study, Kathiravan, Kasilingam, Selvam, and Venkateswar, (2018) took time to x-ray some monthly data of weather in five sample cities, namely Chennai, Mumbai, Dechi, Kolkata and Hyderabad, all in India. Statistical tools such as the ADF Test, Descriptive statistics, and Garch (1,1) model were employed. It was then found that the returns of sample stock indices were influenced by temperature or generally speaking, the weather factor in the cities of Chennai, Mumbai, Kolkata and Hyderabad but very interestingly, the returns of stock indices were not influenced by the temperature in Delhi City.

These anomalies have led many economic researchers to question the Efficient Market Hypothesis and to further attempt to investigate alternate modes of theorizing market behaviour. Such developments are consistent with Kuhn's (1970) route for progress in knowledge for as he states, "discovery commences with the awareness of anomaly, i.e. with the sheer recognition that nature has somehow violated the paradigm which includes our expectations" (Kuhn, 52).

2.3.3.11 Turn-of-the-Month Effect

This effect was first identified by Ariel in the year 1987 for the US equity market. He observed that the mean returns were higher at the end of every month and at the beginning of the following month. In his study covering a period of nineteen years (1963-1981), considering last days of one month (-1.+3), he observed several times that changes in stock prices in those days were found to be positive.

Furthermore, Lakonishok and Smidt (1988) extended this investigation. They used a rather wide ninety years sample spanning the period between 1897 and 1986, and employed a narrow study window of front trading days comprising the last trading days of the month and first four trading days of every new or next month (-1,+4), and found that the mean returns were significantly higher during the turn-of-the-month. Their finding also serially supported many subsequent studies. For example, in their works, Hansel and Ziemba (1996) used a five-day event window gotten by adding two of the last days of the first month and the first three days of the next month (-2, +3) for the US stock market to show the existence of this effect. They analyzed data from 1929-1993 and found that returns on -1,+2 and +3 days were always significantly higher.

Penttengill and Jordan (1988) and Agrawal and Tandon (1994) also showed that the cumulative returns during the short window of turn-of- the- month could totally constitute as much as 55-70 per cent of monthly returns. Then Schwert (2003) noted that return patterns that appear during a particular time period often disappeared once they have been discovered.

With all of the above, the phenomenon of turn-of-the-month effect seems to have been successful in maintaining its existence even after two decades after its first discovery. Some relatively recent studies confirmed that this effect is still present in the US equity market (e.g Pham 2005: McConnel & Xu, 2006). McConnel and Xu (2006) who also examined turn-of–the–month effect in the US equities market for an 80-year period, starting from 1926-2005 found that the effect is powerful over the full period, and that is even being stronger over the recent two decades such that, on the average, investors will receive no reward for bearing market risk except at the turn-of-the-month.

This anomaly seems to have global presence as Casby and Ratner (1992), Jaffe and Westerfield (1989) observed in their international market study that the turn-of–the–month effect was significant at 1% level in Canada, Switzerland, and West Germany and was seen to be at the 5% level in the UK and Australia; they did not find significant results in Japan, Hong Kong, Italy and France.

It was Bildik (2004) who observed statistically and economically large and positive returns in the first and last weeks of the month for the Istanbul stock exchange. Kohali (2006) then found significant positive difference between turn-of-the-month and non-turn-of-the-month in his empirical study for European stock markets.

1. Arsed and Coutts (1997), in their work found similar results from the London stock market. Their study covered a period of sixty year. Some other researchers (e.g, Ziemb & Hensel, 1994, Pham, 2005, Gopal, 2001) have suggested that turn–of–the–month effect could be exploited to construct certain profitable investment strategies. It is, therefore, rather surprising how and why this anomaly still remains unexploited. Vasileiou (2018) in his work entitled "Is the Turn-of-the-Month Effect an Abnormal Normality? Controversial Findings, New Patterns and Hidden Signs?", used a wide data sample from eleven countries that adopted the EURO as their official currency in 1999.

   The study provided the following: (a) the trading days which is defined as turn-of-the-month period should be regularly revised; (b) whenever a stable turn-of-the-month definition is adopted, the empirical findings suggest that turn-of-the-month is not a long lasting anomaly, but an "abnormal normality"; (c) there could be a strategy based on the turn-of-the-month which suggests that in the long term, the efficient market hypothesis (EMH) may be violated in two basic ways (outperformance and or lower risk taking), and (d) there is an interesting pattern based on the turn-of-the-month, signs which could be an indicator for the turn-of-the-month financial trend changes. Finally, using the existing data, there is no evidence that suggests that the turn-of-the-month effect exists since there is always increased liquidity (due to the salary payments) during the turn-of-the-month days.

2.3.3.12 Month-of–the-Year-Effect

Although significant variations are found in the behaviour of stock returns in different countries for different months of the year, generally, the returns are found to be high in the month of January in many countries of the world, including USA. Therefore, this effect is also known as January effect. Wachte (1942) provided the earliest evidence of the abnormal stock returns in January for US stock markets. Rozeff and Kinney (1976) were the first who formally reported this effect in the US equity market. They found that returns on an equally weighed index of NYSE stocks were much higher in January than in other months of the year. Similar results were reported from other parts of the globe.

Gultekin and Gultekin (1983) show abnormal positive January returns in sixteen different countries. Similarly, Agrawal and Tondon (1994) reported monthly anomalies in eighteen countries other than in the US. Studies by Banz (1981), Reinganum (1981), Blume and Stambaugh (1983), Roll (1983) and Keim (1983) investigated the interaction of the month of the year and size effect and found that there is significant negative relationship between stock returns and the size of the issuing firms as measured by the total market value of outstanding equity in their empirical results of the study. They concluded that returns of small firms were significantly higher than that of larger firms in January. Along with small firm effect, Keim (1983) attributed this finding to tax-loss selling and information release hypothesis.

Reinganum (1983) also observed that the tax consideration is an important factor for stock market seasonality. However, he was of the view that the entire seasonality in stock returns cannot be obtained by tax-loss-selling hypothesis. Fama (1991) analyzed the behavior of S and P 500 for the period of forty years (1941-1981). During this period small stock averaged a return of 8.06% in January which was substantively higher than the returns during other months of the year.

Hawalder, Shakila, and Pinto (2017), investigated the turn-of-the-year effect in ten randomly selected firms from the banking sector and the service-driven sector which traded on the Bahrain Bourse for a five-year period, commencing from the 1st of January, 2010 to the 31st of December, 2014. The resultant findings of the study revealed that none of the companies selected for the study period exhibited any significant monthly returns for the study period except Bahrain stock exchange.

2.3.3.13 Day-of-the-Week-Effect

This effect refers to that tendency of stocks to exhibit relatively enormous returns on any one particular day (for instance, a Wednesday) compared to the rest of the days in the week studied. Aziz and Ansari (2015) investigated the presence of the-day-of-the-week effect in the Indian stock market and they found out that the traditional Monday effect is virtually none-existent in the two leading market indices. In contrast, he noticed and recorded a positive Monday effect in Sensex and a positive Wednesday effect in Nifty present in the entire sample period.

Nigerian economists, Onoh and Ndu-okeke (2016), in their work identified and stated that the Friday effect is very much present in the Nigerian Stock Market. Cengiz, Bilen, and Buyuklu (2017) also investigated the market anomalies in the Borsa Istanbul Index (BIST) with the aim of studying the concept of Monday effect. They made use of daily stock data from 2nd January 2010 to 22nd October 2014. They studied 289 companies, making use of daily historical stock prices. These returns were carefully classified based on the sectors of the economy and then statistically analyzed to see if the day-of-the-week had any effect whatsoever on Mondays when the daily stock returns of Monday were fixed at a constant.

The findings showed that the stock returns on the Mondays examined were affected by the other days of the week and these effects were seen to mostly be in the negative and they vary according to the stocks selected and sectors chosen. We see that Thursdays and Fridays had the highest effects, whereas Tuesdays had the least effect on the stocks chosen. The result, therefore, shows that the capital market in Turkey fully has the market anomaly, and so the BIST is not an efficient market.

2.4 Gap in Literature

Given the array of past works reviewed in this area of capital market efficiency so far, it is only curious and perhaps, pertinent to observe that there seems to be lack of agreement among researchers about the state or form of efficiency, or otherwise, of the Nigeria Capital Market. For instance, Nneji (2013), in his study of efficiency of the Nigeria Capital Market, 1986-2009 revealed that the speed of adjustment of stock price to stock information was not very high and the market was also found to be inefficient within the period. On the other hand, Ogundina & Omah (2013) observed that the Nigerian Capital Market during 1990-2009 period was efficient based on market capitalization as an index. Arewa (2014), Olowe (1998), Okpara (2010) and Egbeonu (2016) individually found evidences of weak form efficiency of the Nigeria Capital Market. From these studies, there seems to be inconsistencies in results of efficiency investigations of the Nigerian Capital Market, hence the need for further investigations on the efficiency level with focus on pattern of stock returns, prices, volatility, as well as weather and calendar effects on stock returns.

CHAPTER THREE

METHODOLOGY

3.1 Research Design

Research design brings into proper focus the where and how of the research in order to achieve the desired objective. This study is designed after the ex-poste ante hypothetico-deductive research design that informs the econometric and or finametric procedure. This involved hypothesizing, modeling, estimation, collection of raw data on real security prices on daily and monthly basis and transforming them to daily and monthly stock returns.

In this present study, the data series were tested for randomness that is whether they exhibit random walk, using the following tests/techniques: Runs, Jarque-Bera, stationarity, Variance ratio, Breusch-Godfrey Serial Correlation, Lagrager multiplier test, Breusch-Pagan-Godfrey heteroskedasticity test, ARCH and GARCH techniques.

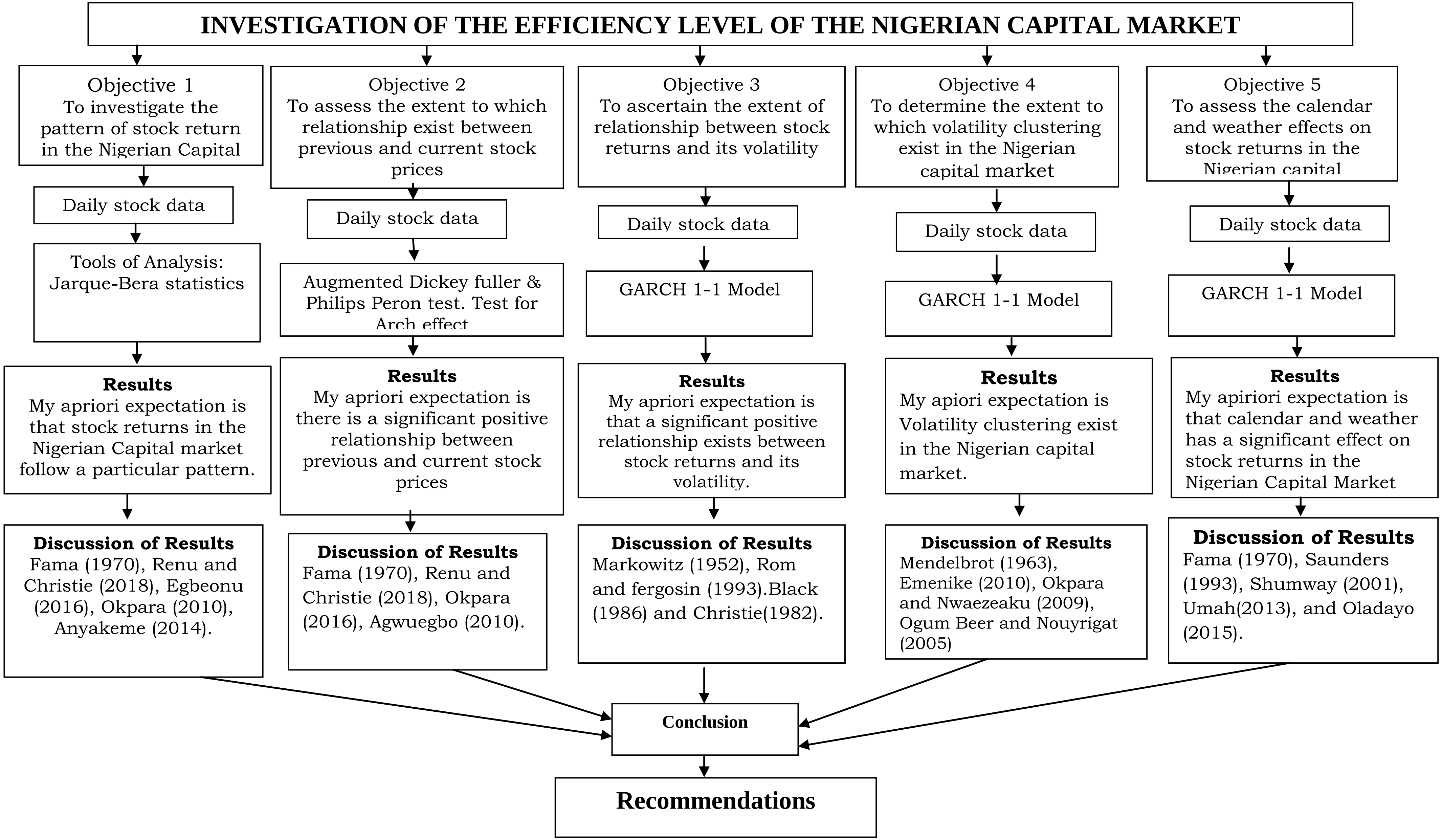


Fig. 3.1: Flow chat on the efficiency level of the Nigerian capital market

3.2 Study Population

The study centred on the Nigeria Capital Market with a limited period ranging from January, 200O to December, 2020. Thus, the population of our study comprises all the listed companies that traded both frequently and infrequently on the floor of the Nigerian Stock Exchange (NSE) for the aforementioned period. Therefore, the companies that lost their listing status after 2000 in the Exchange were, however, excluded from the study population.

3.3 Types and Sources of Data Used

The data used in this work were strictly ex-poste secondary data. The data were obtained from various sources which include: the Nigeria Stock Exchange (NSE) archives, the annual Statistical Bulletin of the Central Bank of Nigeria (CBN), extracts of reports from the Federal Office of Statistics, etc. Some other relevant data were collected from the internet. Other sources of these secondary data were journals and research projects. The nature of the study makes it imperative that secondary data be collected; in other words, the macroeconomic impact of the study makes it necessary that secondary data devoid of personal influence or personal opinions are used for the analysis.

We made use of daily and monthly data in order to capture the relevant objectives of the study.

3.4 Method of Data Analysis

3.4.1 GARCH and Model Specification

In this research study, the univariate GARCH-in-mean model is used to capture the relationship between stock returns and its volatility in the Nigerian stock market. The motivation for using this model is that when compared to other ARCH/GARCH family of models, the GARCH-in-mean model has an advantage of estimating risk-return relationship and parsimoniously capturing volatility clustering in stock returns.

The GARCH model is specified in the following ways.

The mean equation specification:

$$\mathrm{R_t} = \lambda_0 + \lambda_1 \log\sigma + \lambda_2 Monday + \lambda_3 Friday + \lambda_4 Dry_{Season} + \lambda_5 Last_{day_{month}} + \epsilon_t \ldots\ldots (3.1)$$

$$\epsilon_t \sim \mathrm{Niid}(0, \sigma^2)$$

The variance equation is specified as:

$$\sigma_t{}^2 = \omega + \alpha_1 \varepsilon^2{}_{t-1} + \beta_1 \sigma^2{}_{t-1} + \beta_2 Monday + \beta_3 Friday + \beta_4 Dry_{Season} + \beta_5 Last_{day_{month}} \ldots\ldots (3.2)$$

From equation 3.1, $\mathrm{R_t}$ is stock returns, λ_0 is the intercept and λ_1 captures risk-return trade-off in the Nigerian stock market. If λ_1 is positive, then, stock return is positively related to risk measured by the conditional standard deviation. By contrast, however, if λ_1 is negative, then stock return is not positively related to risk. In line with CAPM, it is expected *a prior* that λ_1 will be positive. λ_2,λ_3,λ_4 and λ_5 capture Monday effect, Friday effect, Dry season effect and last day of the month effect respectively. The α_1 in the variance$(\sigma_t{}^2)$ equation(3.2) is the ARCH term which represents the information about volatility in the previous period, while β_1 is the GARCH term which represents the estimated variance from the model in the previous period (Brooks, 2008). The stationarity of the GARCH model depends on the sum of ARCH and GARCH coefficients. If $\alpha_1 + \beta_1 < 1$, then the model is stationary and volatility is mean reverting. By contrast, if $\alpha_1 + \beta_1 = 1$, then volatility is persistent or have a long memory.

$\beta_2, \beta_3, \beta_4$ and β_5 capture Monday effect, Friday effect, Dry season effect and last day of the month effect in the variance equation respectively.

3.5 Estimation Method and Distributional Assumptions

As it is well known, all GARCH type models are estimated, using the maximum likelihood procedure, and compared to the usual OLS technique which estimates only the mean equation by minimizing the error sum of squares, the "maximum likelihood technique can be used to estimate both the mean and variance equations due to its advantage of estimating both linear and non-linear models" (Brooks, 2008, p. 395).

This dissertation estimates the specified GARCH-in-mean model in the usual way by assuming that errors follow a Gaussian normal distribution the incorporating heteroskedasticity in the variance. The modified log likelihood function to be maximized is therefore, given as:

$$L = -\frac{T}{2} l \log(2\pi) - \frac{1}{2}\sum_{t=1}^{T} log\,(\sigma_t^{\,2}) - \frac{1}{2}\sum_{t=1}^{T} \varepsilon_t^{\,2}/\sigma_t^{\,2} \ldots\ldots\ldots\ldots\ldots\ldots (3.3)$$

Unlike time-invariant variance σ in the homoscedasticity models, the subscript *t* in the $\sigma_t^{\,2}$ indicates that variance of the error term is now time-varying (Brooks, 2008). Thus, the log likelihood function for Gaussian error distribution is modified to account for time-varying variance in the conditional variance models. The OPG BHHH (Marquardt steps) optimization approach is employed to maximize the log likelihood function.

3.6 Non-Parametric Models

The test for normality or random walk can be partly explored using non-parametric tools as indicated in the literature. Here, we shall employ four non-parametric estimation techniques to provide a robust and extensive test for the empirical stance of random walk hypothesis in the Nigerian Capital Market. The discussion and presentation of these techniques are as follows:

3.6.1 Runs Model Specification

The Runs Test is applied to determine serial randomness in a given observation. In a capital market such test reveals whether the returns/prices of stocks are randomly distributed over a time horizon. Therefore, the null hypothesis to accomplish this test is that the distribution of stock returns/prices is random which indicate random walk hypothesis. However, the Runs Model Specification according to (Zar, 1984) can be expressed as:

$$Z_R = \frac{OR - ER}{SDR} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.4)$$

where, Z_R stands for the Z-statistics for Runs Test,

OR is the visually observed number of runs,

ER is the expected number of runs, and

SDR is the standard deviation of the number of runs.

The values of ER and SDR are computed using the following formula:

$$ER = \frac{2N_1N_2 + 1}{N_1 + N_2} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.5)$$

$$SDR = \left[\frac{2N_1N_2(2N_1N_2 - N_1 - N_2)}{(N_1 + N_2)^2\,(N_1 + N_2 - 1)}\right]^{1/2} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.6)$$

$$Or\ Var(R) = \frac{2N_1N_2(2N_1N_2 - N_1 - N_2)}{(N_1 + N_2)^2\,(N_1 + N_2 - 1)} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.7)$$

where: *Var(R)* is the variance of the number of runs

N_1 is the positive values in the given series

N_2 is the negative values in the given series

The run test rejects the null hypothesis if the absolute value of the observed or computed z-statistic, /z/ is larger than the critical z-value from the table.

A-priori Expectation for the Runs Test: It is expected that computed z-value will be less than the critical or table z-value so that the null hypothesis that stock returns series exhibit random walk pattern cannot be rejected.

3.6.2 Jarque Bera Model Specification

This specification was formalized by Bera & Jarque, and it is rooted on the coefficients of total skewness and kurtosis which are defined as:

$$S = \frac{E(U^3)}{(\delta^2)^{3/2}} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.. (3.8)$$

$$K = \frac{E(U^4)}{(\delta^2)^2} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3.9)$$

Where: S is the skewness coefficient

K is the kurtosis coefficient

E(U) and δ^2 are the mean and variance of the series respectively.

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

The kurtosis measures the degree of peakedness of the distribution of the series. The kurtosis of the normal distribution is 3. If the kurtosis exceeds 3, the distribution is peaked (leptokurtic) relative to the normal; if the kurtosis is less than 3, the distribution is flat (platykurtic) relative to the normal.

Jarque-Bera is a test statistic for testing whether the series is normally distributed. The test statistic measures the difference of the skewness and kurtosis of the series with those from the normal distribution.

Therefore, The Jarque-Bera statistic can be expressed as:

$$Z_{JB} = N\left(\frac{S^2}{6} + \frac{(K-3)^2}{24}\right) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.10)$$

where: Z_{JB} represents the observed or computed z-statistic for the Jarque Bera Test.

N is the sample size.

A-priori-Expectation: It is expected that the computed J.B Statistic will be larger than the critical Z-statistic for the null hypothesis of normality to be rejected.

Note: The rejection of normality suggests that the distribution exhibits randomness. Therefore, this model will help to answer research question number one.

3.6.3. Variance Ratio Test Specification

This specification was developed by Lo & Mackinlay (1988) as an asymptotic standard normal test statistic. According to Campbell et al. (1997, p. 50), under the null hypothesis of homoscedasticity, the standard normal test statistic Z_{VR} can be defined as:

$$Z^{(q)}{}_{VR} = \frac{VR(q) - 1}{\theta\sqrt{(q)}} \sim\mu(0,1) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots . (3.11)$$

$$Z^{(q)}{}_{VR} = \frac{VR(q) - 1}{\theta(q)^{0.5}} \sim\mu(0,1) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots . (3.12)$$

$$\theta(q) = \frac{2(q-1)(q-1)}{3q\,(nq)} . \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots . (3.13)$$

Where: $Z^{(q)}{}_{VR}$ is the computed variance ratio; θ(q) is the asymptotic variance of the variance ratio order under the assumption of homoscedasticity and n(q) is the number of observation.

