

**EVALUATION OF THE NIGERIAN STOCK MARKET EFFICIENCY IN
THE PRE AND POST FINANCIAL MELTDOWN**

BY

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BEING A RESEARCH THESIS SUBMITTED AND PRESENTED TO THE
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JANUARY, 2018

DECLARATION

I, NAGERI, Kamaldeen Ibraheem hereby declare that this thesis entitled “Evaluation of the Nigerian Stock Market Efficiency in the Pre and Post Financial Meltdown” is a record of my research work. It has neither been submitted nor accepted for the award of any degree. All sources of information have been specially acknowledged.

In addition to the above, the research work has been ethically approved by the University Ethical Review Committee.

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CERTIFICATION

This is to certify that this Ph.D. research thesis has been read and approved as meeting the requirements of the Department of Finance, Faculty of Management Sciences, University of Ilorin, Ilorin, Nigeria.

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DEDICATION

This thesis is dedicated to Almighty Allah, the most Magnificent, the most Merciful, who is the Author and Perfecter of my life.

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ABSTRACT

The controversy surrounding the interaction between efficient stock market hypothesis and financial crisis suggests mixed results for the Nigerian stock market efficiency prior to the financial crisis. The study evaluated the Nigerian stock market efficiency in the pre and post financial meltdown. The objectives were to: (i) examine the efficiency form exhibited by the market before and after the meltdown; (ii) determine the risk-return relationship before and after the meltdown; (iii) examine the magnitude of volatility persistence before and after the meltdown; and (iv) investigate the impact of good or bad news on return volatility in the Nigerian stock market before and after the meltdown.

The study employed ex-post facto research design and covers the Nigerian Stock Exchange (NSE). Secondary data obtained from the NSE were the weekly All Share Index structured into (January 2001-March 2008) pre, (April 2009-December 2016) post financial meltdown, while March 2008 till April 2009 is the meltdown event window. The data, based on market efficiency hypothesis, were subjected to variants of Generalised Auto-Regressive Conditional Heteroscedasticity models which capture heteroscedasticity and volatility clustering in the error term under Gaussian, Student't and Generalised error distributional assumptions.

The findings of the study were that:

- (i) previous week return residual (α_i) pre = 0.275426, 0.362653, 0.311980; post = 0.263188, 0.251813, 0.251136 and previous week return variance (β_j) pre = 0.040516, 0.206215, 0.170131; post = 0.651247, 0.656755, 0.655032; $p < 0.05$, indicates that the NSE is significantly inefficient in the weak form during pre and post meltdown while the market is efficient in the semi strong form after the meltdown;
- (ii) the risk-return relationship is insignificantly negative during the pre and post meltdown with standard deviation (σ) pre = -0.919469, -0.294432, -0.252137; post = -0.120140, -0.032694, -0.111328; $p > 0.05$;
- (iii) the magnitude of volatility persistence is low ($\beta_j + \alpha_i$ = 0.315942, 0.568868, 0.482111) and dying very fast ($\ln(0.5) / \ln(\alpha + \beta)$ = 0.601588, 1.228752, 0.950062) before the meltdown while volatility persistence is high ($\beta_j + \alpha_i$ = 0.914435, 0.908568, 0.906168) and dying very slowly ($\ln(0.5) / \ln(\alpha + \beta)$ = 7.749086, 7.228902, 7.034845) after the meltdown. The return series revert to its mean in 1 and 7 weeks before and after the meltdown respectively; and
- (iv) the return volatility responded more to positive (good) news than negative (bad) news of the same magnitude before the meltdown (γ_i = 0.222173, -0.583358, -0.616583; $p < 0.05$) but insignificantly responds more to negative (bad) news than positive (good) news of the same magnitude after the meltdown (γ_i = -0.033144, 0.078015, 0.047045; $p > 0.05$).