Darrat and Zhong (2000) concluded that if the computed variance ratio $Z^{(q)}{}_{VR}$ is less than unity, it implies negative serial correlation but if it indicates positive correlation if the $Z^{(q)}{}_{VR}$is greater than unity. However, if the $Z^{(q)}{}_{VR}$is equal to unity or one, there is evidence of homoskedasticity. That is the null hypothesis of no heteroskedasticity or no-random walk presences in the specified series (Worthington & Higgs, 2004). On the a-priori expectation, we expected that the variance ratio will be larger or smaller than one. This model will help in answering research question number one.

3.6.4 Stationarity Test

In this work, we made use of time series data. Time series data exhibit a character of not being stable, therefore the results they give today may not hold tomorrow, so to avoid spurious regression which is a characteristic of series data, a unit root is tested so as to ascertain that the data is reliable enough to arrive at conclusion. This unit root test is done to check for the presence of unit root. In other words the unit root test ascertains if the variable(s) to be used for the analysis are stationary at level data. In this case one can do an OLS test. The tests can attain stationarity at first difference (1(1)) that is, at a rate of change (yr2-yr1) other levels (order of stationarity). In this case one can do cointegration using the Johanson Jesellus Approach. But when the data attained stationarity at different levels, for instance, at levels and some at first differencing, the ARDL autoregressive distribution lag approach to cointegration will be used. The unit root test can be done using the augmented Dickey-Fuller test (ADF), Philip Perron test (PP), NG and Perron test, KSSP.

In this study, we employed the popular Augmented Dickey-Fuller (ADF) and Philips-Peron (PP) tests. The null hypothesis for the ADF and PP is that the series is not stationary (i.e. there is presence of a unit root). This test is important to compare with the ADF and PP results so as to verify or check whether the outcome of the unit root test is superior or empirically reliable. The specification of the unit root test model can be stated as:

$$\Delta_{rt} = \lambda_0 + \lambda_{1t} + \beta_0 r_{t-1} + \beta_i \Delta r_{t-1} + \mu_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3.14)$$

r_t and r_{t-1} represents current and lagged value of return series;

$\Delta \mathbf{r}_t = r_t - r_{t-1}$, $\boldsymbol{\beta}$'s are the coefficient to be estimated; $\boldsymbol{k}$ is the maximum number of lagged terms; $\boldsymbol{t}$ is the trend term, which may be include or not depend on the assumption under which the test is being conducted; $\boldsymbol{\lambda_1}$ is the estimated coefficient of trend; $\boldsymbol{\lambda_0}$ is the constant and $\boldsymbol{\mu_t}$ is the white noise.

Therefore, the Augmented Dickey-fuller (ADF) and Philip-peron (PP) tests are employed in this work to check whether there exists a significant positive relationship between current and previous stock return series in the Nigerian Stock Market.

3.7 Parametric Models

The Parametric Models that readily catch our interest are mentioned in 3.4.1 above. For example, the univariate parametric models like Autoregressive Conditionally Heteroskedastic (ARCH) Model and Generalised ARCH (GARCH) Model are employed in this study to examine if there is presence of ARCH/GARCH effects and to verify if there is volatility clustering, exhibiting the series.

The VAR framework shows the lead-lag relationship of stock returns while J. J. Multivariate, Co-integration mechanism provides indication of long-run relationships between/among lead and lag values of stock returns/prices. The model is beyond regression of Granger commonly referred to Granger Causality Specification can be used to show the direction of causality and consequent upon this, to know whether past stock prices can be used to predict current or future prices.

3.7.1 The ARCH and GARCH Model Specifications

The ARCH and GARCH frameworks employed in this study are rooted in the time-varying volatility models of Taylor (1994) and Bollerslev (1986). They are stated as follows:

$$r_t = \alpha + \alpha_2 Vol\, r_t + \mu_t, \mu_t \sim \mu(0, \delta^2{}_t) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.15)$$

Equation 3.15 above is called the ***conditional mean equation***; it can be extended by relating the conditional variance of return to the one lag Square of the residual term (U^2_{t-1}) as:

$$Vol\, r_t = \beta_0\, 1 + \beta_1 \mu^2{}_{t-1} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots . (3.16)$$

Equation (3.16) is the ARCH Specification. Bringing in the lag one of conditional variance term (Vol r_{t-1}) will lead to the GARCH equation as follows:

$$Vol\, \bar{r_t} = \lambda_0 + \lambda_1 \mu^2{}_{t-1} + \lambda_2\, Vol\, r_{t-1} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(3.17)}$$

Equations 3.16 and 3.17 are conditional variance equations and they are called ARCH (1) and GARCH (1) models. That is the maximum lag length is one (1).

r_t = is the average return at time (t).

Vol r_t is the conditional variance volatility of return at time t.

$\boldsymbol{\lambda_1}$ and $\boldsymbol{\lambda_2}$ are the coefficients of the ARCH and GARCH respectively. If they are significant, it implies the rejection of the null hypothesis that there is presence of random walk exhibiting stock returns.

Also, if the coefficient of Vol r_t (i.e. α_2) is negative, it means stock market is inefficient, since the claim of the CAPM is grossly violated. Finally, if the summation of $\boldsymbol{\lambda_1}$ and $\boldsymbol{\lambda_2}$ (i.e. $\boldsymbol{\lambda_1} + \boldsymbol{\lambda_2}$) is one or close to one; it means volatility clustering or pooling which is interpreted as large changes in stock prices or returns of either sign are followed by large changes while small shocks are followed by small shocks.

However, in a market situation that depicts the presence of volatility clustering can be regarded as inefficiency since there is the presence of persistent past volatility in explaining current price/return volatility. Investors can explore this “privilege” to outperform the market.

The most important extension of GARCH model can be traced to the specification of Glosten, Jagannathan and Runkle (1993) and it is called Threshold GARCH (TGARCH) Model. The model is defined as:

$$Vol\, r_t = \alpha_0 + \alpha_1 \mu^2{}_{t-1} + \alpha_2 Dum\, \mu^2{}_{t-1} \alpha_3\, Vol\, r_{t-1} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.18)$$

Where 'Dum' represents the dummy variable.

It takes the value of one (1) when μ_{t-1} is positive which indicates existence of good news but zero, if μ_{t-1} is negative which implies bad news. Thus, equation 3.18 can be estimated to test the effect of information asymmetry on stock return. On the a-priori, it is expected that the ARCH, GARCH coefficient in equations 3.17 and the asymmetry coefficient (a_2) in equation 3.18 will be insignificant to justify the claims of the random walk hypothesis. Test for ARCH effect will help to answer research question number two and the GARCH (1,1)-m model will answer research questions 3 to 8.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 RESULTS

Daily stock prices data were employed in this work from 2000 – 2020 as could be seen from Appendix 1. These data were later transformed to daily stock returns for the purpose of this work and analysed as presented below.

4.1.1 Descriptive Statistics

Table 4.1 presents some descriptive statistics for both daily and monthly data. The statistics presented include: mean, maximum, minimum, standard deviation, skewness and kurtosis. The Jarque-Bera statistic and its associated probability that formally test the hypothesis of normal distribution of both daily and monthly returns series are also presented in Table 4.1.

As this Table 4.1 shows, the mean values of 0.000397 and 0.007753 indicate that the daily and monthly average return on investment for NSE-ASI over the sample period are 0.04% and 0.77% respectively, with daily returns (standard deviation = 0.091161) being more volatile than monthly returns (standard deviation = 0.070388). The skewness coefficients (Skew < 0) indicate that both daily and monthly returns are skewed to the left while the kurtosis coefficients (Kurt > 3) indicate that they both have leptokurtic distributions. However, there are more outliers and data extremes in daily returns than in monthly returns. The Jarque-Bera statistic is highly significant for both series, with the associated p-values being less than 1%, and thus rejecting clearly the null hypothesis of normal distribution for both daily and monthly returns series. This is therefore, strong evidence that daily and monthly returns on the Nigerian Stock Exchange all share index are not normally distributed. This can be explained by the presence of large outliers and data extremes as earlier reported.

Table 4.1: Descriptive Statistics for Daily and Monthly Data

Statistics	**Daily Data**	**Monthly Return**
Mean	0.000397	0.007753
Maximum	4.428528	0.323516
Minimum	-4.608492	-0.365883
Standard Deviation	0.091161	0.070388
Skewness	-2.887187	-0.470909
Kurtosis	2390.796	7.484970
Jarque-Bera (p-value)	1.20+E09 (0.0000)	219.6456 (0.0000)
Observations	5064	251

Source: Computer printout of E-views 11 Output

Figure 4.1 plots the daily log returns data, while Figure 4.2 plots the monthly returns data over the period under study. A cursory look at these figures shows that there is volatility clustering in both daily and monthly returns data. However, it appears that volatility appears in bunches more in daily data than in monthly data. On balance, periods of high volatility are followed by periods of high volatility and periods of low volatility are followed by periods of low volatility in the Nigerian Stock Market. This motivates the use of ARCH/GARCH models to capture the observed stylized facts in the data (Engle, 1982; Bollerslev, 1986; Nelson, 1991).

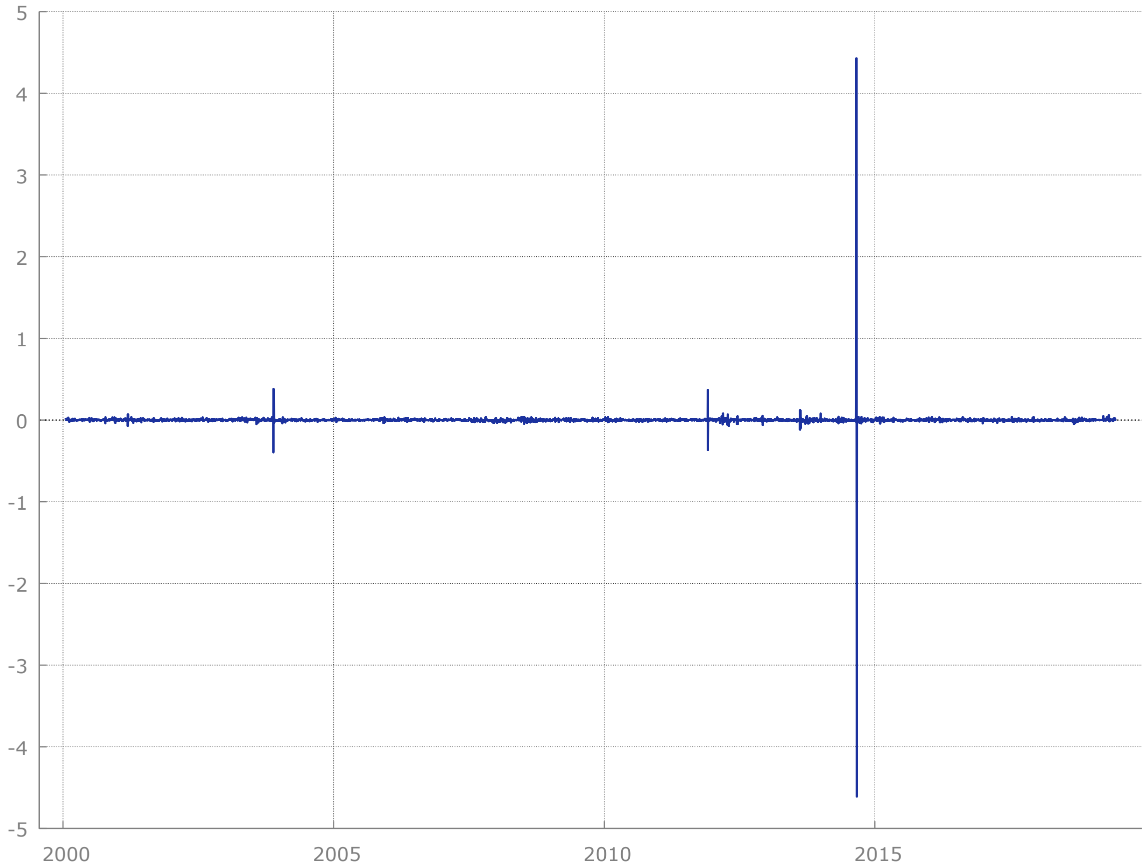


Figure 4.1: Daily log returns on NSE ASI

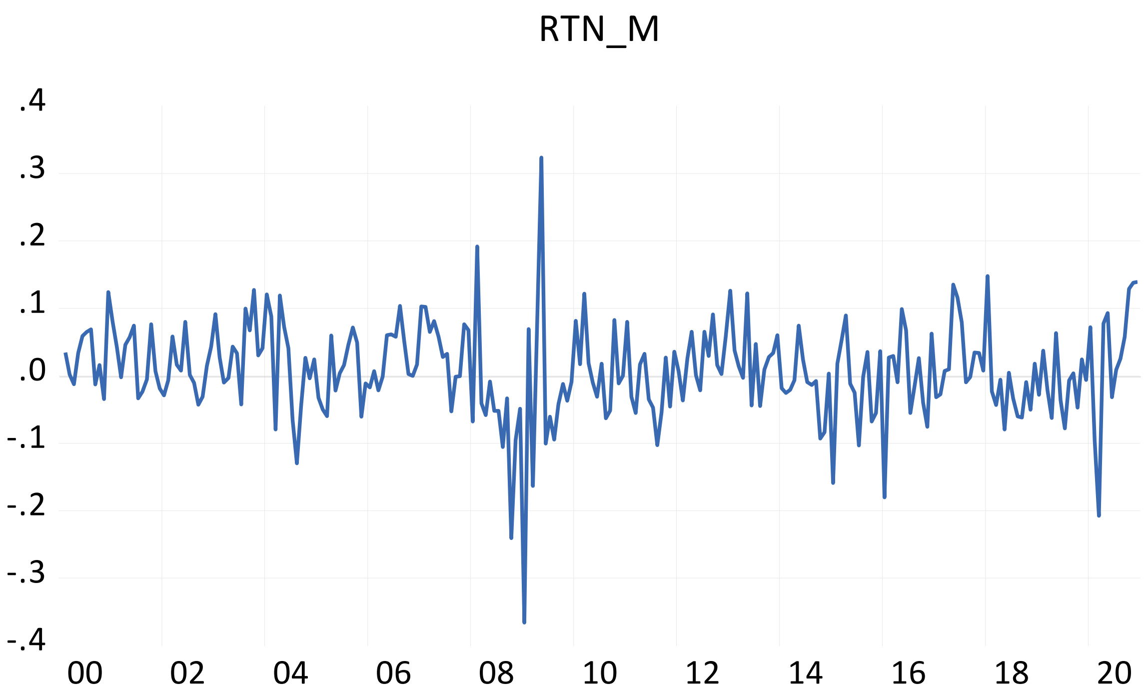


Figure 4.2: Monthly returns on NSE ASI

4.1.2 Stationarity Tests

Table 4.2 reports the results of stationarity test for both daily and monthly data. We apply both ADF and Phillips Perron tests on the two series. The lag length for ADF test is automatically determined, using Akaike information criterion, allowing a maximum of 30 lags for daily returns and 14 lags for monthly returns data. By contrast, the PP test is a non-parametric equivalent and thus, does not require lag specifications.

As the Table 4.2 shows, both the ADF and PP test statistics are highly significant for both daily and monthly returns data, and thus, rejecting the null hypothesis of unit root for both series. This is clear evidence that our data are both stationary at level. This is consistent with random walk theory and implies that returns on the NSE ASI cannot be predicted by their past values.

Table 4.2: ADF and PP Unit Root Tests

Data	**ADF (tau) statistics**	**PP test statistics**
Daily Returns	-28.90509 (0.0000)	-230.0714 (0.0001)
Monthly Returns	-5.233865 (0.0000)	-13.33194 (0.0000)

Source: E-views 11 Output

4.1.3 Testing for ARCH Effects

To determine whether there is ARCH effects in the residuals of stock returns data, the ARCH LM test is conducted for lags 10, 15 and 20. The results are given in Table 4.3. As this Table 4.3 shows, the p-values are all less than 1% significant level for both daily and monthly returns, suggesting evidence that ARCH effect is present in the residuals of these series. This leads us to reject the null hypothesis of no ARCH effect and thus, motivates the use GARCH models to capture the time varying features of our returns data.

Table 4.3: Test for ARCH effects on the Residuals

	Daily Returns	**Monthly Returns**
$\boldsymbol{TR^2}$(10)	2243.190 (0.0000)	40.32025 (0.0000)
$\boldsymbol{TR^2}$(15)	2290.065 (0.0000)	41.00289 (0.0003)
$\boldsymbol{TR^2}$(20)	2306.495 (0.0000)	41.16310 (0.0035)

Source: E-views 11 Output

4.1.4 GARCH Estimation and Analysis for Daily Returns

Table 4.4 shows the results of the estimated GARCH (1,1)-Mean model and diagnostic tests for daily returns on the NSE-ASI. For the residual diagnostic tests, the LM statistic up to lag 15 is not significant at conventional levels, suggesting that there is no further ARCH effect in the standardized residuals of the estimated model. Thus, the null hypothesis of no ARCH effect is not rejected. Similarly, the correlogram (Q statistics) for both the standardized residuals and the standardized residuals squared up to lag 20 and 15 respectively are not significant at conventional levels, suggesting that the mean and variance equations are respectively free of serial correlation and ARCH effects. This is clear evidence that the estimated GARCH (1,1)-M model for daily returns is correctly specified.

For the risk-return trade-off, the coefficient of σ in the mean equation is -0.3863 and the associated p-value is less than 5% (p=0.0309), indicating that stock returns and its volatility are negatively and significantly related. This supports the leverage effect hypothesis and implies that in the Nigerian stock market, the higher the risk, the lower the expected returns and vice versa. The null hypothesis that daily stock returns and its volatility are not significantly related is, therefore, rejected.

The estimated ARCH $(\alpha = 0.5516, p$-value = 0.0000) and GARCH coefficients $(\alpha = 0.5527, p$-value = 0.0000) are both positive and significant at 1% level, while their sum $(\alpha + \beta)$ is slightly above unity (0.5516 + 0.5527 = 1.1043), suggesting evidence that high volatility persistence is present in the daily market data. The null hypothesis that volatility clustering is not present in the Nigerian Stock Market is therefore, rejected.

For the stock market anomalies, the coefficient on *Friday Dummy (DFD)* is negative in both the mean $(\psi = -0.0024)$ and variance eqations $(\psi = -0.0001)$, indicating that Fridays are associated with a decrease in both market returns and volatility in the Nigerian Stock Market. However, as suggested by the high p-values associated with this coefficient in both equations, the effect of Friday on both market returns (p-value = 0.8967) and volatility (p-value = 0.3211) is not statistically significant. This provides no statistical evidence to reject the null hypothesis that investors do not earn significant abnormal returns on Fridays.

Table 4.4: Results of estimated GARCH (1,1)-M model for daily returns

Coefficients/Statistic	**Daily Returns**	**P-value**
Mean Parameter		
σ	−0.386322	0.0309
Constant	0.047216	0.0165
$DMD(\lambda)$	−0.016034	0.1733
$DFD(\psi)$	-0.002440	0.8967
$DDry(\phi)$	−0.004424	0.6493
$DLMD(\theta)$	−0.019911	0.2592
Variance Parameter		
Constant	0.006510	0.0000
$\boldsymbol{\alpha_1}$ ARCH	0.551684	0.0000
$\boldsymbol{\beta_1}$ GARCH	0.552715	0.0000
$DMD(\lambda)$	−0.005443	0.0000
$DFD(\psi)$	-0.000170	0.3211
$DDry(\phi)$	0.000162	0.0358
$DLMD(\theta)$	−0.008503	0.0000
L.lik	6386.048	–
AIC	−2.517001	–
SIC	−2.500238	–
LM(15)	0.181326	1.0000
Correlogram Residual Q(20)	0.0030	0.1230
Correlogram Residual Sq. Q(15)	-0.0000	1.0000

Source: Computer printout of E-views 11

For Monday effect, for mean and variance equations, the coefficient on *Monday Dummy (DMD)* is negative, which indicates that Mondays are associated with a decrease in both market returns (λ = $-$0.0160) and market volatility (λ = $-$0.0054) in Nigeria. However, while the decrease in market returns (p-value = 0.1733) due to Monday effect is not statistically significant, it is highly significant in the case of market volatility (p-value = 0.0000). The null hypothesis that investors do not earn abnormal returns on Mondays is not also rejected. This implies that although, in Nigeria, there is significant Monday effect on market volatility in the Nigerian stock market, there is no corresponding Monday effect on investors' returns.

For seasonal effects, while the coefficient on *Dry Season Dummy* $(DDry)$ is negative and insignificant for the mean equation $(\phi = -0.0044, p$-value = 0.6493), it is positive and significant at 5% level for the variance equation $(\phi = 0.0001, p$-value = 0.0358). This indicates that while dry season is associated with a significant increase in market volatility, it has no significant effect on daily market returns. The null hypothesis that investors do not make more profit during the sunny days is therefore, not rejected.

Finally, for both mean (θ = $-$0.0199, p-value = 0.2592) and variance (θ = $-$0.0085, p-value = 0.0000) equations, the coefficient on *DLMD* is negative, indicating that last day of the month is associated with a decreasing market trend. However, as indicated by the associated p-values, the effect of last day of the month is only significant for variance equation. Hence, while last day of the month causes a significant decrease in market volatility, its negative association with market returns is not significant. The null hypothesis that investors do not make abnormal returns in the last day of the month is, therefore, not rejected.

4.1.5 GARCH Estimation and Analysis for Monthly Returns

Table 4.5 shows the results of the estimated GARCH (1,1)-Mean model, diagnostic tests and test of hypothesis for monthly returns on the NSE-ASI. The estimation is based on Bollerslev-Woodridge robust standard errors.

For the residual diagnostic tests, the results are largely comparable with those in Table 4.4 above. The LM statistic up to lag 5 is not significant at all conventional levels, suggesting that there is no further ARCH effect in the standardized residuals of the estimated model. Similarly, the correlogram (Q statistics) for the standardized residuals squared up to lag 10 is not significant at all conventional levels, suggesting that the estimated model is free from serial correlation and ARCH effects. Thus, there is clear evidence that the estimated GARCH (1, 1)-M model for monthly returns is correctly specified.

For risk-return relationship, the coefficient on conditional variance (σ = -0.4835, p-value = 0.0878) is negative and significant at 10% level, indicating that an increase in market volatility is weakly associated with a decrease in market returns. Thus, consistent with the results for daily data, there is evidence that monthly returns and its volatility are negatively related.

Further, for both mean and variance equations, the estimated seasonal dummy ($Ddry$) is not statistically significant, although, it has mixed sign. This shows that, unlike the case of daily data, there is no dry season effect on both monthly market returns and volatility in Nigeria. Therefore, we conclude that the results for the effect of seasonal variation on stock market activities is not robust as it is sensitive to data frequency.

Table 4.5: Results of estimated GARCH (1,1)-M model for monthly returns

Statistic	Monthly Returns	P-value
Mean Parameter		
Constant	0.047107	0.0053
σ	-0.483508	0.0878
$Ddry\ (\gamma)$	-0.005852	0.4403
Variance Parameter		
Constant	0.000271	0.1731
α_1 ARCH	0.164353	0.0216
β_1 GARCH	0.782834	0.0000
$Ddry\ (\gamma)$	0.000141	0.7280
L.lik	331.8497	−
AIC	−2.588444	−
SBIC	−2.490124	−
LM(5)	6.426598	0.2669
Correlogram Residual Sq. Q(10)	-0.0081	0.1910

Source: E-views 11

Besides, as expected, the estimated ARCH ($\alpha = 0.1643, p$-value = 0.0216) and GARCH coefficients ($\beta = 0.7828, p$-value = 0.0000) are both positive and significant at 1% level, while their sum ($\alpha + \beta$) is not above unity (0.1643 + 0.7828 = 0.9471), showing that monthly returns volatility shocks are mean-reverting as compared with the daily returns, although, they exhibit high clustering and persistence. These results contradict our results for daily data in terms of mean-reversion.

4.1.6 The Variance Ratio Test for RWH for Daily Data

Table 4.6 shows the results of variance ratio test for daily returns. As we can see, both Wald statistic (p-value = 0.0000) and the Max|z| statistic (p-value = 0.0000) are highly significant at period 5 and hence, strongly rejecting the null hypothesis of random walk.

Table 4.6: Variance ratio test of RWH for Daily data

Test	Daily Returns	P-values
Max |z| (at period 5)*	28.03624	0.0000
Wald	874.8243	0.0000
Individual Test Periods		
5	0.136750	0.0000
10	0.068036	0.0000
20	0.034033	0.0000
50	0.013649	0.0000
100	0.006809	0.0000

Source: E-views 11 Output

Similarly, the individual test statistics for different periods are all associated with a zero p-value, indicating that they are also highly significant. All these suggest evidence that daily market return series does not follow a random walk and can be predicted based on historical data.

These results agree with Andabai (2019), Ogbonna, Okpara and Ejem (2020), while they disagree with Olowe (1999) and Okpara (2010).

4.1.7 The Variance Ratio Test for RWH for Monthly Data

Table 4.7 shows the results of variance ratio test for monthly returns. Like the case of daily data, we can see that both the Wald statistic (p-value = 0.0000) and the Max|z| statistic (p-value = 0.0000) are highly significant at period 2 and hence, strongly rejecting the null hypothesis of random walk.

Table 4.7: Variance ratio test of RWH for monthly data

Test	Daily Returns	P-values
Max |z| (at period 2)*	7.423358	0.0000
Wald	55.83385	0.0000
Individual Test Periods		
2	0.530506	0.0000
4	0.312232	0.0000
8	0.139488	0.0000
10	0.078549	0.0000

Source: E-views 11

Similarly, all the individual tests are associated with a zero p-value, indicating that they are also highly significant. This confirms that monthly returns data are not generated by a random walk process, and hence, like daily returns, they can be predicted based on their historical data.

4.1.8 Hypotheses Testing

4.1.9 Hypothesis One

There is no significant evidence of random walk characteristic in the pattern of stock returns in the Nigerian Stock Market.

Test Statistics: Variance ratio test and Jarque-Bera Statistics.

Test Result: From Table 4.1, "Descriptive Statistics For Daily And Monthly Data", the Jarque-Bera statistics is highly significant for both series with the associated probabilities less than 1% i.e. 1.20+E09 (0.0000), 219.6456 (0.0000) and thus, rejecting clearly the null hypothesis of normal distribution for both daily and monthly return series. This is, therefore, strong evidence that daily and monthly returns on the Nigerian Stock Exchange All Share Index are not normally distributed. This is explained by the presence of large outliers and data extremes as reported above.

Moreso, the skewness co-efficient of -2.887187 for daily data and -0.470909 for monthly return data is an indication that the series is not normally distributed.

Also from Table 4.6 and 4.7 above, the results of variance ratio tests for daily and monthly returns indicate that both tests are significant, with all the p-values being less than any conventional level of significance. This implies rejection of the null hypothesis that our data is a martingale, showing that daily returns on the Nigerian Stock Market does not follow a random walk, and thus, is predictable. This result is not consistent with weak-form efficiency theory.

Implication: The stock return and stock price series of the Nigerian Capital Market can be reasonably predicted base on the result of variance ratio test.

4.1.10 Hypothesis Two

There is no significant relationship between previous and current stock returns in the Nigerian Capital Market.

Test Statistics: Stationarity Test (augmented Dikey Fuller and Phillips Perron test statistics). Table 4.3, test for ARCH effect on the residuals.

Test Result: From Table 4.2, both the augmented Dikey Fuller and Phillips Perron test statistics are highly significant for both daily and monthly return data, thus rejecting the null hypothesis of unit root for both series. This is clear evidence that our data are both stationary at level i.e. 1% level of significance. This further shows that our data are consistent with random walk theory which supports the Jarque-Bera statistics result.

The variables are stationary, which means that it has equal mean and constant variance. So we can use ARCH and GARCH to forecast and it will not give a spurious relationship or outcome.

Implication: The observed historical data cannot be used to predict the future return series of the Nigerian Stock Market.

4.1.11 Hypothesis Three

Stock returns and their volatility are not significantly related in the Nigerian Capital Market.

Test Statistics: GARCH (1,1) –M Model

Test Result: From Tables 4.4 and 4.5, for the risk return trade off of α in the daily stock returns, the mean equation is (-0.386322) and the associated p-value is less than 5% (p=0.0309), indicating that the stock returns and its volatility are negatively and significantly related. The null hypothesis that stock returns and its volatility are not significantly related is, therefore, rejected.

From Table 4.5, the (results of estimated GARCH (1,1)-m model for monthly returns), the risk return trade off α , the mean equation is -0.483508 and the associated p-value is less than 10% (0.0878) significant level indicating that the stock returns and its volatility is negatively and significantly related.

Implication: This supports the leverage effect theory and implies that the higher the risk, the lower the expected returns and vice versa.

4.1.12 Hypothesis Four

There is no significant presence of volatility clustering in the Nigerian Capital Market.

Test statistics: GARCH (1,1) model. The variance equation from the daily return series, the estimated ARCH and GARCH coefficients are both significant at 1% level and their sum ($\alpha + \beta$) is more than 1, i.e (0.551684 + 0.552715), equals to 1.104399, suggesting evidence that high volatility persistence is present in the Nigerian Stock Market.

More so, from the monthly return series, the estimated ARCH AND GARCH coefficient are both significant at 5% level and their sum ($\alpha + \beta$) is less than 1 (0.164353 + 0.782834) which equals 0.947187. This indicated that there is volatility clustering in the Nigerian Stock Market. The null hypothesis that volatility clustering is not present in the Nigerian Stock Market, therefore, is rejected.

Implication: There is a clear indication that there is marketing activity going on in the Nigerian Stock Market. Sometimes, the trading activity might be high over a period of days or months and vice versa. As can be seen from the graph (Figure 4.1 and Figure 4.2), periods of low volatility are followed by periods of low volatility and periods of high volatility are followed by period of high volatility.

More so, it shows that the stock prices are not constant and there are some factors that affect it, that could be explained by the sharp up and down movement of its prices.

4.1.13 Hypothesis Five

There is no significant evidence of Calender and Weather effects on stock returns in the Nigerian Capital Market. This hypothesis has been broken down as follows:

4.1.14 HO_5a: Investors do not make abnormal returns on Fridays than other days of the week.

Test Statistics: From Table 4.4 GARCH (1,1) – M model for daily returns data or series (mean equation and variance equation).

The coefficient on Fridays in the mean equation is (-0.002440) and the variance equation is (-0.000170). This means that lower market volatility is associated with lower returns, because their coefficients are both negative. However, the effect of Friday on both volatility and investors' returns is not significant because their respective p-values are greater than (0.1). The probability in the mean equation is 0.8967 and 0.3211 in the variance equation. Thus, the non-significant decrease in volatility leads to a non significant decrease in returns on Fridays. The null hypothesis that investors do not earn abnormal returns on Fridays is, therefore, accepted.

Implications: Therefore, investors do not earn higher on Fridays than other days of the week.

4.1.15 HO_5b: Investors do not make abnormal returns on Mondays than on other days of the week.

Test Statistics: GARCH (1,1)-m mean and variance equation. Lower market volatility (-0.005443) is associated with returns (-0.016034), the significant decrease in the market volatility (p=0.0000) on Mondays has no significant effect on investors' returns (p=0.1733). Based on this, the null hypothesis that investors do not earn abnormal returns on Mondays is also accepted. This also suggests that there is no weekend effect. Since there is no Friday and Monday effect therefore our result gives support to the argument of the reverse weekend effect theory for one thing, bad news released by firms during the weekend (on Friday after closure of stock Market) do not automatically influence prices on Mondays. This reduces the predictability of prices and lends more credence to Efficient Market hypothesis.

Implication: This means that investors do not make abnormal returns on Mondays and thus, confirming that no weekend effect exists in the Nigerian Stock Market on investor's returns.

4.1.16 HO_5c: Investors do not make abnormal returns in the last day of the month.

Test Statistics: GARCH (1,1) -m model, mean and variance equation. The effect of the last day of the month, lower volatility coefficient of -0.008503 is associated with lower return of -0.019911. The probability value of 0.0000 for the last day of the month from the variance equation is significant and the probability value from the mean equation 0.2592 is greater than 0.1. Therefore, we can say that the significant decrease in volatility leads to the non-significant decrease in returns. The null hypothesis that investors do not make abnormal returns on the last days of the month is, therefore, not rejected.

Implication: That investors do not make abnormal returns on the last days of the month. During the month end, there was significant drop in volatility leading to a non-significant decrease in returns. Therefore, there is no end of the month effect which invariably reduces predictability of stock prices.

4.1.17 HO_5d: Investors do not make more profit during the sunny days than during the rainy days.

Test Statistics: GARCH (1,1)-m model. From the mean and variance equation: The coefficient of dry season equation is negative -0.004424 from the mean equation but 0.000162 in the variance equation. This implies that increase in volatility on dry season is associated with decrease in returns. The variance equation is significant with probability value of (0.0358) which is less than 5% at conventional levels (probability levels,< 0.05). However, the effect of dry season on returns is not significant with probability value of (0.6493). It is of note again that positive and significant volatility is followed by negative and non-significant returns.

This implies that the dry season has no significant effect on stock market, and thus, does not give rise to more profit during the sunny days, and the hypothesis is therefore accepted.

Implication: Investors do not make super-normal profits during the dry season and thus, no seasonal effect. Predictability of stock prices is not very easy.

4.2 Discussion

The findings are discussed here within the context of research objectives.

4.2.1 Objective one:

To investigate the extent to which the pattern of stock returns in the Nigerian Capital Market exhibits a random walk.

Given that Jarque-Bera test supports non predictability of stock prices in view of their stochastic nature while the variance ratio test supports predictability of stock prises. It goes to mean that the Nigeria stock market will be said to lie somewhere in between the line of continuum that extends from levels of efficiency to inefficiency. The actual position in that line of continuum seems to suggest that the Market is weekly efficient. This agrees with the theory that states that all capital Markets of the world lies somewhere within the line of continuum between efficiency and inefficiency.

The prediction of the stock return and stock prices series of the Nigerian Capital Market cannot be effectively and successfully done. This is in line with the random walk theory which states that prices of traded assets (e.g. stocks, bonds or property) already reflect all past publicly available information. Thus, this is the weak form efficiency hypothesis theory which deals with whether or not security prices fully reflect historical price or return information.

The findings of Egbeonu (2016), Okpara (2010), and Andabai (2019) is in tandem with our finding, which supports the weak form efficiency level of the Nigeria Stock Market and, therefore, follows a random walk process. The weak form efficiency level implies that all information conveyed in past patterns of a stock price is impounded into the current price of the stock. It will be useless to select stocks based on information about recent trends in stock prices. The fact that the price of stocks has risen for the past two or four days will give no user information as what today or tomorrow's price will be. Thus, tape watchers and chartists who follow the price trend in order to forecast price or determine when to buy and when to sell the stocks are wasting their time. Agwuegbo *et al.* (2010), in their study, "A Random Walk Model for Stock Market Prices" revealed that the Nigerian Stock Exchange is not efficient even in the weak form and that the NSE follows the random walk model. The idealized stock price in the Nigerian Stock Exchange is a martingale.

There are some works which do not agree with our findings; prominent among them is Ayakeme (2014), and Ogbonna, Okpara, Ejem (2020).

4.2.2 Objective two:

To assess the extend to which relationship exist between previous and current stock prices.

The observed historical data cannot be used to predict the future return series of the Nigerian Stock Market. This is in line with the finding of Egbeonu (2016), Okpara (2010), Agwuego *et al.*, (2010) and the weak form efficiency hypothesis propounded by Fama (1970).

4.2.3 Objective three.

To ascertain the extent of relationship between stock returns and its volatility.

Stock returns and its volatility are negatively and significantly related. This supports the leverage effect theory and implies that the higher the risk, the lower the expected returns and vice versa. In furtherance, our work supports the "leverage effect" theory with the likes of Ngozi (2014), Emenike (2010), and Herbert, Ugwuanyi and Nwaocha (2019).

4.2.4 Objective four:

To determine the extent to which volatility clustering exist in the Nigerian Capital Market.

Volatility clustering or pooling is present in the Nigerian Capital Market. This can be seen from the graph in Figure 4.1 and Figure 4.2 above where periods of low volatility are followed by periods of low volatility and periods of high volatility are followed by periods of high volatility.

Many researchers have deposited evidence showing that stock returns exhibit phenomenon of volatility clustering, leptokurtosis and asymmetry. Volatility clustering occurs when large stock price changes are followed by large price changes, of both signs, and small price changes are followed by periods of small price changes. Leptokurtosis means that the distribution of stock returns is not normal but exhibits fat-tails. Asymmetry, also known as leverage effects, means that a fall in returns is followed by an increase in volatility greater than the volatility induced by an increase in returns (Emenike, 2010).

This implies that more prices wander far from the average trend in a crash than in a bubble because of higher perceived uncertainty (Mandelbrot, 1963; Fama, 1965 & Black, 1976). These characteristics are perceived as indicating a rise in financial risk, which can adversely affect investors' assets and wealth. For instance, volatility clustering makes investors more averse to holding stocks due to uncertainty. Investors in turn demand a higher risk premium in order to insure against the increased uncertainty. A greater risk premium results in a higher cost of capital, which leads to less private physical investment.

Emenike (2010) in his work "Modeling Stock Returns Volatility In Nigeria, Using GARCH Models" indicates evidence of volatility clustering in the Nigerian Stock Exchange (NSE) return series. Also the results of the GJR-GARCH (1,1) model shows the existence of leverage effects in the series. He employed monthly all share indices of the NSE from January, 1999 to December, 2008 and used GARCH (1,1) and the GJR-GARCH (1,1) models assuming the Generalised Error Distribution (GED).

Okpara and Nwaezeaku (2009) examined the effect of the idiosyncratic risk and beta risk on the returns of 41 randomly selected companies listed on the Nigerian Stock Exchange from 1996-2005. Their results reveal among others that volatility clustering is not quite persistent but there exists asymmetric effect in the Nigerian Stock Market.

Ogum, Beer and Nouyrigat (2005) posited that the asymmetric volatility present in the United States and other developed Markets is present in the Nigeria Capital Market. They made use of the exponential GARCH model to carefully examine the emerging market volatility, using Nigeria and Kenya stock return series. More so, the work of Herbert, Ugwuanyi and Nwaocha (2019) supports the existence of volatility clustering in the Nigerian Stock Market.

4.2.5 Objective five:

To analyse the extent to which calendar and weather affect stock returns in the Nigerian Capital Market.

4.2.6. Objective five A:

To analyse the extent to which investors make abnormal returns on other days of the week than on Fridays.

Investors do not earn higher on Fridays than on other days of the week. This is to say that there is no Friday effect in the Nigerian Stock Market for the period 2000-2020. Contrary to our findings, Onoh (2016) confirms the existence of the day-of the-week effect in the Nigerian Stock Market. More so, Umar (2013) his work revealed that the Nigerian Capital Market exhibits day-of-the week effect on Fridays only in the mean equation. While in the variance equation, there is evidence of day-of-the-week effect on Tuesdays and Thursdays respectively.

4.2.7. Objective five B:

To analyse the extent to which investors make abnormal returns on other days of the week than on Mondays.

Investors do not make abnormal returns on Mondays than other days of the week and thus confirming that no weekend effect exists in the Nigerian stock market on investors return. This result is akin to the work of Umar (2013) where there is Monday effect in the variance equation but in the mean equation there is none. The work of Oladayo (2015) gives fillip to our findings. The result showed that there are no calendar anomalies within the reviewed period, and thus, the efficient market hypothesis held true for the NSE.

4.2.8. Objective five C:

To analyse the extent to which investors make abnormal returns on the last day of the month.

Investors do not make abnormal returns on the last days of the month. During the month end, there was significant drop in volatility leading to a non-significant decrease in returns. Therefore, one can conclude that there is end-of-the-month effect on volatility but in the corresponding mean return equation there was none. Meanwhile, most researches on monthly patterns suggest that certain months provide better returns as compared to others, i.e., the month-of-the-year effect (Rozett & Kinney, 1976, Gultekin & Gultekin 1983, Mehdian & Perry, 2002). Mills and Coutts (1995) noted that one of the most prevalent stock market anomalies that have been researched appears to be the January effect, in which returns are much higher in January than any other month of the year.

4.2.9. Objective five D:

To analyse the extent to which investors make more profit during the sunny days than during the rainy days.

Investors do not make super-normal profits during the dry season. This means that the dry season has no significant effect on stock market and thus does not cause more profit during sunny days. The results of this study supports efficient market hypothesis in the weak form.

Other empirical works done on this topic like the works of Arsad and Coutts (1997) argued that the implication of the EMH is that when several investors recognize the seasonal patterns, the seasonality disappears and any profitable opportunities would be traded out of arbitrager’s existence. There is proof that some anomalies such as the month-of-the-year effect have indeed disappeared in recent years (Maberly & Waggoner, 2000).

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Summary of Findings

Based on the results of the analysis, we summarise our findings as follows:

i. The prediction of the stock return and stock price series of the Nigerian Capital Market cannot be effectively and successfully done on the evidence of the result of hypothesis one partly, two, three, four and five.

ii. The observed historical data cannot be used to predict the future return series of the Nigerian Stock Market going on the result of hypothesis two and partly hypothesis one.

iii. Stock returns and its volatility are negatively and significantly related in the Nigerian Stock Market as verified by the result of hypothesis three.

iv. Volatility clustering or pooling is present in the Nigerian Stock Market by the result of the hypothesis four.

v. Investors do not earn higher returns on Fridays than on other days of the week.

vi. Investors do not earn abnormal returns on Mondays than on other days of the week.

vii. Investors do not make abnormal returns on the last day of the month.

viii. Investors do not make supernormal profits during the dry season.

5.2 Conclusion

Based on the result of our analysis the following conclusions are made. It is clear from the test result of the study's hypothesis one that our data are martingale, showing that daily returns on the Nigerian Stock Market follow a random walk and thus is not predictable. This means that each stock price is a random departure from the one preceding it. The philosophy behind it is that information on its own is a random variable. Today's information might be at variance from yesterday's and tomorrow's information. More so, from hypothesis two, the observed historical data cannot be used to predict the future return series of the Nigerian Stock Market. By this, no one can successfully use the previous stock price series to predict the future price series.

The result of our hypothesis three supports the leverage effect theory indicating that the stock returns and its volatility are negatively and significantly related. This is at variance with the first fundamental law of finance, the higher the risk, the higher the returns and thus the lower the risk, the lower the expected returns. From our hypothesis four, volatility clustering is found to be present in the Nigerian Stock Market. As could be seen from the graph, periods of low volatility are followed by periods of low volatility and periods of high volatility are followed by periods of high volatility.

From our hypothesis five, investors do not earn higher returns on Fridays than other days of the week as there is no weekend effect. Investors do not make abnormal returns on Monday and thus confirming that no weekend effect exists on the Nigerian Stock Market, on investor's returns. More so investors do not make abnormal returns on the last days of the months. It is equally observed that investors do not make super-normal profits during the dry season.

5.3 Recommendations

Based on the above conclusions the following recommendations are made:

1. The Nigerian Stock Market returns follow a martingale process and thus the fundamental and technical analysts should refrain from charting and plotting graphs of predictions and even using stock valuation process to adjust stock prices via interim company reports and final account of listed companies.

2. Studies on the efficiency level of any stock market are of huge importance to investors. As it relates to this present study no arbitrage opportunity is open for the market makers to make excess profit as all the available information has been embedded into current prices. By implication, expectations with regards to overvaluation or undervaluation of stock prices in the market are ruled out.

3. As could be seen from our results, the weekend effect of Fridays, Mondays and the turn-of-the-month effects do not exist in the Nigerian Capital Market. We recommend, therefore, that those who think that they can outsmart the Market through the weekend effect and end-of-the-month effect should stop thinking that way because the Nigerian stock market does not give arbitragers that opportunity.
4. The study also recommend that in order to attain an efficiency level of weak form, semi-strong form and strong form, the Nigerian Capital Market must minimize the level of insider dealing by adopting the policy of full automation of trading activities in the market.

5.4 Contribution to Knowledge

In this study, effort has been made to check the efficiency of the Nigerian Capital Market. The study established that the Nigerian Stock Market is weak-form efficient and thus the prediction of its stock returns series cannot be successfully done.

It is also established that the observed historical data cannot be used to predict the future return series of the Nigerian Stock Market. “The leverage effect” was found to exist in the Nigerian Stock Market whereby stock and its volatility are negatively and significantly related. It is also revealed that volatility clustering due to large outliers is found to be present in the Nigeria Stock Market of which other studies of this magnitude did not highlight.

Investors do not earn higher returns on Fridays than other days of the week as could be deduced from the work.

More so, from the result of this work, investors do not earn abnormal returns on Mondays than other days of the week. Also investors do not earn or make abnormal returns on the last day of the month.

It is equally established that investors do not make supernormal profits during the dry season in the Nigerian Capital Market.