The study concluded that information is irregular, not opened and unbalanced, leading to information asymmetry and the information environment of the NSE is unconducive and unattractive for shrewd investors. Therefore, the study recommended free flow of relevant securities information through the development and provision of latest and user friendly software application for stock information dissemination. Provision of on-line real time access to share price movement will enable investors make informed decision and also reduce insider trading in the market.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The Nigerian stock market, prior to the 2008-2009 global financial crisis witnessed considerable growth in market capitalization from ₦764.9 billion in December 2002 (which was a 10% share of the total gross domestic product at current market prices) to ₦13.181 trillion (64% share of the total gross domestic product at current market prices) by December 2007 (CBN, 2014). In 2008, market capitalisation reduced by 45.8%, a sharp reversal of growth from 2007, when the market grew by 74.7%. The market turnover ratio dropped from 21.86% in 2008 to 13.26% in 2009, the drop in stock prices was ascribed to the global financial crisis (Okereke-Onyiuke, 2009 & 2010).

Supporting the view of Okereke-Onyiuke (2009), Ajakaiye and Fakiyesi (2009) asserts that the All Share Index has been growing from 12,138 points in December 2002 to 66,371 points and market capitalisation of about ₦12.640 trillion in March 2008. But the All Share Index reduced to 22,349 points in January 2009 with a market capitalisation of ₦4.998 trillion and to 21,608 points with market capitalisation of ₦4.836 trillion, by the end of the second week of March 2009 because of the meltdown. This discloses that between March 2008 and March 2009, the All share index had lost a total of 67% points and the market capitalisation had lost 62% of its value (CBN, 2014). Therefore, there are worries concerning how rapidly the global financial crisis infiltrated the Nigerian stock market.

Financial crises are economic phenomena in both advanced and emerging countries which are often heralded by asset and credit booms or bubbles that ultimately turn into bursts. Economic theory postulates that booms or bubbles and crisis are partially related to economic

fundamentals of markets and non-fundamental, variances or random element (Chari & Kehoe, 2003). Economic fundamentals such as macroeconomic imbalances, internal or external shocks, help to forecast financial crisis but they are not dependable source since “crisis may occur even when the fundamentals are thorough or may not occur even when they are weak” (Cipriani & Guarino, 2008). Non-fundamentals (irrational causes) such as sudden runs on banks, contagion and spillovers among financial markets, restrictions to arbitrage during times of stress, advent of asset bursts, credit crunches, and other aspects relating to financial market disorder seems to be inconsistent with theories of asset-pricing behavior.

Asset mispricing which can be positive or negative (bubble or crisis) occur when information about a firm’s fundamentals moves the stock price to gain or loss value. Investors react to this movement by buying or selling shares in response to past price movement without regards for current valuation thus, continuing the price movement beyond the value justified by fundamentals (Scherbina, 2013). Bubble is a deviation of the market price of an asset from its fundamental prices (i.e asset price not determined by fundamental factors) by a significant amount for an extended period (Evanoff, 2012; Scherbina, 2013). Financial crisis is often associated with considerable changes in credit volume and asset prices, very bad disturbances in financial intermediation and supply of external financing, large scale balance sheet problems of households, firms and financial intermediaries together with huge government support in the form of liquidity and recapitalization (Claessens & Kose, 2013).

The efficient market hypothesis asserts that unexpected movements in asset prices are a result of significant changes in information about fundamentals. Thus, actual and fundamental prices are always the same, and bubbles cannot exist unless they are motivated by irrational behavior or market stringencies (Evanoff, 2012). The financial crisis of 2008-2009 originated as

a result of the subprime mortgages in the United States. It led to the liquidation of many banking and non-banking institutions, and investors' loss of confidence in the credit markets worldwide (Farhi & Cintra, 2009 and Prates & Cintra, 2010).

The crisis spread to developing countries but it was originally anticipated that the impact on Africa would be insignificant because of the low level of Africa financial market integration into global financial markets, but the impact was very serious on Africa (Kaberuka, 2009; Osakwe, 2010). The crisis affected African countries through its impact on local stock markets and led to an increase in stock market volatility. From December 2007 and January 2010 the Nigerian, Kenyan, Zambian and Egyptian stock market index declined by 62%, 35%, 27% and 30% respectively. Between 2007 and 2008, the Namibian, Mauritius and Egyptian stock market lost about 55%, 41% and 36% of their market value respectively (Osakwe, 2010). The declines in the stock markets increased the number of non-performing loans and subsequent significant deterioration in the balance sheet of banks in Nigeria and Tanzania. The banks losses forced the Central Bank of Nigeria and the government respectively to inject funds into the banks (IMF, 2009).