5.5 Suggestions for Further Studies

Given the results of the findings, studies on efficient market hypothesis are needed. Thus, the suggestions for further research are along the following lines:

1. This study should be replicated on other stock markets in West African countries.

2. Effort should be directed towards investigating efficient market hypothesis relative to information on dividend, bonus issues, takeover, stock splits, merger and acquisition, thus directing efforts to semi-strong form efficiency hypothesis.

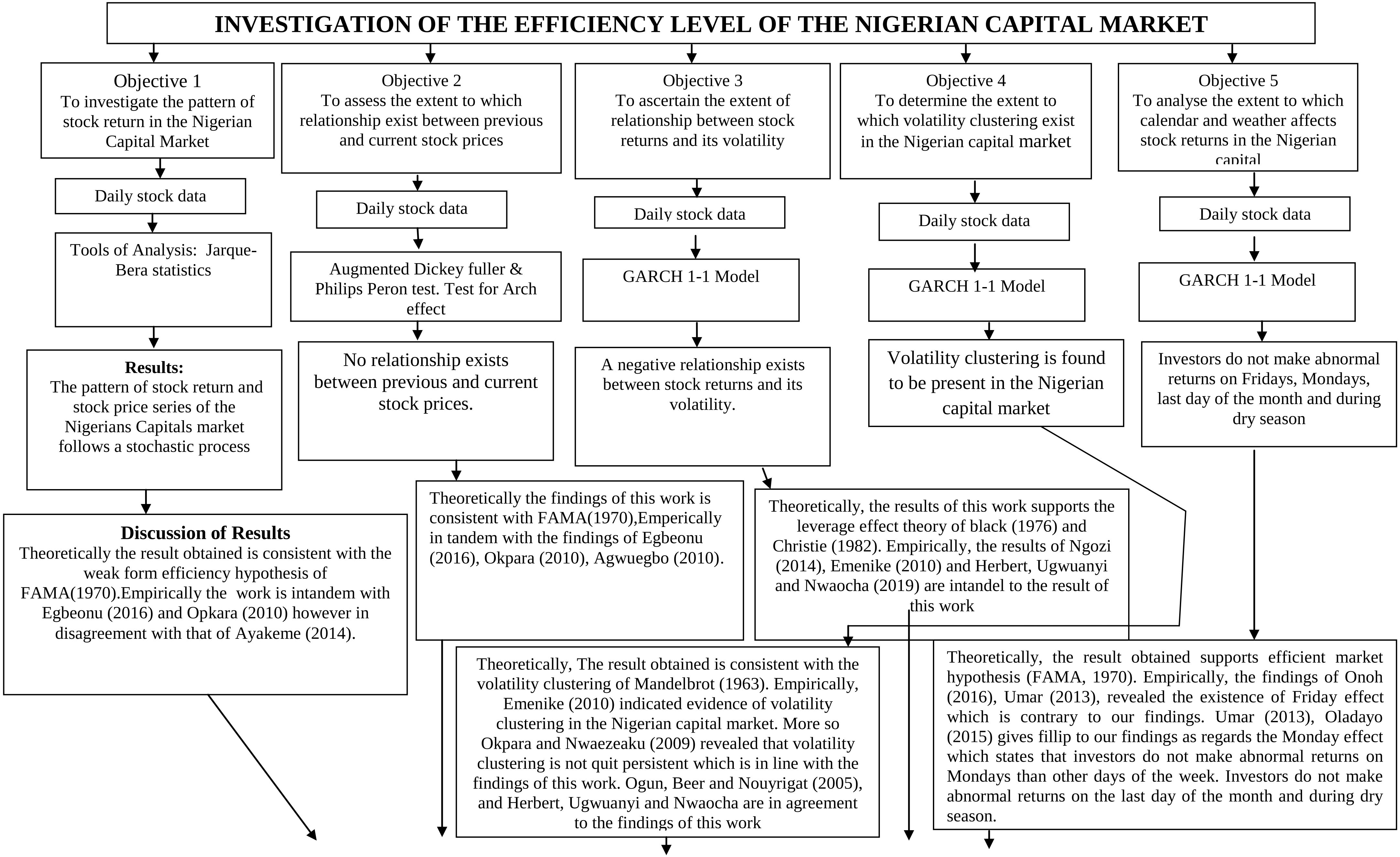
3. Effort should be directed towards studying the strong form efficiency hypothesis and thus checking whether insider information could be used to outperform the market in the Nigerian Capital Market.

4. To check whether holiday effect is present in the Nigerian Capital Market as Lakonishok and Smidt (1988) reported in their seminal studies that the returns of pre-holiday periods were higher than those of post-holiday periods.

5. More studies should be made on the leverage effect theory of black (1976) and Christie (1982) as stock returns and its volatility are negatively and significantly related in the Nigerian Stock Market.

Summary of the Work

There seems to be low level of inventor confidence in the Nigerian capital market in the more recent times which may be attributed to the efficiency level of activities in the market.



Conclusion

Daily returns of the Nigerian stock market follows a random walk and thus not predictable. The observed historical data cannot be used to predict the future return series of the Nigerian stock market. Stock returns and its volatility are negatively and significantly related. Volatility clustering is found to be present in the Nigerian capital market. Investors do not earn higher returns on Fridays, Mondays, last day of the month and even during the dry season

Recommendations

The fundamental and technical analyst should refrain from charting or plotting graphs of prediction since prediction of stock return in the Nigerian capital market follows a stochastic process.

Studies of the efficiency level of any stock market are of huge importance to the investors and market markers (stock brokers). There is no arbitrage opportunity for the investors to make super normal profit as it relates to this present study. By implications, expectations with regards to overvaluation or undervaluation of stock prices in the Nigerian capital market are ruled out. As could be seen from our results, the weekend effect of Friday, Mondays and turn-of-the-month effects do not exist in the Nigerian capital market. The study also recommend that in order to attain an efficiency level of strong form, the Nigerian Capital Market must minimize the level of insider dealing by adopting the policy of full automation of trading activities in the market.

Source: Researcher's Review of this Study

REFERENCES

Abdullahi, A. (2009). *Financial Management by Corporate Publishing*. Lagos: El-Toda Ventures Limited.

Aboribo, C. (2009). The military and its impact on Nigerian state and society. *Interdisciplinary J. Nig. Social. Society. 1(1), 167-184.*

Abraham, A. & Ikenberry, D. (1994). The individual investor and the weekend effect. *Journal of Financial and Quantitative Analysis, 29, 263-277.*

Adams, A., Bloomfield, D., Booth, P. & England, P. (1993). *Investment Mathematics And Statistics*. Massachusetts: Kluwer Academic Publishers Group.

Adelegan, O.J. (2009). *Price Reactions to Dividend Announcements On The Nigerian Capital Market. AERC Research Paper 188. Retrieved From Price Reactions* to Dividend Announcement NCM..

Aggarwal, R., Inclan, C. and Leal, R. (1999). Volatility in Emerging Stock Markets, "*Journal of Financial and Quantitative Analysis*, 34(1), 33-55.

Agrawal, R. & Tandon, K. (1994). Anomalies Or Illusions? Evidence From Stock Markets In Eighteen Countries. *Journal of International Money and Finance, 13, 83–106.*

Agrawal, R., Rao, P. & Hiraki, T. (1989). Skewness and Kurtosis in Japanese Equity Returns: Empirical Evidence. *The Journal of Financial Returns*, 12, 253–60.

Agwuegbo, S.O.N., Adewole, A.P. & Madueguna, A.N. (2010). A Random Walk Model for Stock Market Prices. *Journal of Mathematics and Statistics* 6 (3): 342-346, 2010 ISSN 1549-3644 (c) 2010 Science Publications.

Ait-Sahalia, Y., Fan, J. & li, Y. (2013). The Leverage Effect Puzzle: Disentangling Sources of Bias at High Frequency. *Journal of Financial Econometrics*, 109,224-249.

Ait-Sahalia, Y., Fan, J. & Ziu, D. (2010). High-frequency covariance estimates with noisy and asynchronous data. *Journal of the American Statistical Association*, 105, 1504-1517.

Ait-Sahalia, Y., Mykland, P.A. & Zhang, L. (2011). Ultra high frequency volatility estimation with dependent microstructure noise. *Journal of Econometrics*, 160, 160-175.

Ajayi, J.A. (2017), Testing the semi-strong form of efficiency theory in the Nigerian Capital Market: The input and output index. Retrieved from https://ssrn.com/abstract= 3085887.

Akujuobi, (2006). *Investment Analysis Published*. Adyudo Press, Owerri.

Alenius, A. (2008). Downside Risk Measures in Evaluation of Portfolio Performance, Bachelors thesis. School of Business. Lappeenranta University of Technology.

Andabia, P.W. (2019), Weak-Form efficient market hypothesis in the Nigerian stock market: An empirical investigation. *Online Journal of Arts, Management and social science*, 4(1), 174-181.

Ang, A., Chen, J. & Xing, Y. (2006). Downside risk. *Review of Financial Studies*. 19(4), 1191-1239.

Arewa, A. & Nwakanma, P.C. (2014). Detecting market anomalies: Do evidence hold in Nigeria? *International Review of Management and Business Research*, 2, 1128-1138.

Arewa, A. (2014). Detecting market anomalies: Do evidence hold in Nigeria? *International Review of Management and Business Research*, 3, pp 1128-1137.

Ariel, R. A. (1990). High stock returns before holidays: Existence and evidence on possible causes, *Journal of Finance* 45, 1611-1626.

Ariel, R.A. (1987). A monthly effect in stock returns. *Journal of Financial Economics,* 18,161-174.

Arsad, Z. & Coutts, J.A. (1997). Security price anomalies in the London International Stock Exchange***:*** A 60-year perspective. *Applied Financial Economics*, 7, 455-464.

Ayakeme, E.W. (2014). *An empirical analysis of the stochastic implications of stock price movement in the Nigerian Capital Market*. Archives of Business Research, 2(5), 57-68.

Aziz, T. & Ansari, V.A. (2015). The Day-Of-The-Week Effect: evidence from India. *Afro-Asian Journal of Finance and Accounting,* Vol. 5, No. 2.

Bachelier, L. (1900, 1964). Theory of speculation. (James Boness, Trans.) In the random character of stock market prices. ed Paul Cortner, pp17-78.

Ball, R. (1994): The development, accomplishments and limitations of the Theory of Stock Market Efficiency. *Managerial Finance*, 20(2) 3- 48.

Bandi, F.M & Reno, R. (2012). Time-varying leverage effects. *Journal of Econometrics*. 169, 94-113.

Bandi, F.M. & Russel, J.R. (2006). Separating microstructure noise from volatility. *Journal of Econometrics* 79, 655-692.

Banz, R. (1981). The relationship between return and market value of common stocks. *Journal of Financial Economics* 19, 13- 18.

Basu, S. (1977). The investment performance of common stocks in relation to their price-to-earnings ratios: A test of the efficient market hypothesis. *Journal of Finance,* 132, 663-682.

Bean, N. (2009). Time to Replace Modern Portfolio Theory. Retrieved from Http://www.feg.com/documents/time to Replace Modern PortfolioTheory.pdf.

Beaver, W.H. (1981): Market efficiency. *Accounting Review*, 56, 23-37.

Bekaert, G. & Harvey, C.R. (1997). Emerging market volatility. *Journal of Financial Economics*, 43, 29-77.

Bekaert, G. & Wu, G. (2000). Asymmetric volatility and risk in equity markets. *The Review of Financial Studies*, 13, 1-42.

Bera, A. & Jarque, C. (1981). Effect tests for normality, heteroskedasticity and serial independence of regression residual. Monte Carlo evidence. *Economic Letters*, 7: 313–318.

Bernard, V. L. (1993). Stock price reaction to earnings announcements: A summary of recent anomalous evidence and possible explanations, *Advances in Behavioral Finance*, Russell Sage Foundation, 303-340.

Bhabra, H.S., Dillion, U.S., & Ramirez, G.G. (1999). A November effect? Revisiting the tax-loss-selling hypothesis. *Financial Management,* 28, 5-15.

BhardWoj, R.K. & Brooks, L.D. (1992). The January anomaly: Effects of low share price, transaction costs and bid ask bias. *Journal of Finance,* 47, 553-575.

Bildik, R. (2004). Are calendar anomalies still alive? Evidence from the Istanbul Stock Exchange. Available at *SSRN: http://ssrn.com/abstract*=598904.

Black, F. (1976). Studies of stock market volatility changes. *Proceedings of the American Statistical Association. Business and Economic Statistics*. 177-181.

Blume, M.E., & Stambaugh, R.F. (1983). Bias in computed returns: An application to the size effect. *Journal of Financial Economics,* 12, 387-404.

Bollerslev, T. (1986). Generalized autoregressive conditional hetereoskedasticity. *Journal of Econometrics*, 31, 307–327.

Bollerslev, T. (1987) A conditionally heteroscedastic time-series model for speculative prices and rates of return. *Review of Economics and Statistics*, 69, 542–47.

Bollerslev, T., Litvinova, J. & Tauchen, G. (2006). Leverage and volatility feedback effects in high-frequency data. *Journal of Financial Econometrics*, 4, 353-384.

Bollerslev, T., Sizova, N. & Tauchen, G.T. (2012). Volatility in equilibriums: asymmetries and dynamic dependencies. *Review of Finance* 16 31-80

Bowers, J. & Dimson, E. (1988). Introduction, in stock market Anomalies. In Dimson. E.D. *Cambridge University Press, Cambridge*, pp. 3–15.

Branddorff-Nielsen, O.E., Hensen, P.R., Lunde, A. & Shephard, N. (2008a). Designing realized kernels to measure ex-post variation of equity prices in the presence of noise. *Econometrica*, 76, 1481-1536.

Brauer, A. & Chang, E.C. (1990). Return seasonality in stocks and their underlying assets: Tax-loss selling versus information explanations. *Review of Financial Studies,* 3, 255-280.

Braun, P. A., Nelson, D. B., Sunier, A. M. (1995). Good news, bad news, volatility and betas, *Journal of Finance*, 1 (5). 1575-1603.

Brian, M.R., & Ferguson, K.W. (1993). Post-Modern Portfolio Theory comes of age. *Journal of Investing*, 2(4), 27-33.

Brickley, J., Manaster, S. & Schallheim, J. (1985). The tax timing option and the discount on closed-end investment companies. *Journal of Business*, 64, 287-312.

Brockman, P. & Michayluk, D. (1998). The persistent holiday effect: Additional evidence. *Applied Economics Letters*, 5:205-209.

Brooks, C. & Burke, S.P. (2003). Information criteria for GARCH model selection: An application to high frequency data. *European Journal of Finance,* 9(6), 557-580.

Brooks, C. (2008). *Introductory Econometrics for Finance* (2nd ed.). Cambridge: Cambridge University Press. Retrieved from http://dx.doi.org/10.1017/CBO9780511841644

Brown, P., Keim, D.B., Keleidon, A.W. & Marsh, T.A. (1983). Stock return seasonalities and the tax loss-selling hypothesis: analysis of the arguments and the Australian evidence. *Journal of Financial Economics,* 12 (6) 105-127.

Cadsby, Charles B. & Ratner, M. (1992). Turn of month and pre-holiday effects on stock returns: some international evidence. *Journal of Banking and Finance*, 16, 497-509.

Campball, J.Y. & Hentshel, L. (1992). No news is good news: An asymmetrical model of changing volatility in stock returns. *Journal of Financial economics*, 31, 281-318.

Campbell, J.Y. & Shiller, R.J. (1987). Co-Integration and tests of present value models. *Journal of Political Economy,* 95, 1062-1088.

Campbell, J.Y., Lo, A.W. & McKinley, A.C. (1997): *The Econometrics of Financial Markets***,** (2nd Edition). Princeton: Princeton University Press.

Cengiz, H, Bilen, O. & Buyuklu, G.D. (2017). Stock Market Anomalies: The-day-of-the-week effects, evidence from Borsa Istanbul. *Journal of Global Entrepreneurship Research. 12(8), 132-137.*

Chang, E.C. & Pinegar, M.J. (1986). Return seasonality and tax-loss selling in the market for long-term government and corporate bonds. *Journal of Financial Economics,* 17, 391-415.

Cheng, P. (2001). Comparing downside-risk and mean-variance analysis using bootstrap simulation. *Journal of Real Estate Portfolio Management*, 7(3).

Choi, J. & Richardson, M. (2016). The volatility of a firm's assets and the leverage effect. *Journal of Financial Economics*. 121(2), 254-277.

Chopra, V.K. & Ziemba, W.T. (1993). The effect of errors in means, variances, and covariances on optimal portfolio. *Journal of Portfolio Management*, 19(2), 6.

Christie, A.A. (1982). The stochastic behaviour of common stock variances-value, leverage and interest rate effect. *Journal of Financial Economics,* 10, 407-432.

Cootner, P.H. (1962): Stock prices: Random versus systematic changes. *Industrial Management Review*, 3(2), 24-45.

Cowles, A. & Jones, H. (1937). Some a-posteriori probabilities in stock market action" *Econometrica*, 5, 280- 294.

Cowles, A. (1933). Can stock market forecasters forecast? *Econometrics*, 1, 309-324.

Cristea, C. & Cristea, M. (2017). Determinants of corporate dividends policy: Evidence from Romanian listed companies. MATEC Web Conferences http://www.matec-conference.org>pdf. Annual Session Of Scientific Papers, IMT ORADEA.

Dalio, R. (2005). Post-Modern Portfolio theory: Engineering Targeted Returns and Risks. Bridgewater - An open letter to investors.

Darrat, A.F. & Zhong, M. (2000). On testing the random-walk hypothesis: A model-comparison approach. *The Financial Review*, 35(3), 105-124.

David, U. & Samuel, I. (2017). Econometrice test for arbitrage pricing and its volatility in the Nigerian equities market. *International Journal of Management Studies, Business and Entrepreneurship Research*, 2(2), 2545 – 5907.

De-Bondt, W. & Richard, T. (1985). Does the stock market overreact? *Journal Finance*, 40, 793 -805.

De-Bondt, W.F.M., & Thaler, R. (1990). Do security analyst overreact? *American Economic Review*, 80(2), 52-57.

Dechow, P.M., Hutton, A.P., Mealbrock, L. & Sloan, R.G. (2001). Short sellers, fundamental analysis and stock returns. *Journal of Economics,* 61, 77-106.

Delattre, S. & Jacob, J. (1997). A central limit theorem for normalized functions of the increments of a diffusion process on the presence of round-off errors. *Bernoulli*, 3, 1-28.

Di Bartoiomeo, D. (2007). Fat tails, tale tails and puppy dog tail. *Annual Summer Seminar-Newport*, R1 June 8.

Dike, D.N. (2011). Strategic financial management theory and application solid passion publications 5 Queen Street Woji, Transamadi, Port Harcourt.

Duffee, G.R. (1995). Stock return volatility: A firm level analysis. *Journal of Financial Economics,* 37, 399-420.

Egbeonu, O .C. (2016). Random walk hypothesis of stock prices in the Nigerian stock market. *International Journal of advanced Academic research/Social & Management Sciences*, 2.

Elewarapu, V.R. & Rengamum, M.R. (1993). The seasonal behaviour of the liquidity premium in asset pricing. *Journal of Financial Economic*, 34, 373-386.

Eling, M. & Schumacher, F. (2007). Does the choice of performance measure influence the evaluation of hedge funds? *Journal of Banking & Finance*, 31(9), 2632–2647.

Emeike, K.O. (2010). Modeling stock returns volatility in Nigeria using GARCH Models. *Munich Personal RePEc Archive*, 23432, 111-117.

Engle, R.F. & Ng V.K. (1993). Measuring and testing the impact of news on volatility. *Journal of Finance*, 48, 1749-1778.

Engle, R.F. (1982). Autoregressive conditional heteroscedasticity with estimates of the variance of United Kingdom inflation. *Econometrica,* 50, 987–1007.

Engle, R.F., Lilien, M.D., & Robins, R.P. (1987). Estimating time-varying risk premium in the term structure: The ARCH-M model. *Econometrica*, 55, 391–407.

Epps, T.W. (1979). Co-movements in stock prices in the very short run. *Journal of The American Statistical Association*. 74, 291-296.

EURO Books (2003). International capital market, 2nd Edition London Cromwell Press.

Euro books (2003): "International capital market"(2nd ed.). Nestor House playhouse yard, London Ex4V5EX Cromwell Press.

Fama, E. & French, K. (1995). Size and book-to-market factors in earning and returns. *Journal of Finance,* 50, 131-155.

Fama, E. (1965). Random walks in stock market prices. *Journal of Business.* Retrieved from http://dx.doi.org/10.1086/294743.

Fama, E. (1970). Efficient capital markets: a review of theory and empirical work. *Journal of Finance*, 25(2), 283-417.

Fama, E.F. (1965). The behaviour of stock market prices. *Journal of Business,* 3 (1), 34-105.

Fama, E.F. (1991) Efficient Capital Market, II. *The Journal of Finance,* 45(5), 1575-1617.

Fan, J. & Wang, T. (2007). Multi-scale jump and volatility analysis for high-frequency financial data. *Journal of the American Statistical Association*, 102, 1349-1362.

Fields, M.J. (1934). Security prices and stock exchange holidays in relation to short selling. *Journal of Business,* 7, 328–338.

Figiewski, S.T. & Wang, X. (2000). Is the leverage effect, a leverage effect? Working paper, New York University.

Figlewski, S. & Webb, G.P. (1993). Options, short sales, and market completeness. *Journal of Finance*, 48, 761–777.

Findlay, M.C., & Williams, E.E. (2000). A fresh look at the efficient market hypothesis: How the intellectual history of finance encouraged a real fraud-on-the-market. *Journal of Post Keynesian Economics*, 23(2), 181-199.

Fishburn, P.C. (1977). Mean-risk analysis with risk associated with below-target returns. *The American Economic Review*, 67(2), 116-126.

Fisher, D.E. & Jordan, R.J. (2008). Security analysis and portfolio management. (6th Ed). Dorling Kinderley (India) PVT. Ltd, Delhi India.

Forsey, H. (2001). The mathematician's view modeling uncertainty with the three parameter lognormal. In F.A. Sortino and S.E. Satchell (Eds.), *Managing downside risk in financial markets*, UK 2001: Butterworth-Heinemann.

French, K.R., (1980). Stock returns and the weekend effect, *Journal of Financial Economics*, 8, 55–69.

French, K.R., Schwert, G.W. & Stambaugh, R.F. (1987). Expected stock returns and volatility. *Journal of Financial Economics*, 19, 3–29.

Frimpong, J.M. & Oteng-Abayie, E.F. (2006). Modeling and forecasting volatility of returns on the Ghana stock exchange using GARCH model. *Munich Personal Repecarchive*, 593, 1-21.

Gatheral, J. & Oomen, R.C. (2010). Zero intelligence realized variance estimation. *Finance and Stochastic*, 14, 249-283.

Gil-Alana, L.A., Gupta, R., Shittu, O.I. & Yaya, O.S. (2018). Market efficiency of Baltic stock markets: A fractional integration approach. *Physical A*, 511(1), 251 – 262.

Gilles, P. & Leroy, I. (1990). Common factors in the arbitrage pricing model in two Scandinavian countries. *Omega International Journal of Management Science*, 18(6), 615-624.

Glosten, L.R., Jagannathan, R. & Runkle, D.E. (1993). On the relations between the expected value and the volatility of the nominal excess return on stocks. *Journal of Finance*, 48, 1779-1801.

Glysels, E., Santa – Clara, P. & Valkanov, R. (2005). There is a risk–return trade-off after all. *Journal of Financial Economics*, 776, 509-548. Retrieved from http.//www.elsevier.com/locate/enconbase.

Gopal, N. (2001). The Significance of the turn-of-the-month effect: Revisited: Master of Business Administration, Simon Fraser University.

Granger, C.W.J. & Morgenstern, O. (1963). Spectral analysis of New York stock market prices. *Kyklos*, 16, 1-27.

Grootveld, H. & Hallerbach, W. (1999). Variance versus downside risk: Is there really that much difference? *European Journal of Operational Research*, *Elsevier*, 114(2), 304-319.

Grossman, S. (1976). On the efficiency of competitive stock markets where traders have diverse information. *The Journal of Finance,* 31, 573 – 583.

Grossman, S.J. & Stiglitz, J.E. (1980). On the impossibility of informational efficient markets. *The American Economic Review*, 70(3), 393-408.

Gultekin, M.N. & Gultekin, N.B. (1983). Stock market seasonality: International evidence. *Journal of Financial Economics*, 12, 469-481.

Hansen, P.R. & Lunde, A. (2006). Realized variance and market microstructure noise. *Journal of Business and Economic Statistics*, 24, 127-161.

Haporta, R., Lakonishok, J., Slieter, A. & Visiting, R. (1997). Good news for value stocks further evidence on market efficiency. *Journal of Finance*, 57, 859-874.

Harlow, W.V. (1991). Asset allocation in a downside risk framework. *Financial Analysts Journal*, 47(5), 28-40.

Harris, L. & Gurel, E. (1986). Price and volume effects associated with changes in the S&P 500 list: New evidence for the existence of price pressures**.** *Journal of Finance*, 41, 815-829.

Harvey, C.R. & Siddique, A. (1999). Autoregressive conditional skewness. *Journal of Financial and Quantitative Analysis* 34(4), 465-477.

Hawalder, I.T., Shakila, B. & Pinto, P. (2017). Empirical testing of the month-of-the-year effect on selected commercial banks and services sector companies listed on Bahrain bourse. *International Journal of Economics and Finance*, 7(2), 426-436.

Hensel, C. R. & Ziemba,W.T. (1996). Investment results from exploiting turn-of-the month effects, *Journal of Portfolio Management, Spring* 17-22.

Henzel, R., Sick, G., & Ziemba, W. (1994). The turn-of-the-month effect in the U.S. stock index futures markets, 1982-1992. *Review of Future Markets*, 13, 827-856.

Herbert, W.E., Ugwuanyi, G.O. & Nwaocha, E.I. (2019). Volatility clustering, leverage effects and risk-return trade-off in the Nigerian stock market. *Journal of Finance and Economics*, 7(1), 1-13.

Hirsch, (1968). The Stock Trader's Almanac. The Hirsch Organization Old Tappan. NJ.

Hirshleifer, D. & Shumway, T. (2001). Good day sunshine: Stock returns and the weather, working paper, www.ssrn.com. Do cloudy days affect stock exchange returns: Evidence from Istanbul Stock Exchange

Hsich, D. (1991). Chaos and Nonlinear Dynamics: Application to Financial markets. *Journal of finance*, 46, 1839 – 1877.

Jacod, J. & Ait-Shalia, Y. (2009). Testing for jumps in a discretely observed process. *Annals of Statistics*, 37, 184-222.

Jamaani, F. and Roca, E. (2015). Are the regional Gulf stock markets weak from efficient as single stock markets and as a regional stock market? *Research in international Business and Finance*, 33, 221–246. https://doi.org/10.1016/J.ribaf 2014 - 09 - 001.

James, C.Y., Von, H., James, M. & Wachowicz, Jr. (2008). Standard University Fundamentals of Financial Management, (13th Edition), 396-397.

Jayasuriya, S. (2002). Does stock market liberalization affect volatility of stock returns? Evidence from emerging market economics.

Jecheche, P. (2012). An empirical investigation of arbitrage pricing theory: a case of the Zimbabwe stock exchange. *Journal of Case Research In Business and Economics.*

Jensen, M.C. (1978). Some anomalous evidence regarding market efficiency. *Journal Of Finance And Economics,* 6(2/3), 95-101.

Kalnina, I. & Linton, O. (2008). Estimating quadratic variation consistently in the presence of endogenous and diurnal measurement error. *Journal of Econometrics,* 147, 47-59.

Kamara, A.(1997). New evidence on the Monday seasonal stock returns. *Journal Of Business,* 70(1) 63-84.

Kamil, A.A, & Ibrahim, K. (2005). The downside risk optimal portfolio selection problem. IRCMSA Proceedings.

Kaplan, P. & Siegel, L. (1994). Portfolio theory is still alive and well. *Journal of Investing*, 3(3), 45-46.

Kathiravan, C., Kasilingam, L., Selvam, M. & Venkateswar, S. (2018). Effect of temperature on stock market indices: A study on BSE and NSE in India. *International Journal Of Economic Research.* 14(15), 3. http:www.serialjournals.com.

Keim, D. (1983). Size-related anomalies and stock return seasonality: Further empirical evidence. *Journal of Financial Economics*, 12, 13-32.

Keim, D.B. & Stambaugh, R.F. (1984). A further investigation of the weekend effect in stock returns. *Journal of Finance*, 39, 819-835.

Kendal, M. (1953). The analysis of economic time series. *Journal of the Royal Statistical Society, Series A*, 95, 953-1001.

Kinnebrock, S. & Podolski, M. (2008). Estimation of the quadratic covariation, matrix in noisy diffusion models. Unpublished working paper, University of Oxford and Heidelberg.

Kohali, F. (2006). Turn of the effect for the European Stock Market. Master of the Business Administration. Simon Fraser University.

Kuhn, T.S. (1970). The structure of scientific revolutions. University of Chicago Press.

Kunkel, R. & Compton, W. (1998). A tax-free exploitation of the tom effects: C.R.E.F. *Financial Services Review,* 7, 11-23.

Lai, T. (1991). Portfolio selection with skewness: A multi-objective approach. *Review of Quantitative Finance and Accounting,* 1(3), 293-306.

Lakonishok, J. & Smidt, S. (1988). Are seasonal anomalies real? A ninety-year perspective**.** *Review of Financial Studies*, 1, 403-425.

LaPort, R., Lakonishok, J., Shleifer, A. & Vishny, R.W. (1997). Good news for value stock - further evidence on market efficiency. *Journal of Finance,* 52, 859-874.

Latham, M. (1986). Informational efficiency and information subsets. *Journal of Finance*, 41, 39-52.

Lee, M., Song, J.W., Kim, S. & Chang, W. (2018). Asymmetric market efficiency using the index-based asymmetric – MFDFA. Physica A, 512, 1278 – 1294. Retrieved from https://doi.org/10.10.

Lee, M.C.C., Shleifer, A., & Thaler, R.H. (1991). Investor sentiment and the closed-end fund puzzle. *Journal of Finance*, 46, 75-109.

Leibowitz, M.L. & Langeteig, T.C. (1989). Shortfall risk and the asset allocation decision: a simulation analysis of stock and bond risk profiles. *The Journal of Portfolio Management*, 16(1), 61-68.

Leroy, S.F. (1989). Efficient Capital Markets and Martingales. *Journal of Economic Literature*, 27(4), 1583-1621.

Li, Y. & Mykland P.A. (2007). Are volatility estimations robust with respect to modelling assumptions? *Bernoulli*, 13, 601-622.

Li, Y., Jacord, J., Mykeland, P.A., Podolski, M. & Vetter, M. (2009). Microstructure noise in the continuous case: the pre-averaging approach. *Stochastic processes and their Applications*, 119, 2249-2276.

Li, Y., Mykeland P., Renault, E., Zheng, L. & Zheng, X. (2009): Realized volatility when endogeniety of time matters. Working paper.

Lintner, J. (1956). Distribution of incomes of corporations among dividends, retained earnings and taxes. *American Economic Review*, 46, 97-113.

Lo, A.W., & MacKinlay, A.C. (1988). Stock market prices do not follow random walks: evidence from a simple specification test. *Review of Financial Studies*, 1(1), 41-66.

Loth, R. (2010). Five Ways To Measure Fund Risks. Retrieved from https://doi.org/15.16.

Malkiel, B.G. (1977). The valuation of closed-end investment company shares. *Journal of Finance*, 2, 847-859.

Malkiel, B.G. (2003). The efficient market hypothesis and its critics. Retrieved from http://www.efficient market hypothesis pdf – Adobe reader.

Malkiel, F. (1992). Efficient market hypothesis. In new polgrave dictionary of money and finance. Macmillan.

Malkiel, M. (1992). Efficient market hypotheis in P. Newman, Milgate, M. & Eatwell, J., (eds.), *New Palgrave Dictionary of Money and Finance*, New York, Macmillan.

Mandelbrot, B. (1963). The variation of certain speculative prices. *Journal of Business*, 36 (4), 394-419.

Mandelbrot, B. (1966). Forecasts of future prices, unbiased markets, and martingale models. *Journal of Business*, 39(1), 242-255.

Mankiw, G.N. & Shapiro R. (1986). Risk and return: Consumption beta verses market beta. *The Review of Economics and Statistics*, 668(3), 452-459.

Marberly, D.E. & Waggoner, F.D. (2000). Closing the question on the continuation of turn-of-the-month effects: evidence from the S & P 500 index futures contract. Federal Reserve Bank of Atlanta, working paper 2000 – 11.

Markowitz, H.M. (1952). Portfolio selection. *Journal of Finance*, 7(1), 77-91.

Markowitz, H.M. (1959). Portfolio selection-efficient diversification. New York: John Wiley.

Mauboussin, J.M. (2002). Revisiting market efficiency the stock market as a complex adaptive system. *Journal of Applied Corporate Finance*, 14(4), 15.

Maxwell, W. (1998). The January effect in the corporate bond market: a systematic examination. *Financial Management*, 27, 18-30 http://dx.doi.org/10.2307/3666290.

Maxwell, W. (1998). The January effect in the corporate bond market a systematic examination financial management, 27, 18-30. Retrieved from http://dx.doi.org/10.2307/3666290.

Mc Connell, J.J. & Xu, W. (2006). Equity returns at the turn of the month. *Financial Analyst Journal*, 64(2).

Mehdian, S. & Perry, M.J. (2002). Anomalies in US equity markets: A re-examination of the January effect. *Applied Financial Economics*, 12, 141-145.

Mewasingh, V. (2006). Downside-side performance measures and hedge funds, in Omega, (2006).

Mills, T.C. & Coutts, J.A. (1995). Calendar effects in the London stock exchange, FTSE indices**.** *European Journal of Finance*, 1, 79-93.

Modigliani & Modigliani, L. (1997). Risk-adjusted performance: How to measure it and why. *The Journal of Portfolio Management*, 23(2), 45-54.

Mykeland, P.A. & Zhang, L. (2009). Inference for continuous semi-martingales observed at high frequency. *Econometrica*, 77, 1403-1455.

Nelson, D.B. (1991). Conditional heteroskedasticity in asset returns: A new approach. *Econometrica*, 59, 347-370.

Ngozi, V.A. (2014). Testing volatility in the Nigeria stock market using GARCH models. *CBN Journal of Applied Statistics*, 5(2).

Niel, R. (2001). A portfolio manager's view of downside risk. U.K, Butterworth-Heinemann.

Nneji, I. (2013). Efficiency of the Nigerian Capital Market: An empirical analysis. *Research Journal Of Finance and Accounting*, 4(4), 2222-1697.

Nwaru, N.M. (2016). Economics of money, banking and financial markets. Owerri: (K) Kricel publishers. 3 Oyima Street.

Nwezeaku, N.C. & Okpara, G.C. (2010). The effects of financial deepening on stock market returns and volatility: Evidence from Nigeria. *International Journal for Finance and Economics*, 40. Retrieved from: http:www:eurojournals.com/finance.html.

Nwidobie, B.M. (2016). The random walk theory: An empirical test in the Nigerian capital market. *Asian Economic and Financial Review*, 4(4&2), 1840 – 1848.

Nzotta, S. M. (2014). Money, banking and finance (Rev. ed) Owerri: osprey publishers.

Nzotta, S.M. (2003). Corporate financial decision (vol. 2) Owerri: olliverson industrial publishers.

Nzotta, S.M. (2005). *Corporate Financial Decisions*, 1 & 2. Owerri: Olliverson Industrial Publishers.

Obayagbona, J. & Igbinosa, S.O. (2015). Test of random walk hypothesis in Nigerian Stock Exchange. *Current Research Journal of Social Sciences*, 7(2) 27-36.

Ogbonna, U.G., Okpara, G.C., & Ejem, C.A. (2020).Efficient market hypothesis controversy and the Nigerian stock exchange relations. *International Journal of Acconting, Finance and Risk Management*, 5(3), 131.

Ogum, G., Beer, F. & Nouyrigat, G. (2005). Emerging equity market volatility: An empirical investigation of markets in Kenya and Nigeria. *Journal of African Business*, 6, (1 & 2) 139-154.

Ogundina, J.A. & Omah, I. (2013). Test of capital market efficiency theory in the Nigeria Capital market. *Research Journal of Finance and Accounting,* 4(1).

Okafor, F. (1983). Investment decisions: Evaluation of projects and securities. London: Cassel Ltd.

Okafor, F.O. (1980). The Nigerian capital market. Foundations of Nigeria's Financial Infrastructure, Onoh J.K. London: Croomhelm Ltd.

Okpara, G.C. & Nwaezeaku, N.C. (2009). Idiosyncratic risk and the cross section of expected stock returns: Evidence from Nigeria. *European Journal Of Economics, Finance And Administrative Science*, 17, 1-10.

Okpara, G.C. (2010). Stock market prices and the random walk hypothesis: Further evidence from GARCH model. *The International Journal of Applied Economic and Finance,* 4(2), 62-66. http://dx.doi.org/10.3923/ijaef.2010.62.66.

Oladayo, O. (2015). The January and Monday effect or the lack thereof. *Mathematical Theory And Modelling*, 5(4), 163-167.

Olowe, R.A. (1998). Stock splits and efficiency of the Nigerian stock market. *African Review of Money, Finance and Banking*. Retrieved from: www.jstor.org/stable/23026306.

Olowe, R.A. (2009). Modeling Naira/Dollar exchange rate volatility: Evidence from the GARCH and Asymmetric models. *International Review of Business Research Papers*, 5(3), 377-398.

Olowe, R.A. (2011). Exchange rate volatility: Global financial crisis and the day-of-the-week effect. *KJBM*, 3.

Oludoyi, S.B. (1999). Capital market efficiency and the effects of earning announcements on share prices in Nigeria. (Unpublished Ph.D Thesis). University of Ibadan, Nigeria.

Omisore, I., Muniral, Y. & Nwufo, C. (2012). The modern portfolio theory as an investment decision tool. *Academic Journals of Accounting and Taxation*, 4(2), 28. Retrieved from http://www.academicjournals.org/JAT

Onoh, J.O. & Ndu-Okeke, O.E. (2016). Day of the week effect: Evidence from the Nigerian Stock Exchange. *HARD International Journal of Banking and Finance Research,* 2(3), 76-90.

Osazevbaru, H.O. & Oboreh, J. (2014). The Monday effect in Nigerian Stock Market: Evidence and implication. *Journal of Social Sciences and Public Policy,* 1, 1-8.

Osborne, M.F. (1962). Periodic structure in the Brownian motion of stock prices. *Operations Research*, 10, 345-379.

Ou, J.A. & Penman S.H. (1989). Financial statement analysis and the prediction of stock returns. *Journal Of Accounting And Economics*, 11, 295-329.

Pandey, I.M. (2002). Financial management. New Dehli: Vijas Publishing House, PVT. Ltd.

Pettengill, G., & Jordan, B. (1988). A comprehensive examination of volume effects and seasonality of daily security returns, *Journal of Financial Research*, 11, 57-70.

Pham, B. (2005). A monthly effect in stock returns: Revisited MBA thesis paper: Master of Business Administration of Simon Fraser University.

Reinganum, M.R. (1983). The anomalies of stock market behaviour of small firms in January: Empirical tests for tax-loss selling effects. *Journal of Financial Economics*, 5, 89–104.

Reinganum, R.M. (1981). Misspacification of the capital assets pricing: Empirical anomalies based on earnings yields and market values. *Journal of Financial Economics,* 12, 89-164.

Renu, I. & Christie, P. (2018). Fundamental analysis vesus technical analysis – A comparative review. *International Journal of Recent Scientific Research, 9(1), 23009-23013.*

Riddles, N. (2001). *A portfolio manager's view of downside risk*. In F.A. Sortino & S.E. Satchell (eds.), *Managing downside risk in financial markets*. UK: Butterworth-Heinemann.

Roberts, H. (1959). Stock market patterns and financial analysis: Methodological suggestion. *Journal of Finance*, 44, 1-10.

Roll, R. (1983). Vas ist das? The turn-of-the-year effect and the return premium of small firms. *Journal of Portfolio Management*, 9, 18-28.

Roll, R. (1984). Orange juice and weather. *American Economic Review,* 74, 861-880.

Rom, B.M. & Ferguson, K.W. (1994). Post-modern Portfolio theory comes of Age-proceeding AFIR. Orlando, United States of America, 1, 349-364.

Rose, P.S. & Marquis, M.H. (2006). Money and capital markets: Financial institutions and instruments in a global market place. McGraw-Hill/Irwin Series in Finance, Insurance and Real Estate.

Ross, S.A. (1976). The arbitrage theory of capital asset pricing. *Journal of Economic Theory,* 13, 341-360.

Ross, S.A., Westerfield, R.W. & Jordan, B.D. (1993). Fundamentals of Corporate Finance (2nd Edition), Richard. D. Irwin. Inc., 1992 & 1993.

Rounagh, M. & Zadeh, F. (2018). Investigation of market efficiency and financial stability between S and P 500 and London Stock Exchange: Monthly and yearly forecasting of time series stock return using ARMA model. *Physica A, Statistical Mechanics and Applications*, 456, 10-21.

Rozeff, M.S. & Kinney, W.R. Jr. (1976). Capital market seasonality: The case of stock returns. *Journal of Financial Economics*, 3(4), 379-402.

Rubenstein, M. (1975). Securities market efficiency in an Arrow-Debreu economy. *American Economic Review*, 65, 812 – 824.

Samuelson, P.A. (1965). Proof that properly anticipated prices fluctuate randomly. *Industrial Management Review*, 6, 41-49.

Satchell, F. & Sortino, S. (2001). Managing downside risk in financial markets: Theory, practice and implementation. *Butterworth-Heinemann Finance*.

Satchell, S.E. & Sortino, F.A. (2001). Managing downside risk in financial markets: Theory, practice and implementation. U.K, Butterworth-Heinemann Finance

Saunders, E. M. J. (1993). Stock prices and Wall Street weather. *American Economic Review,* 83, 1337-1345.

Schwert, G. W. (2003). Anomalies and Market Efficiency. Handbook of the Economics of Finance. Amsterdam: Elsevier, pp. 939–74.

Sharpe, W.F. (1964). Capital assets prices: A theory of market equilibrium under conditions of risk. *Journal of Finance*, 19(9), 425-442.

Sharpe, W.F. (1965). Risk aversion in the stock market. *Journal of Finance*, 20(9), 416-422.

Sharpe, W.F. (1985). Investments, Engle Woods Cliffs NJ, India, Prentice Hall.

Sharpe, W.F., Alexander G. J. & Bailey, J. (2004). Investment. New Dehli: Prentice Hall of India.

Sharpe, W.R. (1966). Mutual fund performance. *Journal of Business*, 39, 119-138.

Shleifer, A. (1986). Do demand curves for stocks slope down? *Journal of Finance*, 41, 579-590.

Sing, T.F. & Ong, S.E. (2000). Asset allocation in a downside risk framework. *Journal of Real Estate Portfolio Management*, 6(3), 425-442.

Sivitanides, P.S. (1998). A downside-risk approach to real estate portfolio structuring. *Journal of Real Estate Portfolio Management,* 4(2), 159-168.

Sortino, F. & Forsey, H. (1996). On the use and misuse of Downside Risk. *The Journal of Portfolio Management*, 22, 35-42.

Sortino, F. & Price, L. (1994). Performance measurement in a downside risk framework, *Journal of Investing*.

Stechey, J.M. (2001). A note on information seasonality and the disappearance of the weekend effect in the UK stock market. *Journal of Banking and Finance*, 25, 1941-1956.

Sumnicht, V. (2008). Pratical approach of post-modern portfolio theory. MBA, http://www.isectors.com/pdf/pratical App PMPT.pdf

Swisher, P. & Kasten, G.W. (2005). Post-modern portfolio theory, *Journal of Financial Planning*, 18(9), (2005), 74-85.

Swisher, P. & Marquis. M.H. (2008). Money and Capital Markets, (10th edition).New York: McGraw-Hill Higher Education.

Taylor, S. (1994). Modeling stochastic volatility: A review and comparative study. *Mathematical Finance*, 4,185-204.

Theodosius, P. (1998). Financial data and the skewed generalized t-distribution. *Management Science*, 44, 1650-1661.

Timmermann, A. & Granger, C.W.J. (2004). Efficient market hypothesis and forecasting. *International Journal of Forecasting,* 20(1), 15-27.

Tinic, S.M.G., Barone, A. & West, R.K. (1987). Seasonality in Canadian stock prices: A test of the tax-loss-selling hypothesis**.** *Journal of Financial and Quantitative Analysis*, 22, 51–63.

Umar, B.N. (2013). The day-of-the-week effect on stock market returns and volatility: Evidence from Nigeria and South Africa. MPRA Paper No. 48076.

Urquhart, A. & McGroarty, F. (2016). Are stock markets efficient market hypothesis. *International Review of Financial Analysis*, doi: 10.1016/Jirfa; 2016.06.011.

Van, H.J.C. & Wachowicz J.M. (2004). Fundamentals of Financial Management. Prentice Hall.

Vasileiou, E. (2018). Is the turn-of-the-month effect an abnormal normality? Controversial findings, new patterns and hidden signs. *Research in International Business and Finance*, 44, 153-175.

Verhoeven, P. & McAleer, M. (2003). Fat tails and asymmetry in financial volatility models. CIRJE-F-211 Discussion paper.

Wachtel, S. (1942). Certain observations on seasonal movements in stock prices. *Journal of Business*, 15, 184-193.

Wang, C.D. & Mykland, P.A. (2009). The estimation of leverage effect with high frequency data, University of Chicago.

Wang, X. (2000). Is the Leverage Effect a leverage effect? New York University. Working Paper No. S-CDM-00-09.

Watchel, S.B. (1942). Certain observations on seasonal movements in stock prices. *Journal of Business*, 15(2), 184-193.

Whisky, A.E. (2015). An empirical analysis of stochastic implications of stock price movements in the Nigerian Capital Market. *International Journal of Finance and Banking*, 2(2), 2374-2089.

William, F.S. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. *Journal of Finance*, 19(3), 425-442.

Worthington, A. & Higgs, H. (2004). Random walks and market efficiency in European equity market. *The global Journal of Finance and Economics*, 1(1), 59 – 78.

Xiao, B. (2016). The monthly effect and the day of the week effect in the American Stock Market. *International Journal of Finance Research*, 7(2).

Xiu, D. (2010). Quasi-maximum likelihood estimation of volatility with high frequency data. *Journal of Econometrics*, 159, 235-250.

Yu, J. (2005). On leverage in a stochastic volatility model. *Journal of Econometrics*, 127, 165-178.

Zakoian, J.M. (1994). Threshold heteroscedastic models. *Journal of Economic Dynamics and control*, 18, 931-955.

Zar, J.H. (1984). Bio statistical analysis, (2nd ed.). New Jersey, Prentice Hall Eaglewood Clitts.

Zarowin, P. (1989). Does the stock market overreact to corporate earnings information? *Journal of Finance, 8(4) 312.*

Zhang, L. (2006). Efficient estimation of stochastic volatility using noisy observations: A multi-scale approach. *Bernoulli*, 12, 1019-1043.

Zhang, L. (2011). Estimating Covariation: Epps effect and microstructure noise. *Journal of Econometrics*, 160, 33-47.

Zhang, L., Mykland, P.A. & Ait-Shalia, Y. (2005). A tale of two time scales: Determining integrated volatility with noisy high-frequency data. *Journal of the American Statistical Association*, 100, 1394-1411.

Ziemba, W.T. (1991). Japanese security market regularities: Monthly turn-of-the month and year holiday and golden week effects. *Japan and the World Economy*, 3, 199-146.

APPENDIX 1

DAILY STOCK DATA

S/NO	DATE	PRICE_D
1.	14/1/2000	5395.5
2.	17/1/2000	5436.68
3.	18/1/2000	5499.07
4.	19/1/2000	5532.29
5.	20/1/2000	5545.83
6.	21/1/2000	5561.07
7.	25/1/2000	5655.6
8.	26/1/2000	5669.23
9.	27/1/2000	5712.31
10.	28/1/2000	5742.96
11.	31/1/2000	5752.9
12.	1/2/2000	5780.24
13.	2/2/2000	5831.51
14.	3/2/2000	5858.48
15.	4/2/2000	5952.79
16.	7/2/2000	6132.15
17.	8/2/2000	6215.61
18.	9/2/2000	6298.6
19.	10/2/2000	6346.29
20.	11/2/2000	6235.55
21.	14/2/2000	6098.42
22.	15/2/2000	6000.21
23.	16/2/2000	5959.47
24.	17/2/2000	5965.99
25.	18/2/2000	5966.32
26.	21/2/2000	5982.03
27.	22/2/2000	5993.14
28.	23/2/2000	5957.98
29.	24/2/2000	5957.98
30.	25/2/2000	5946.6
31.	28/2/2000	5987.89
32.	29/2/2000	5955.73
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4154.	26/4/2017	25,620.94
4155.	27/4/2017	25,753.00

4156.	28/4/2017	25,767.26
4157.	2/5/2017	25,965.18
4158.	3/5/2017	26,117.15
4159.	4/5/2017	26,166.80
4160.	5/5/2017	26,235.63
4161.	8/5/2017	26,419.17
4162.	9/5/2017	26,756.21
4163.	10/5/2017	27,546.68
4164.	11/5/2017	28,423.70
4165.	12/5/2017	28,192.46
4166.	15/5/2017	27,513.69
4167.	16/5/2017	27,609.67
4168.	17/5/2017	27,900.44
4169.	18/5/2017	28,101.63
4170.	19/5/2017	28,113.44
4171.	22/5/2017	28,078.30
4172.	23/5/2017	28,093.30
4173.	24/5/2017	28,286.43
4174.	25/5/2017	28,467.61
4175.	26/5/2017	29,064.52
4176.	30/5/2017	29,281.04
4177.	31/5/2017	29,498.31
4178.	1/6/2017	30,314.14
4179.	2/6/2017	31,371.63
4180.	5/6/2017	32,578.38
4181.	6/6/2017	32,200.38
4182.	7/6/2017	32,686.72
4183.	8/6/2017	32,937.98
4184.	9/6/2017	33,276.68
4185.	12/6/2017	33,236.70
4186.	13/6/2017	33,141.85
4187.	14/6/2017	33,598.20

4188.	15/6/2017	33,797.84
4189.	16/6/2017	33,810.56
4190.	19/6/2017	34,135.10
4191.	20/6/2017	34,375.60
4192.	21/6/2017	33,477.89
4193.	22/6/2017	32,928.44
4194.	23/6/2017	32,122.14
4195.	28/6/2017	32,657.30
4196.	29/6/2017	33,269.84
4197.	30/6/2017	33,117.48
4198.	3/7/2017	32,769.83
4199.	4/7/2017	32,410.20
4200.	5/7/2017	32,302.32
4201.	6/7/2017	32,354.78
4202.	7/7/2017	32,459.17
4203.	10/7/2017	32,620.84
4204.	11/7/2017	32,827.98
4205.	12/7/2017	32,981.63
4206.	13/7/2017	33,246.91
4207.	14/7/2017	33,261.66
4208.	17/7/2017	33,301.43
4209.	18/7/2017	33,436.61
4210.	19/7/2017	33,514.93
4211.	20/7/2017	33,695.83
4212.	21/7/2017	34,020.37
4213.	24/7/2017	34,652.52
4214.	25/7/2017	35,533.00
4215.	26/7/2017	36,740.77
4216.	27/7/2017	37,245.17
4217.	28/7/2017	36,864.71
4218.	31/7/2017	35,847.75
4219.	1/8/2017	36,720.62

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4223.	7/8/2017	37,525.38
4224.	8/8/2017	37,999.56
4225.	9/8/2017	38,144.02
4226.	10/8/2017	38,102.85
4227.	11/8/2017	38,198.60
4228.	14/8/2017	37,950.96
4229.	15/8/2017	37,096.60
4230.	16/8/2017	36,102.38
4231.	17/8/2017	36,316.58
4232.	18/8/2017	36,920.56
4233.	21/8/2017	36,584.44
4234.	22/8/2017	36,962.48
4235.	23/8/2017	37,059.21
4236.	24/8/2017	36,575.86
4237.	25/8/2017	36,646.46
4238.	28/8/2017	36,317.31
4239.	29/8/2017	36,165.93
4240.	30/8/2017	35,629.13
4241.	31/8/2017	35,504.62
4242.	5/9/2017	35,403.92
4243.	6/9/2017	35,609.07
4244.	7/9/2017	36,112.37
4245.	8/9/2017	35,953.44
4246.	11/9/2017	35,664.94
4247.	12/9/2017	35,397.52
4248.	13/9/2017	35,464.34
4249.	14/9/2017	35,660.04
4250.	15/9/2017	35,005.57
4251.	18/9/2017	34,873.07

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4253.	20/9/2017	35,207.89
4254.	21/9/2017	35,188.97
4255.	22, 2017	35,488.81
4256.	22/9/2017]	35,361.52
4257.	26/9/2017	34,951.27
4258.	27/9/2017	35,103.40
4259.	28/9/2017	35,429.31
4260.	29/9/2017	35,439.98
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4262.	4/10/2017	35,358.57
4263.	5/10/2017	35,773.98
4264.	6/10/2017	36,320.98
4265.	9/10/2017	36,831.93
4266.	10/10/2017	36,776.60
4267.	11/10/2017	36,652.82
4268.	12/10/2017	36,732.24
4269.	13/10/2017	36,848.17
4270.	16/10/2017	36,970.81
4271.	17/10/2017	36,669.61
4272.	18/10/2017	36,641.52
4273.	19/10/2017	36,645.65
4274.	20/10/2017	36,587.31
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4277.	25/10/2017	36,622.85
4278.	26/10/2017	36,517.48
4279.	27/10/2017	36,462.26
4280.	30/10/2017	36,484.30
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4283.	2/11/2017	36,877.15

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4293.	16/11/2017	36,634.89
4294.	17/11/2017	36,703.58
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4296.	21/11/2017	36,600.07
4297.	22/11/2017	36,608.76
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4303.	30/11/2017	37,944.60
4304.	4/11/2017	37,974.58
4305.	5/11/2017	38,494.43
4306.	6/11/2017	39,075.30
4307.	7/11/2017	39,534.14
4308.	8/11/2017	39,257.53
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4311.	13/11/2017	38,534.64
4312.	14/11/2017	37,933.70
4313.	15/12/2017	38,436.08
4314.	18/12/2017	37,957.96
4315.	19/12/2017	37,783.76

4316.	20/12/2017	37,933.86
4317.	21/12/2017	38,350.64
4318.	22/12/2017	38,522.14
4319.	27/12/2017	37,889.57
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4322.	2/1/2018	38,264.79
4323.	3/1/2018	38,187.28
4324.	4/1/2018	38,676.12
4325.	5/1/2018	38,923.26
4326.	8/1/2018	39,849.65
4327.	9/1/2018	40,362.97
4328.	10/1/2018	41,816.11
4329.	11/1/2018	43,041.54
4330.	12/1/2018	42,898.90
4331.	15/1/2018	43,119.00
4332.	16/1/2018	44,054.72
4333.	17/1/2018	44,885.24
4334.	18/1/2018	44,848.74
4335.	19/1/2018	45,092.83
4336.	22/1/2018	44,912.53
4337.	23/1/2018	44,389.85
4338.	24/1/2018	43,963.40
4339.	25/1/2018	43,529.06
4340.	26/1/2018	43,773.76
4341.	29/1/2018	44,306.48
4342.	30/1/2018	44,493.79
4343.	31/1/2018	44,343.65
4344.	1/2/2018	44,460.18
4345.	2/2/2018	44,639.99
4346.	5/2/2018	44,261.72
4347.	6/2/2018	43,877.30

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4349.	8/2/2018	43,326.89
4350.	9/2/2018	43,127.92
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4352.	13/2/2018	41,708.15
4353.	14/2/2018	42,171.80
4354.	15/2/2018	42,604.40
4355.	16/2/2018	42,638.83
4356.	19/2/2018	41,988.18
4357.	20/2/2018	42,148.40
4358.	21/2/2018	42,158.32
4359.	22/2/2018	42,258.78
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4362.	27/2/2018	42,299.56
4363.	28/2/2018	43,330.54
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4367.	6/3/2018	43,609.77
4368.	7/3/2018	42,952.70
4369.	8/3/2018	43,090.55
4370.	9/3/2018	43,167.86
4371.	12/3/2018	43,056.51
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4382.	27/3/2018	41,243.24
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4384.	29/3/2018	41,504.51
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4386.	4/4/2018	40,749.86
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4388.	6/4/2018	40,841.14
4389.	9/4/2018	40,429.18
4390.	10/4/2018	40,499.04
4391.	11/4/2018	40,846.24
4392.	12/4/2018	40,808.48
4393.	13/4/2018	40,808.48
4394.	16/4/2018	40,533.37
4395.	17/4/2018	40,788.68
4396.	18/4/2018	40,772.26
4397.	19/4/2018	40,874.09
4398.	20/4/2018	40,814.89
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4422.	25/5/2018	39,323.62
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4443.	28/6/2018	37,733.44

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4456.	17/7/2018	36,963.70
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4472.	8/8/2018	36,299.82
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4475.	13/8/2018	35,410.61

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4493.	10/9/2018	33,611.69	**4525.**	25/10/2018	32,545.06
4494.	11/9/2018	33,449.17	**4526.**	26/10/2018	32,907.33
4495.	12/9/2018	32,292.79	**4527.**	29/102018	33,196.07
4496.	13/9/2018	32,022.23	**4528.**	30/10/2018	33,167.88
4497.	14/9/2018	32,327.59	**4529.**	31/10/2018	32,466.27
4498.	17/9/2018	32,201.98	**4530.**	1/11/2018	32,006.65
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4503.	24/9/2018	32,451.27	**4535.**	8/11/2018	32,228.50
4504.	25/9/2018	33,114.44	**4536.**	9/11/2018	32,200.21
4505.	26/9/2018	32,963.27	**4537.**	12/11/2018	32,143.41
4506.	27/9/2018	32,763.35	**4538.**	13/11/2018	32,152.90
4507.	28/9/2018	32,766.37	**4539.**	14/11/2018	32,108.92

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4545.	23/11/2018	31,678.70
4546.	26/11/2018	31,579.72
4547.	27/11/2018	31,173.71
4548.	28/11/2018	31,023.47
4549.	29/11/2018	30,611.55
4550.	30/11/2018	30,874.17
4551.	3/12/2018	30,798.76
4552.	4/12/2018	31,007.25
4553.	5/12/2018	31,151.68
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4555.	7/12/2018	30,866.82
4556.	10/12/2018	30,614.73
4557.	11/12/2018	30,718.72
4558.	12/12/2018	30,642.35
4559.	13/12/2018	30,568.05
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4561.	17/12/2018	30,609.06
4562.	18/12/2018	30,822.33
4563.	19/12/2018	30,704.98
4564.	20/12/2018	30,802.90
4565.	21/12/2018	30,773.64
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4569.	31/12/2018	31,430.50
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4571.	3/1/2019	30,771.32

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4575.	9/1/2019	29,336.80
4576.	10/1/2019	29,517.73
4577.	11/1/2019	29,830.70
4578.	14/1/2019	29,964.79
4579.	15/1/2019	29,964.79
4580.	16/1/2019	30,460.68
4581.	17/1/2019	30,583.21
4582.	18/1/2019	31,005.17
4583.	21/1/2019	30,732.72
4584.	22/1/2019	30,736.88
4585.	23/1/2019	30,878.56
4586.	24/1/2019	30,989.60
4587.	25/1/2019	31,426.63
4588.	28/1/2019	31,344.24
4589.	29/1/2019	31,178.71
4590.	30/1/2019	31,145.34
4591.	31/1/2019	30,557.20
4592.	1/2/2019	30,636.36
4593.	4/2/2019	30,745.05
4594.	5/2/2019	30,773.57
4595.	6/2/2019	30,821.80
4596.	7/2/2019	31,433.49
4597.	8/2/2019	31,529.92
4598.	11/2/2019	31,781.87
4599.	12/2/2019	32,462.31
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4612.	1/3/2019	31,827.24
4613.	4/3/2019	32,129.94
4614.	5/3/2019	32,173.66
4615.	6/3/2019	32,121.74
4616.	7/3/2019	32,010.06
4617.	8/3/2019	31,924.51
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4619.	12/3/2019	31,313.36
4620.	13/3/2019	31,360.28
4621.	14/3/2019	31,210.79
4622.	15/3/2019	31,142.72
4623.	18/3/2019	31,125.39
4624.	19/3/2019	31,082.32
4625.	20/3/2019	31,040.84
4626.	21/3/2019	30,885.31
4627.	22/3/2019	31,139.35
4628.	25/3/2019	31,042.32
4629.	26/3/2019	31,038.86
4630.	27/3/2019	30,829.45
4631.	28/3/2019	30,833.50
4632.	29/3/2019	31,041.42
4633.	1/4/2019	30,527.50
4634.	2/4/2019	30,226.77
4635.	3/4/2019	29,668.73

4636.	4/4/2019	29,553.12
4637.	5/4/2019	29,616.38
4638.	8/4/2019	29,162.24
4639.	9/4/2019	29,149.46
4640.	10/4/2019	29,193.42
4641.	11/4/2019	29,347.62
4642.	12/4/2019	29,560.47
4643.	15/4/2019	29,495.91
4644.	16/4/2019	29,746.24
4645.	17/4/2019	29,970.86
4646.	18/4/2019	30,086.31
4647.	23/4/2019	30,076.00
4648.	24/4/2019	29,898.31
4649.	25/4/2019	29,919.77
4650.	26/4/2019	29,740.41
4651.	29/4/2019	29,521.06
4652.	30/4/2019	29,159.74
4653.	2/5/2019	29,171.73
4654.	3/5/2019	29,212.00
4655.	6/5/2019	29,196.87
4656.	7/5/2019	29,096.41
4657.	8/5/2019	28,966.41
4658.	9/5/2019	28,896.25
4659.	5-Oct-19	28,847.81
4660.	13/5/2019	28,484.44
4661.	14/5/2019	28,422.76
4662.	15/5/2019	28,286.08
4663.	16/5/2019	28,438.19
4664.	17/5/2019	28,871.93
4665.	20/5/2019	29,373.40
4666.	21/5/2019	30,218.14
4667.	22/5/2019	31,145.15

4668.	23/5/2019	31,477.51
4669.	24/5/2019	30,881.29
4670.	27/5/2019	30,194.71
4671.	28/5/2019	31,307.00
4672.	30/5/2019	31,254.19
4673.	31/5/2019	31,069.37
4674.	3/6/2019	30,928.29
4675.	6/6/2019	30,527.07
4676.	7/6/2019	30,432.13
4677.	10/6/2019	30,322.19
4678.	11/6/2019	30,099.83
4679.	13/6/2019	30,029.15
4680.	14/6/2019	30,046.70
4681.	17/6/2019	29,936.33
4682.	18/6/2019	29,818.80
4683.	19/6/2019	29,772.72
4684.	20/6/2019	29,765.31
4685.	21/6/2019	29,851.29
4686.	24/6/2019	29,809.20
4687.	25/6/2019	29,668.68
4688.	26/6/2019	29,609.00
4689.	27/6/2019	29,749.35
4690.	28/6/2019	29,966.87
4691.	1/7/2019	29,614.61
4692.	2/7/2019	29,395.14
4693.	3/7/2019	29,375.25
4694.	4/7/2019	29,300.09
4695.	5/7/2019	29,270.95
4696.	8/7/2019	29,287.87
4697.	9/7/2019	29,318.85
4698.	10/7/2019	29,256.60
4699.	11/7/2019	28,712.90

4700.	12/7/2019	28,566.79
4701.	15/7/2019	28,341.03
4702.	16/7/2019	28,200.88
4703.	17/7/2019	28,042.80
4704.	18/7/2019	27,864.49
4705.	19/7/2019	27,919.50
4706.	22/7/2019	27,808.69
4707.	23/7/2019	28,144.87
4708.	24/7/2019	28,088.74
4709.	25/7/2019	27,990.61
4710.	26/7/2019	27,918.59
4711.	29/7/2019	27,950.36
4712.	30/7/2019	27,820.57
4713.	31/7/2019	27,718.26
4714.	1/8/2019	27,748.46
4715.	2/8/2019	27,630.46
4716.	5/8/2019	27,669.38
4717.	6/8/2019	27,527.40
4718.	7/8/2019	27,412.13
4719.	8/8/2019	27,424.92
4720.	9/8/2019	27,306.81
4721.	14/8/2019	27,083.11
4722.	15/8/2019	27,052.93
4723.	16/8/2019	26,925.29
4724.	19/8/2019	27,117.22
4725.	20/8/2019	27,058.62
4726.	21/8/2019	27,352.94
4727.	22/8/2019	27,629.66
4728.	23/8/2019	27,800.17
4729.	26/8/2019	27,691.85
4730.	27/8/2019	27,602.77
4731.	28/8/2019	27,607.02

4732.	29/8/2019	27,425.57
4733.	30/8/2019	27,525.81
4734.	2/9/2019	27,565.14
4735.	3/9/2019	27,586.79
4736.	4/9/2019	27,319.64
4737.	5/9/2019	27,252.09
4738.	6/9/2019	27,146.57
4739.	9/9/2019	27,089.84
4740.	10/9/2019	27,047.58
4741.	11/9/2019	27,153.53
4742.	12/9/2019	27,426.64
4743.	13/9/2019	27,779.00
4744.	16/9/2019	27,574.32
4745.	17/9/2019	27,407.04
4746.	18/9/2019	27,681.61
4747.	19/9/2019	27,646.15
4748.	20/9/2019	27,698.69
4749.	23/9/2019	27,650.28
4750.	24/9/2019	27,352.24
4751.	25/9/2019	27,283.05
4752.	26/9/2019	27,579.85
4753.	27/9/2019	27,675.04
4754.	30/9/2019	27,630.56
4755.	2/10/2019	27,314.87
4756.	3/10/2019	27,085.69
4757.	4/10/2019	26,987.45
4758.	7/10/2019	26,866.41
4759.	8/10/2019	26,809.92
4760.	9/10/2019	26,598.94
4761.	10/10/2019	26,583.75
4762.	11/10/2019	26,533.78
4763.	14/10/2019	26,557.44

4764.	15/10/2019	26,513.65
4765.	16/10/2019	26,472.20
4766.	17/10/2019	26,456.29
4767.	18/10/2019	26,448.62
4768.	21/10/2019	26,390.08
4769.	22/10/2019	26,365.83
4770.	23/10/2019	26,397.94
4771.	24/10/2019	26,357.24
4772.	25/10/2019	26,348.73
4773.	28/10/2019	26,384.45
4774.	29/10/2019	26,244.39
4775.	30/10/2019	26,310.77
4776.	31/10/2019	26,355.35
4777.	1/11/2019	26,293.30
4778.	4/11/2019	26,401.06
4779.	5/11/2019	26,375.35
4780.	6/11/2019	26,223.66
4781.	7/11/2019	26,188.24
4782.	8/11/2019	26,314.49
4783.	12/11/2019	26,456.39
4784.	13/11/2019	26,357.61
4785.	14/11/2019	26,843.11
4786.	15/11/2019	26,851.68
4787.	18/11/2019	26,691.09
4788.	19/11/2019	26,739.44
4789.	20/11/2019	26,776.15
4790.	21/11/2019	26,872.09
4791.	22/11/2019	26,991.42
4792.	25/11/2019	27,035.78
4793.	26/11/2019	26,883.33
4794.	27/11/2019	26,790.10
4795.	28/11/2019	26,824.50

4796.	29/11/2019	27,002.15
4797.	2/12/2019	26,990.59
4798.	3/12/2019	26,944.32
4799.	4/12/2019	26,938.58
4800.	5/12/2019	26,913.70
4801.	6/12/2019	26,855.52
4802.	9/12/2019	26,681.31
4803.	10/12/2019	26,384.21
4804.	11/12/2019	26,434.00
4805.	12/12/2019	26,569.80
4806.	13/12/2019	26,536.21
4807.	16/12/2019	26,695.18
4808.	17/12/2019	26,660.44
4809.	18/12/2019	26,665.73
4810.	19/12/2019	26,584.45
4811.	20/12/2019	26,526.35
4812.	23/12/2019	26,115.80
4813.	24/12/2019	26,092.82
4814.	27/12/2019	26,416.48
4815.	30/12/2019	26,609.34
4816.	31/12/2019	26,842.07
4817.	2/1/2020	26,867.79
4818.	3/1/2020	26,968.79
4819.	6/1/2020	27,339.68
4820.	7/1/2020	27,586.93
4821.	8/1/2020	28,562.48
4822.	9/1/2020	29,395.57
4823.	10/1/2020	29,415.39
4824.	13/1/2020	29,633.58
4825.	14/1/2020	29,283.15
4826.	15/1/2020	29,062.50
4827.	16/1/2020	29,352.13

4828.	17/1/2020	29,618.52
4829.	20/1/2020	29,710.56
4830.	21/1/2020	29,462.76
4831.	22/1/2020	29,458.21
4832.	23/1/2020	29,591.29
4833.	24/1/2020	29,628.84
4834.	27/1/2020	29,552.99
4835.	28/1/2020	29,378.63
4836.	29/1/2020	29,110.90
4837.	30/1/2020	29,030.93
4838.	31/1/2020	28,843.53
4839.	3/2/2020	28,533.40
4840.	4/2/2020	28,432.27
4841.	5/2/2020	28,093.76
4842.	6/2/2020	28,140.41
4843.	7/2/2020	28,067.09
4844.	10/2/2020	27,773.20
4845.	11/2/2020	27,871.90
4846.	12/2/2020	27,878.43
4847.	13/2/2020	27,864.84
4848.	14/2/2020	27,755.87
4849.	17/2/2020	27,570.94
4850.	18/2/2020	27,547.56
4851.	19/2/2020	27,523.08
4852.	20/2/2020	27,568.91
4853.	21/2/2020	27,388.62
4854.	24/2/2020	27,041.03
4855.	25/2/2020	27,033.10
4856.	26/2/2020	26,974.38
4857.	27/2/2020	26,808.24
4858.	28/2/2020	26,216.46
4859.	2/3/2020	25,816.57

4860.	3/3/2020	26,255.11
4861.	4/3/2020	26,415.54
4862.	5/3/2020	26,426.20
4863.	6/3/2020	26,279.61
4864.	9/3/2020	25,647.54
4865.	10/3/2020	24,388.66
4866.	11/3/2020	23,572.75
4867.	12/3/2020	22,695.88
4868.	13/3/2020	22,734.07
4869.	16/3/2020	22,705.19
4870.	17/3/2020	22,543.07
4871.	18/3/2020	22,789.64
4872.	19/3/2020	22,118.90
4873.	20/3/2020	22,198.43
4874.	23/3/2020	21,700.98
4875.	24/3/2020	21,741.16
4876.	25/3/2020	21,729.48
4877.	26/3/2020	21,757.47
4878.	27/3/2020	21,861.78
4879.	30/3/2020	21,330.79
4880.	31/3/2020	21,300.47
4881.	4-Jan-20	21,100.54
4882.	2/4/2020	21,121.20
4883.	3/4/2020	21,094.62
4884.	6/4/2020	20,669.38
4885.	7/4/2020	20,925.19
4886.	8/4/2020	21,073.26
4887.	9/4/2020	21,384.03
4888.	14/4/2020	21,879.95
4889.	15/4/2020	22,539.94
4890.	16/4/2020	22,554.84
4891.	17/4/2020	22,921.59
4892.	20/4/2020	22,920.56
4893.	21/4/2020	22,629.92
4894.	22/4/2020	22,780.30
4895.	23/4/2020	22,470.79
4896.	24/4/2020	22,599.38
4897.	27/4/2020	22,616.28
4898.	28/4/2020	22,727.87
4899.	29/4/2020	22,868.40
4900.	30/4/2020	23,021.01
4901.	4/5/2020	23,089.86
4902.	5/5/2020	23,809.31
4903.	6/5/2020	24,143.37
4904.	7/5/2020	24,354.25
4905.	8/5/2020	24,045.40
4906.	11/5/2020	23,950.83
4907.	12/5/2020	23,695.90
4908.	13/5/2020	23,709.44
4909.	14/5/2020	23,892.92
4910.	15/5/2020	23,871.33
4911.	18/5/2020	24,010.19
4912.	19/5/2020	24,202.87
4913.	20/5/2020	24,452.23
4914.	21/5/2020	24,758.39
4915.	22/5/2020	25,204.75
4916.	27/5/2020	25,221.29
4917.	28/5/2020	25,166.01
4918.	29/5/2020	25,267.82
4919.	1/6/2020	25,321.29
4920.	2/6/2020	25,383.43
4921.	3/6/2020	25,407.96
4922.	4/6/2020	25,312.05
4923.	5/6/2020	25,016.30

4924.	8/6/2020	25,250.20	**4956.**	23/7/2020	24,512.27
4925.	9/6/2020	25,335.15	**4957.**	24/7/2020	24,427.73
4926.	10/6/2020	25,215.04	**4958.**	27/7/2020	24,783.61
4927.	11/6/2020	25,182.67	**4959.**	28/7/2020	24,650.16
4928.	15/6/2020	24,956.04	**4960.**	29/7/2020	24,693.73
4929.	16/6/2020	24,930.88	**4961.**	3/8/2020	24,766.12
4930.	17/6/2020	24,972.94	**4962.**	4/8/2020	24,841.94
4931.	18/6/2020	24,933.41	**4963.**	5/8/2020	24,882.04
4932.	19/6/2020	24,826.75	**4964.**	6/7/2020	24,930.34
4933.	22/6/2020	24,779.26	**4965.**	8-Jul-20	25,041.89
4934.	23/6/2020	24,751.32	**4966.**	10/8/2020	25,027.61
4935.	24/6/2020	24,654.99	**4967.**	11/8/2020	24,883.70
4936.	25/6/2020	24,625.17	**4968.**	12/8/2020	25,141.48
4937.	26/6/2020	24,828.96	**4969.**	13/8/2020	25,236.97
4938.	29/6/2020	24,858.82	**4970.**	14/8/2020	25,199.84
4939.	30/6/2020	24,479.16	**4971.**	17/8/2020	25,143.68
4940.	1/7/2020	24,594.99	**4972.**	18/8/2020	25,136.49
4941.	2/7/2020	24,374.40	**4973.**	19/8/2020	25,171.32
4942.	3/7/2020	24,336.12	**4974.**	20/8/2020	25,204.58
4943.	6/7/2020	24,109.65	**4975.**	21/8/2020	25,221.87
4944.	7/7/2020	24,098.08	**4976.**	24/8/2020	25,229.12
4945.	8/7/2020	24,278.07	**4977.**	25/8/2020	25,291.78
4946.	9/7/2020	24,276.56	**4978.**	26/8/2020	25,330.10
4947.	10/7/2020	24,306.36	**4979.**	27/8/2020	25,297.55
4948.	13/7/2020	24,200.60	**4980.**	28/8/2020	25,309.37
4949.	14/7/ 2020	24,117.40	**4981.**	31/8/2020	25,327.13
4950.	15/7/2020	24,132.30	**4982.**	1/9/2020	25,413.76
4951.	16/7/2020	24,330.06	**4983.**	2/9/2020	25,460.00
4952.	17/7/2020	24,287.66	**4984.**	3/9/2020	25,511.02
4953.	20/7/2020	24,273.42	**4985.**	4/9/2020	25,605.64
4954.	21/7/2020	24,174.45	**4986.**	7/9/2020	25,582.23
4955.	22/7/2020	24,173.53	**4987.**	8/9/2020	25,497.32

4988.	9/9/2020	25,424.91
4989.	10/9/2020	25,520.97
4990.	11/9/2020	25,591.95
4991.	14/9/2020	25,605.59
4992.	15/9/2020	25,597.96
4993.	16/9/2020	25,558.81
4994.	17/9/2020	25,533.35
4995.	18/9/2020	25,572.57
4996.	21/9/2020	25,574.35
4997.	22/9/2020	25,654.90
4998.	23/9/2020	25,783.02
4999.	24/9/2020	25,987.14
5000.	25/9/2020	26,319.47
5001.	28/9/2020	26,507.84
5002.	29/9/2020	26,611.96
5003.	30/9/2020	26,837.42
5004.	2/10/2020	26,985.77
5005.	5/10/2020	27,554.56
5006.	6/10/2020	28,909.37
5007.	7/10/2020	28,634.35
5008.	8/10/2020	28,546.22
5009.	9/10/2020	28,415.31
5010.	12/10/2020	28,337.49
5011.	13/10/2020	28,344.04
5012.	14/10/2020	28,344.33
5013.	15/10/2020	28,344.04
5014.	16/10/2020	28,659.45
5015.	19/10/2020	28,659.07
5016.	20/10/2020	28,665.82
5017.	21/10/2020	28,449.49
5018.	22/10/2020	28,563.87
5019.	23/10/2020	28,697.06

5020.	26/10/2020	28,777.96
5021.	27/10/2020	28,980.29
5022.	28/10/2020	29,437.60
5023.	30/10/2020	30,530.69
5024.	2/11/2020	30,479.39
5025.	3/11/2020	30,733.47
5026.	4/11/2020	30,741.88
5027.	5/11/2020	30,738.92
5028.	6/11/2020	31,016.17
5029.	9/11/2020	32,243.05
5030.	10/11/2020	32,647.10
5031.	11/11/2020	33,268.36
5032.	12/11/2020	35,342.46
5033.	13/11/2020	35,037.46
5034.	16/11/2020	34,795.82
5035.	17/11/2020	34,242.83
5036.	18/11/2020	34,818.01
5037.	19/11/2020	34,643.65
5038.	20/11/2020	34,136.82
5039.	23/11/2020	34,121.78
5040.	24/11/2020	34,340.56
5041.	25/11/2020	34,769.00
5042.	26/11/2020	34,803.00
5043.	27/11/2020	34,885.51
5044.	30/11/2020	35,042.14
5045.	1/12/2020	35,147.62
5046.	2/12/2020	35,056.82
5047.	3/12/2020	34,968.94
5048.	4/12/2020	35,137.99
5049.	7/12/2020	35,064.36
5050.	8/12/2020	35,033.74
5051.	9/12/2020	35,021.26

5052.	10/12/2020	34,577.26
5053.	11/12/2020	34,250.74
5054.	14/12/2020	34,843.44
5055.	15/12/2020	35,225.22
5056.	16/12/2020	35,493.15
5057.	17/12/2020	36,239.62
5058.	18/12/2020	36,804.75

5059.	21/12/2020	37,443.40
5060.	22/12/2020	37,893.61
5061.	23/12/2020	38,803.74
5062.	24/12/2020	38,800.01
5063.	29/12/2020	39,110.17
5064.	30/12/2020	39,512.31
5065.	31/12/2020	40,270.72

APPENDIX 2

Stationarity Tests

Null Hypothesis: RTN_D has a unit root
Exogenous: Constant
Lag Length: 11 (Automatic - based on AIC, maxlag=32)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-28.90509	0.0000
Test critical values:	1% level	-3.431463	
	5% level	-2.861917	
	10% level	-2.567013	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RTN_D)
Method: Least Squares
Date: 03/21/21 Time: 17:32
Sample (adjusted): 14 5065
Included observations: 5052 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RTN_D(-1)	-4.393738	0.152006	-28.90509	0.0000
D(RTN_D(-1))	2.631309	0.146956	17.90541	0.0000
D(RTN_D(-2))	2.020289	0.138763	14.55923	0.0000
D(RTN_D(-3))	1.536683	0.128412	11.96680	0.0000
D(RTN_D(-4))	1.156665	0.116526	9.926278	0.0000
D(RTN_D(-5))	0.853149	0.103467	8.245643	0.0000
D(RTN_D(-6))	0.611791	0.089475	6.837528	0.0000
D(RTN_D(-7))	0.420316	0.074748	5.623120	0.0000
D(RTN_D(-8))	0.269348	0.059485	4.527982	0.0000
D(RTN_D(-9))	0.151024	0.043930	3.437809	0.0006
D(RTN_D(-10))	0.068408	0.028543	2.396692	0.0166
D(RTN_D(-11))	0.021106	0.014088	1.498088	0.1342
C	0.001663	0.001024	1.624375	0.1044

R-squared	0.784702	Mean dependent var	2.02E-06
Adjusted R-squared	0.784189	S.D. dependent var	0.156357
S.E. of regression	0.072636	Akaike info criterion	-2.404133
Sum squared resid	26.58595	Schwarz criterion	-2.387336
Log likelihood	6085.840	Hannan-Quinn criter.	-2.398249
F-statistic	1530.479	Durbin-Watson stat	2.000255
Prob(F-statistic)	0.000000		

Null Hypothesis: RTN_D has a unit root
Exogenous: Constant
Bandwidth: 186 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-230.0714	0.0001
Test critical values:	1% level	-3.431460	
	5% level	-2.861915	
	10% level	-2.567012	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.006494
HAC corrected variance (Bartlett kernel)	0.001030

Phillips-Perron Test Equation
Dependent Variable: D(RTN_D)
Method: Least Squares
Date: 03/21/21 Time: 17:23
Sample (adjusted): 3 5065
Included observations: 5063 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RTN_D(-1)	-1.467447	0.012426	-118.0909	0.0000
C	0.000579	0.001133	0.511414	0.6091

R-squared	0.733722	Mean dependent var	2.25E-06
Adjusted R-squared	0.733669	S.D. dependent var	0.156187
S.E. of regression	0.080604	Akaike info criterion	-2.198143
Sum squared resid	32.88131	Schwarz criterion	-2.195564
Log likelihood	5566.599	Hannan-Quinn criter.	-2.197239
F-statistic	13945.45	Durbin-Watson stat	2.286716
Prob(F-statistic)	0.000000		

Null Hypothesis: RTN_M has a unit root
Exogenous: Constant
Lag Length: 4 (Automatic - based on AIC, maxlag=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.233865	0.0000
Test critical values:	1% level	-3.456840	
	5% level	-2.873093	
	10% level	-2.573002	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RTN_M)
Method: Least Squares
Date: 03/21/21 Time: 17:25
Sample (adjusted): 2000M07 2020M12
Included observations: 246 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RTN_M(-1)	-0.608914	0.116341	-5.233865	0.0000
D(RTN_M(-1))	-0.215878	0.107859	-2.001481	0.0465
D(RTN_M(-2))	-0.160460	0.099967	-1.605126	0.1098
D(RTN_M(-3))	-0.008467	0.085437	-0.099103	0.9211
D(RTN_M(-4))	-0.139552	0.064832	-2.152504	0.0324
C	0.004834	0.004433	1.090438	0.2766

R-squared	0.446622	Mean dependent var	0.000325
Adjusted R-squared	0.435093	S.D. dependent var	0.091213
S.E. of regression	0.068556	Akaike info criterion	-2.498253
Sum squared resid	1.127971	Schwarz criterion	-2.412758
Log likelihood	313.2852	Hannan-Quinn criter.	-2.463828
F-statistic	38.73993	Durbin-Watson stat	1.997203
Prob(F-statistic)	0.000000		

Null Hypothesis: RTN_M has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-13.33194	0.0000
Test critical values:	1% level	-3.456408	
	5% level	-2.872904	
	10% level	-2.572900	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.004809
HAC corrected variance (Bartlett kernel)	0.005401

Phillips-Perron Test Equation
Dependent Variable: D(RTN_M)
Method: Least Squares
Date: 03/21/21 Time: 17:24
Sample (adjusted): 2000M03 2020M12
Included observations: 250 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RTN_M(-1)	-0.829351	0.063005	-13.16330	0.0000
C	0.006412	0.004427	1.448276	0.1488

R-squared	0.411308	Mean dependent var	0.000418
Adjusted R-squared	0.408934	S.D. dependent var	0.090567
S.E. of regression	0.069628	Akaike info criterion	-2.483322
Sum squared resid	1.202330	Schwarz criterion	-2.455151
Log likelihood	312.4153	Hannan-Quinn criter.	-2.471984
F-statistic	173.2726	Durbin-Watson stat	2.019304
Prob(F-statistic)	0.000000		

ARCH Effects

Heteroskedasticity Test: ARCH

F-statistic	402.4609	Prob. F(10,5043)	0.0000
Obs*R-squared	2243.190	Prob. Chi-Square(10)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 03/21/21 Time: 17:36
Sample (adjusted): 12 5065
Included observations: 5054 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.004568	0.004275	1.068679	0.2853
RESID^2(-1)	0.890475	0.014037	63.43970	0.0000
RESID^2(-2)	-0.785412	0.018686	-42.03209	0.0000
RESID^2(-3)	0.685182	0.021445	31.95121	0.0000
RESID^2(-4)	-0.590007	0.023066	-25.57940	0.0000
RESID^2(-5)	0.498351	0.023825	20.91696	0.0000
RESID^2(-6)	-0.410499	0.023825	-17.22961	0.0000
RESID^2(-7)	0.324951	0.023066	14.08803	0.0000
RESID^2(-8)	-0.242042	0.021445	-11.28684	0.0000
RESID^2(-9)	0.160299	0.018686	8.578545	0.0000
RESID^2(-10)	-0.080017	0.014037	-5.700597	0.0000

R-squared	0.443845	Mean dependent var	0.008325
Adjusted R-squared	0.442742	S.D. dependent var	0.406614
S.E. of regression	0.303536	Akaike info criterion	0.455544
Sum squared resid	464.6335	Schwarz criterion	0.469752
Log likelihood	-1140.159	Hannan-Quinn criter.	0.460521
F-statistic	402.4609	Durbin-Watson stat	1.988607
Prob(F-statistic)	0.000000		

Heteroskedasticity Test: ARCH

F-statistic	278.5107	Prob. F(15,5033)	0.0000
Obs*R-squared	2290.065	Prob. Chi-Square(15)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 03/21/21 Time: 17:39
Sample (adjusted): 17 5065
Included observations: 5049 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.004271	0.004246	1.005927	0.3145
RESID^2(-1)	0.910041	0.014080	64.63468	0.0000
RESID^2(-2)	-0.824679	0.018999	-43.40654	0.0000
RESID^2(-3)	0.744439	0.022180	33.56402	0.0000
RESID^2(-4)	-0.669621	0.024383	-27.46247	0.0000
RESID^2(-5)	0.598883	0.025917	23.10801	0.0000
RESID^2(-6)	-0.532594	0.026931	-19.77629	0.0000
RESID^2(-7)	0.469454	0.027512	17.06348	0.0000
RESID^2(-8)	-0.409897	0.027701	-14.79735	0.0000
RESID^2(-9)	0.352662	0.027512	12.81838	0.0000
RESID^2(-10)	-0.298153	0.026931	-11.07104	0.0000
RESID^2(-11)	0.245264	0.025917	9.463558	0.0000
RESID^2(-12)	-0.194448	0.024383	-7.974677	0.0000
RESID^2(-13)	0.144511	0.022180	6.515489	0.0000
RESID^2(-14)	-0.095918	0.018999	-5.048587	0.0000
RESID^2(-15)	0.047545	0.014080	3.376800	0.0007

R-squared	0.453568	Mean dependent var	0.008333
Adjusted R-squared	0.451939	S.D. dependent var	0.406815
S.E. of regression	0.301170	Akaike info criterion	0.440880
Sum squared resid	456.5100	Schwarz criterion	0.461564
Log likelihood	-1097.002	Hannan-Quinn criter.	0.448126
F-statistic	278.5107	Durbin-Watson stat	1.995848
Prob(F-statistic)	0.000000		

Heteroskedasticity Test: ARCH

F-statistic	211.6073	Prob. F(20,5023)	0.0000
Obs*R-squared	2306.495	Prob. Chi-Square(20)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 03/21/21 Time: 17:43
Sample (adjusted): 22 5065
Included observations: 5044 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.004426	0.004240	1.044022	0.2965
RESID^2(-1)	0.917477	0.014103	65.05479	0.0000
RESID^2(-2)	-0.839631	0.019124	-43.90373	0.0000
RESID^2(-3)	0.766995	0.022459	34.15102	0.0000
RESID^2(-4)	-0.699947	0.024869	-28.14496	0.0000
RESID^2(-5)	0.637165	0.026668	23.89283	0.0000
RESID^2(-6)	-0.579103	0.028015	-20.67123	0.0000
RESID^2(-7)	0.524488	0.029010	18.07974	0.0000
RESID^2(-8)	-0.473836	0.029712	-15.94767	0.0000
RESID^2(-9)	0.425921	0.030161	14.12138	0.0000
RESID^2(-10)	-0.381237	0.030381	-12.54867	0.0000
RESID^2(-11)	0.338714	0.030381	11.14900	0.0000
RESID^2(-12)	-0.298905	0.030161	-9.910179	0.0000
RESID^2(-13)	0.260663	0.029712	8.772992	0.0000
RESID^2(-14)	-0.224559	0.029010	-7.740821	0.0000
RESID^2(-15)	0.189524	0.028015	6.765099	0.0000
RESID^2(-16)	-0.156202	0.026668	-5.857372	0.0000
RESID^2(-17)	0.123517	0.024869	4.966652	0.0000
RESID^2(-18)	-0.092098	0.022459	-4.100740	0.0000
RESID^2(-19)	0.060923	0.019124	3.185597	0.0015
RESID^2(-20)	-0.030531	0.014103	-2.164835	0.0304

R-squared	0.457275	Mean dependent var	0.008341
Adjusted R-squared	0.455114	S.D. dependent var	0.407017
S.E. of regression	0.300445	Akaike info criterion	0.437052
Sum squared resid	453.4129	Schwarz criterion	0.464222
Log likelihood	-1081.246	Hannan-Quinn criter.	0.446571
F-statistic	211.6073	Durbin-Watson stat	1.998310
Prob(F-statistic)	0.000000		

Heteroskedasticity Test: ARCH

F-statistic	4.621122	Prob. F(10,230)	0.0000
Obs*R-squared	40.32025	Prob. Chi-Square(10)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 03/21/21 Time: 17:46
Sample (adjusted): 2000M12 2020M12
Included observations: 241 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.002650	0.001000	2.650048	0.0086
RESID^2(-1)	-0.067015	0.066138	-1.013268	0.3120
RESID^2(-2)	0.156769	0.066593	2.354150	0.0194
RESID^2(-3)	0.228138	0.067357	3.387000	0.0008
RESID^2(-4)	0.312394	0.069015	4.526495	0.0000
RESID^2(-5)	0.012560	0.071907	0.174676	0.8615
RESID^2(-6)	-0.112747	0.072599	-1.553010	0.1218
RESID^2(-7)	0.021505	0.069401	0.309861	0.7569
RESID^2(-8)	-0.042473	0.067393	-0.630234	0.5292
RESID^2(-9)	-0.018375	0.066756	-0.275253	0.7834
RESID^2(-10)	0.006965	0.068638	0.101481	0.9193

R-squared	0.167304	Mean dependent var	0.005082
Adjusted R-squared	0.131100	S.D. dependent var	0.012827
S.E. of regression	0.011957	Akaike info criterion	-5.970453
Sum squared resid	0.032882	Schwarz criterion	-5.811396
Log likelihood	730.4396	Hannan-Quinn criter.	-5.906372
F-statistic	4.621122	Durbin-Watson stat	1.989889
Prob(F-statistic)	0.000005		

Heteroskedasticity Test: ARCH

F-statistic	3.084024	Prob. F(15,220)	0.0001
Obs*R-squared	41.00289	Prob. Chi-Square(15)	0.0003

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 03/21/21 Time: 17:47
Sample (adjusted): 2001M05 2020M12
Included observations: 236 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.002730	0.001089	2.507204	0.0129
RESID^2(-1)	-0.069579	0.067573	-1.029688	0.3043
RESID^2(-2)	0.163876	0.068075	2.407282	0.0169
RESID^2(-3)	0.238700	0.069136	3.452606	0.0007
RESID^2(-4)	0.314438	0.070865	4.437120	0.0000
RESID^2(-5)	0.007022	0.073929	0.094986	0.9244
RESID^2(-6)	-0.122490	0.074922	-1.634898	0.1035
RESID^2(-7)	0.003739	0.075704	0.049395	0.9606
RESID^2(-8)	-0.058078	0.075176	-0.772563	0.4406
RESID^2(-9)	-0.010217	0.075450	-0.135412	0.8924
RESID^2(-10)	0.036487	0.078641	0.463967	0.6431
RESID^2(-11)	0.048420	0.079025	0.612713	0.5407
RESID^2(-12)	0.022442	0.074073	0.302975	0.7622
RESID^2(-13)	-0.039132	0.071746	-0.545415	0.5860
RESID^2(-14)	-0.052013	0.071625	-0.726181	0.4685
RESID^2(-15)	0.001002	0.071214	0.014068	0.9888

R-squared	0.173741	Mean dependent var	0.005098
Adjusted R-squared	0.117405	S.D. dependent var	0.012943
S.E. of regression	0.012159	Akaike info criterion	-5.916092
Sum squared resid	0.032526	Schwarz criterion	-5.681256
Log likelihood	714.0989	Hannan-Quinn criter.	-5.821428
F-statistic	3.084024	Durbin-Watson stat	1.995497
Prob(F-statistic)	0.000147		

Heteroskedasticity Test: ARCH

F-statistic	2.276757	Prob. F(20,210)	0.0021
Obs*R-squared	41.16310	Prob. Chi-Square(20)	0.0035

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 03/21/21 Time: 17:48
Sample (adjusted): 2001M10 2020M12
Included observations: 231 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.002995	0.001190	2.516546	0.0126
RESID^2(-1)	-0.071627	0.069168	-1.035540	0.3016
RESID^2(-2)	0.163546	0.069687	2.346864	0.0199
RESID^2(-3)	0.239180	0.070783	3.379054	0.0009
RESID^2(-4)	0.313710	0.072624	4.319620	0.0000
RESID^2(-5)	0.002573	0.076084	0.033816	0.9731
RESID^2(-6)	-0.126677	0.077140	-1.642173	0.1021
RESID^2(-7)	0.007389	0.078066	0.094652	0.9247
RESID^2(-8)	-0.049022	0.078058	-0.628023	0.5307
RESID^2(-9)	-0.002530	0.078213	-0.032351	0.9742
RESID^2(-10)	0.028977	0.081735	0.354526	0.7233
RESID^2(-11)	0.039872	0.082299	0.484472	0.6286
RESID^2(-12)	0.016558	0.082180	0.201490	0.8405
RESID^2(-13)	-0.054331	0.081971	-0.662804	0.5082
RESID^2(-14)	-0.047484	0.082878	-0.572936	0.5673
RESID^2(-15)	0.027835	0.082597	0.337000	0.7365
RESID^2(-16)	0.016126	0.082426	0.195644	0.8451
RESID^2(-17)	0.046379	0.077010	0.602240	0.5477
RESID^2(-18)	-0.025854	0.074293	-0.347998	0.7282
RESID^2(-19)	-0.068072	0.073469	-0.926545	0.3552
RESID^2(-20)	-0.022267	0.073031	-0.304895	0.7607

R-squared	0.178195	Mean dependent var	0.005166
Adjusted R-squared	0.099928	S.D. dependent var	0.013072
S.E. of regression	0.012402	Akaike info criterion	-5.855418
Sum squared resid	0.032300	Schwarz criterion	-5.542471
Log likelihood	697.3008	Hannan-Quinn criter.	-5.729196
F-statistic	2.276757	Durbin-Watson stat	1.995414
Prob(F-statistic)	0.002085		

GARCH Results for Daily Data

Dependent Variable: RTN_D
Method: ML ARCH - Normal distribution (OPG - BHHH / Marquardt steps)
Date: 03/21/21 Time: 18:03
Sample (adjusted): 2 5065
Included observations: 5064 after adjustments
Failure to improve likelihood (non-zero gradients) after 194 iterations
Coefficient covariance computed using outer product of gradients
Presample variance: backcast (parameter = 0.7)
GARCH = C(7) + C(8)*RESID(-1)^2 + C(9)*GARCH(-1) + C(10)*DMD +
C(11)*DFD + C(12)*DDRY + C(13)*DLMD

Variable	Coefficient	Std. Error	z-Statistic	Prob.
@SQRT(GARCH)	-0.386322	0.179022	-2.157959	0.0309
C	0.047216	0.019696	2.397218	0.0165
DMD	-0.016034	0.011776	-1.361548	0.1733
DFD	-0.002440	0.018797	-0.129803	0.8967
DDRY	-0.004424	0.009730	-0.454704	0.6493
DLMD	-0.019911	0.017648	-1.128206	0.2592
		Variance Equation		
C	0.006510	0.000504	12.91021	0.0000
RESID(-1)^2	0.551684	0.044753	12.32737	0.0000
GARCH(-1)	0.552715	0.039136	14.12288	0.0000
DMD	-0.005443	0.000391	-13.93230	0.0000
DFD	-0.000170	0.000171	-0.992167	0.3211
DDRY	0.000162	7.74E-05	2.098631	0.0358
DLMD	-0.008503	5.34E-05	-159.2893	0.0000

R-squared	0.121522	Mean dependent var	0.000397
Adjusted R-squared	0.120653	S.D. dependent var	0.091161
S.E. of regression	0.085485	Akaike info criterion	-2.517001
Sum squared resid	36.96194	Schwarz criterion	-2.500238
Log likelihood	6386.048	Hannan-Quinn criter.	-2.511130
Durbin-Watson stat	2.814464		

Heteroskedasticity Test: ARCH

F-statistic	0.012050	Prob. F(15,5033)	1.0000
Obs*R-squared	0.181326	Prob. Chi-Square(15)	1.0000

Test Equation:
Dependent Variable: WGT_RESID^2
Method: Least Squares
Date: 03/21/21 Time: 18:23
Sample (adjusted): 17 5065
Included observations: 5049 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.141586	0.115903	1.221589	0.2219
WGT_RESID^2(-1)	0.005974	0.014096	0.423830	0.6717
WGT_RESID^2(-2)	9.75E-06	0.014096	0.000691	0.9994
WGT_RESID^2(-3)	-2.76E-05	0.014096	-0.001961	0.9984
WGT_RESID^2(-4)	6.38E-08	0.014096	4.53E-06	1.0000
WGT_RESID^2(-5)	-6.41E-05	0.014096	-0.004548	0.9964
WGT_RESID^2(-6)	-3.03E-05	0.014096	-0.002150	0.9983
WGT_RESID^2(-7)	-7.29E-05	0.014096	-0.005172	0.9959
WGT_RESID^2(-8)	-5.61E-05	0.014096	-0.003983	0.9968
WGT_RESID^2(-9)	-1.36E-05	0.014096	-0.000967	0.9992
WGT_RESID^2(-10)	-4.98E-05	0.014096	-0.003535	0.9972
WGT_RESID^2(-11)	-8.75E-06	0.014096	-0.000621	0.9995
WGT_RESID^2(-12)	-0.000157	0.014096	-0.011125	0.9911
WGT_RESID^2(-13)	-0.000202	0.014096	-0.014304	0.9886
WGT_RESID^2(-14)	-0.000283	0.014096	-0.020042	0.9840
WGT_RESID^2(-15)	-0.000236	0.014096	-0.016709	0.9867

R-squared	0.000036	Mean dependent var	0.142267
Adjusted R-squared	-0.002944	S.D. dependent var	8.205275
S.E. of regression	8.217346	Akaike info criterion	7.053536
Sum squared resid	339852.2	Schwarz criterion	7.074219
Log likelihood	-17790.65	Hannan-Quinn criter.	7.060781
F-statistic	0.012050	Durbin-Watson stat	2.000000
Prob(F-statistic)	1.000000		

Date: 03/21/21 Time: 18:25
Sample (adjusted): 2 5065
Included observations: 5064 after adjustments

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
		1	0.038	0.038	7.3553	0.007
		2	0.022	0.021	9.8816	0.007
		3	0.013	0.011	10.693	0.014
		4	0.024	0.023	13.583	0.009
		5	0.020	0.018	15.686	0.008
		6	0.018	0.016	17.333	0.008
		7	0.010	0.008	17.883	0.013
		8	0.008	0.006	18.222	0.020
		9	0.012	0.010	18.948	0.026
		10	0.027	0.024	22.519	0.013
		11	0.021	0.017	24.655	0.010
		12	0.012	0.008	25.341	0.013
		13	0.008	0.005	25.699	0.019
		14	0.008	0.005	25.993	0.026
		15	0.015	0.012	27.159	0.027
		16	0.007	0.003	27.399	0.037
		17	0.000	-0.003	27.400	0.052
		18	-0.001	-0.003	27.402	0.072
		19	-0.001	-0.003	27.410	0.095
		20	0.003	0.001	27.446	0.123
		21	0.000	-0.002	27.446	0.157
		22	-0.002	-0.004	27.478	0.194
		23	0.003	0.002	27.515	0.235
		24	0.021	0.020	29.718	0.194
		25	0.015	0.013	30.854	0.194
		26	0.008	0.006	31.181	0.222
		27	0.009	0.007	31.614	0.247
		28	0.000	-0.002	31.614	0.290
		29	-0.001	-0.003	31.625	0.337
		30	0.007	0.006	31.897	0.372
		31	0.014	0.012	32.873	0.375
		32	-0.003	-0.004	32.906	0.422
		33	0.000	-0.001	32.907	0.472
		34	-0.004	-0.005	32.974	0.518
		35	0.004	0.002	33.048	0.563
		36	-0.001	-0.003	33.059	0.609

*Probabilities may not be valid for this equation specification.

Date: 03/21/21 Time: 18:26
Sample (adjusted): 2 5065
Included observations: 5064 after adjustments

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
. | .	. | .	1	0.006	0.006	0.1809	0.671
. | .	. | .	2	0.000	0.000	0.1809	0.914
. | .	. | .	3	-0.000	-0.000	0.1809	0.981
. | .	. | .	4	-0.000	0.000	0.1809	0.996
. | .	. | .	5	-0.000	-0.000	0.1809	0.999
. | .	. | .	6	-0.000	-0.000	0.1809	1.000
. | .	. | .	7	-0.000	-0.000	0.1810	1.000
. | .	. | .	8	-0.000	-0.000	0.1810	1.000
. | .	. | .	9	-0.000	-0.000	0.1810	1.000
. | .	. | .	10	-0.000	-0.000	0.1810	1.000
. | .	. | .	11	-0.000	-0.000	0.1810	1.000
. | .	. | .	12	-0.000	-0.000	0.1811	1.000
. | .	. | .	13	-0.000	-0.000	0.1813	1.000
. | .	. | .	14	-0.000	-0.000	0.1818	1.000
. | .	. | .	15	-0.000	-0.000	0.1820	1.000
. | .	. | .	16	-0.000	-0.000	0.1824	1.000
. | .	. | .	17	-0.000	-0.000	0.1829	1.000
. | .	. | .	18	-0.000	-0.000	0.1833	1.000
. | .	. | .	19	-0.000	-0.000	0.1834	1.000
. | .	. | .	20	-0.000	-0.000	0.1836	1.000
. | .	. | .	21	-0.000	-0.000	0.1839	1.000
. | .	. | .	22	-0.000	-0.000	0.1840	1.000
. | .	. | .	23	-0.000	-0.000	0.1844	1.000
. | .	. | .	24	-0.000	-0.000	0.1845	1.000
. | .	. | .	25	-0.000	-0.000	0.1847	1.000
. | .	. | .	26	-0.000	-0.000	0.1851	1.000
. | .	. | .	27	-0.000	-0.000	0.1854	1.000
. | .	. | .	28	-0.000	-0.000	0.1858	1.000
. | .	. | .	29	-0.000	-0.000	0.1861	1.000
. | .	. | .	30	-0.000	-0.000	0.1864	1.000
. | .	. | .	31	-0.000	-0.000	0.1865	1.000
. | .	. | .	32	-0.000	-0.000	0.1869	1.000
. | .	. | .	33	-0.000	-0.000	0.1873	1.000
. | .	. | .	34	-0.000	-0.000	0.1877	1.000
. | .	. | .	35	-0.000	-0.000	0.1881	1.000
. | .	. | .	36	-0.000	-0.000	0.1885	1.000

*Probabilities may not be valid for this equation specification.

GARCH Results for Monthly Data

Dependent Variable: RTN_M
Method: ML ARCH - Normal distribution (OPG - BHHH / Marquardt steps)
Date: 03/22/21 Time: 11:34
Sample (adjusted): 2000M02 2020M12
Included observations: 251 after adjustments
Convergence achieved after 45 iterations
Coefficient covariance computed using Bollerslev-Wooldridge QML
sandwich with expected Hessian
Presample variance: backcast (parameter = 0.7)
GARCH = C(4) + C(5)*RESID(-1)^2 + C(6)*GARCH(-1) + C(7)*DDRY

Variable	Coefficient	Std. Error	z-Statistic	Prob.
@SQRT(GARCH)	-0.483508	0.283227	-1.707142	0.0878
C	0.047107	0.016895	2.788206	0.0053
DDRY	-0.005852	0.007581	-0.771930	0.4402
		Variance Equation		
C	0.000271	0.000199	1.362462	0.1731
RESID(-1)^2	0.164353	0.071567	2.296480	0.0216
GARCH(-1)	0.782834	0.049680	15.75746	0.0000
DDRY	0.000141	0.000405	0.347850	0.7280

R-squared	0.013153	Mean dependent var	0.007753
Adjusted R-squared	0.005194	S.D. dependent var	0.070388
S.E. of regression	0.070205	Akaike info criterion	-2.588444
Sum squared resid	1.222331	Schwarz criterion	-2.490124
Log likelihood	331.8497	Hannan-Quinn criter.	-2.548877
Durbin-Watson stat	1.688968		

Heteroskedasticity Test: ARCH

F-statistic	1.287608	Prob. F(5,240)	0.2699
Obs*R-squared	6.426598	Prob. Chi-Square(5)	0.2669

Test Equation:
Dependent Variable: WGT_RESID^2
Method: Least Squares
Date: 03/22/21 Time: 11:33
Sample (adjusted): 2000M07 2020M12
Included observations: 246 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.028262	0.178656	5.755529	0.0000
WGT_RESID^2(-1)	-0.017886	0.064510	-0.277253	0.7818
WGT_RESID^2(-2)	-0.048600	0.064661	-0.751614	0.4530
WGT_RESID^2(-3)	0.126999	0.064314	1.974670	0.0495
WGT_RESID^2(-4)	-0.015190	0.064752	-0.234587	0.8147
WGT_RESID^2(-5)	-0.068569	0.064766	-1.058714	0.2908

R-squared	0.026124	Mean dependent var	1.004873
Adjusted R-squared	0.005835	S.D. dependent var	1.691945
S.E. of regression	1.687002	Akaike info criterion	3.907871
Sum squared resid	683.0339	Schwarz criterion	3.993366
Log likelihood	-474.6681	Hannan-Quinn criter.	3.942296
F-statistic	1.287608	Durbin-Watson stat	1.996862
Prob(F-statistic)	0.269858		

Date: 03/22/21 Time: 11:43
Sample (adjusted): 2000M02 2020M12
Included observations: 251 after adjustments

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
		1	-0.024	-0.024	0.1468	0.702
		2	-0.059	-0.060	1.0444	0.593
		3	0.134	0.132	5.6520	0.130
		4	-0.016	-0.014	5.7164	0.221
		5	-0.081	-0.068	7.4171	0.191
		6	0.024	0.002	7.5650	0.272
		7	0.046	0.044	8.1191	0.322
		8	0.091	0.117	10.306	0.244
		9	-0.011	-0.009	10.340	0.324
		10	-0.035	-0.044	10.658	0.385
		11	0.051	0.026	11.350	0.414
		12	0.043	0.057	11.843	0.458
		13	-0.083	-0.055	13.699	0.395
		14	-0.038	-0.060	14.091	0.443
		15	0.031	-0.004	14.353	0.499
		16	-0.044	-0.028	14.874	0.534
		17	0.038	0.064	15.260	0.577
		18	-0.012	-0.031	15.300	0.641
		19	-0.054	-0.064	16.093	0.651
		20	-0.045	-0.066	16.658	0.675
		21	-0.002	0.018	16.659	0.732
		22	-0.034	-0.005	16.983	0.764
		23	-0.079	-0.090	18.722	0.717
		24	0.073	0.059	20.209	0.685
		25	-0.027	-0.028	20.410	0.725
		26	0.034	0.079	20.734	0.756
		27	-0.053	-0.072	21.520	0.761
		28	-0.031	-0.031	21.795	0.791
		29	-0.029	-0.049	22.040	0.819
		30	-0.043	-0.012	22.560	0.833
		31	0.022	0.063	22.706	0.860
		32	-0.022	-0.061	22.846	0.883
		33	-0.002	-0.007	22.847	0.907
		34	0.062	0.047	23.977	0.899
		35	-0.066	-0.037	25.249	0.888
		36	0.007	0.011	25.264	0.910

*Probabilities may not be valid for this equation specification.

Variance Ratio Test Results for Daily Data

Null Hypothesis: RTN_D is a random walk
Date: 03/22/21 Time: 07:29
Sample: 1 5065
Included observations: 5063 (after adjustments)
Standard error estimates assume no heteroskedasticity
Use biased variance estimates
User-specified lags: 5 10 20 50 100 1000 2000

Joint Tests	Value	df	Probability
Max |z| (at period 5)*	28.03624	5063	0.0000
Wald (Chi-Square)	874.8243	7	0.0000

Individual Tests

Period	Var. Ratio	Std. Error	z-Statistic	Probability
5	0.136750	0.030790	-28.03624	0.0000
10	0.068036	0.047451	-19.64042	0.0000
20	0.034033	0.069846	-13.82986	0.0000
50	0.013649	0.113027	-8.726707	0.0000
100	0.006809	0.161063	-6.166495	0.0000
1000	0.000679	0.512790	-1.948792	0.0513
2000	0.000171	0.725467	-1.378187	0.1681

*Probability approximation using studentized maximum modulus with parameter value 7 and infinite degrees of freedom

Test Details (Mean = 2.25342237202e-06)

Period	Variance	Var. Ratio	Obs.
1	0.02439	--	5063
5	0.00334	0.13675	5059
10	0.00166	0.06804	5054
20	0.00083	0.03403	5044
50	0.00033	0.01365	5014
100	0.00017	0.00681	4964
1000	1.7E-05	0.00068	4064
2000	4.2E-06	0.00017	3064

Variance Ratio Test Results for Monthly Data

Null Hypothesis: RTN_M is a random walk
Date: 03/22/21 Time: 11:46
Sample: 2000M01 2020M12
Included observations: 250 (after adjustments)
Standard error estimates assume no heteroskedasticity
Use biased variance estimates
User-specified lags: 2 4 8 16

Joint Tests	Value	df	Probability
Max |z| (at period 2)*	7.423358	250	0.0000
Wald (Chi-Square)	55.83385	4	0.0000

Individual Tests

Period	Var. Ratio	Std. Error	z-Statistic	Probability
2	0.530506	0.063246	-7.423358	0.0000
4	0.312232	0.118322	-5.812704	0.0000
8	0.139488	0.187083	-4.599631	0.0000
16	0.078549	0.278388	-3.309950	0.0009

*Probability approximation using studentized maximum modulus with
parameter value 4 and infinite degrees of freedom

Test Details (Mean = 0.00041771459229)

Period	Variance	Var. Ratio	Obs.
1	0.00817	--	250
2	0.00433	0.53051	249
4	0.00255	0.31223	247
8	0.00114	0.13949	243
16	0.00064	0.07855	235