Ajakaiye and Fakiyesi (2009) discuss that foreign portfolio investment withdrawals/withholdings and the prospects of reduced Foreign Direct Investment (FDI) are some of the explanations for the meltdown in Nigerian stock market that affected investor's confidence. Evidence shows that total foreign portfolio inflow to Nigeria between 2007 and 2008 increased by 21% while it fell by 38.6% between 2008 and 2009. The credit crunch experienced by banks in Nigeria as a result of "margin lending", affected businesses that require short and long-term funding. The margin lending can be termed the Nigeria's own type of 'sub-prime problem'; it resulted in the crash of Nigerian stock market, due to astounding returns to provider

of fund and speculators. Other factors that affected the Nigerian stock market termed the “intensifiers” which was caused by the initial slow stand of the government; comprises interpretation of announcements, rumors and assertions by the market.

According to efficient stock market hypothesis, changes in stock prices are impossible to forecast from available public information but stock price can only move as a result news/information that changes the market’s perception of a firm’s asset value. Thus when good news about a firm’s prospect becomes public, the value and stock price of the firm gain and when the company prospect declines both the value and stock price of the firm reduced. This claim by the efficient stock market hypothesis that neither technical analysis (the study of past stock prices to predict future stock price) nor fundamental analysis (the analysis of financial information such as company’s earnings, asset price, etc, as guides for choosing undervalued stocks) could assist investors to achieve greater returns have been confronted with mix responses from researchers, academics and policy analyst (Malkiel, 2003).

The critics of the efficient market hypothesis argued that it is better as an explanation of the world than might be assumed in practice. Bailey, Kumar and Ng, (2011); Baker and Nofsinger, (2010); Fox, (2009); Shefrin, (2007); Shiller, (2000); Simon, (1957); Thaler, (1993 & 2005) stressed that shareholders are not always rational and that stock prices are not always informational efficient every time because stock prices are swayed by psychological perception (behavioural human tendency i.e irrationality) of investors and economic outlook (small firm and value effects, excess volatility and overreaction and seasonality). In response, the advocate (Fama, 1965; Samuelson, 1965) of the efficient stock market hypothesis argued that even if the stock price is not exactly informational efficient, it is actually close to it (Malkiel, 2003). This is because of the fact that a stock price increased or reduced in the past is

not a sign that it would repeat similar trend in the future. That is, the relationship between stock performance currently and how it will perform in the future is almost exactly zero.

In addition, some studies (Ako, 1999; Keim & Ziemba, 2000; Nwidobie, 2015; Schwert, 2002) have also laid credibility for the efficient stock market hypothesis on the ground that: first, it improves investment opportunities of potential investors by alleviating moral hazard and asymmetric information problems associated with buying and selling of shares. Second, the informational efficiency of the stock market provides an inducement for potential investors to enter new investment venture and include worthwhile assets in their portfolio, based on the prevalent market value of the firm.

1.2 Statement of the Problem

The Nigerian stock market since inauguration has experienced a lot of hitches (e.g. paucity of tradable shares, corrupt practices, the global financial crises, etc.) which have delayed its operational competences. More so, the extent of efficiency or inefficiency of the stock market is yet to be convincingly determined. There has also been the debate concerning the volatility persistence of stock prices, the asymmetric properties and risk-return relationship of stock in the Nigerian stock market (Bekaert & Wu 2000; Karolyi, 2001; Olowe, 2009). Meanwhile, the Nigerian stock market experienced growth in market capitalization and All Share Index from 2001 till the second quarter of 2008. The market experienced serious decline in its indicators afterwards, due to the negative impact of the financial meltdown of 2008-2009.

The financial meltdown of 2008-2009 was ascribed to the sub-prime mortgage events in the United States of America. Borrowers with poor credit history were allowed mortgage lending packaged by banks into Mortgage Backed Securities (MBS). The MBS were sold to government-backed mortgages (Federal National Mortgage Association and Federal Home Loan Mortgage

Corporations) to repackage and sell to investors (Ayuba, 2011; Njiforti, 2015; Sanusi, 2010). The mortgage company's inability to renegotiate loans as rates retune to market rates led to the downfall of the government-backed mortgages. Due to the global financial system integration and contagions, stocks in all major exchanges dropped gradually as the crisis spread. Stock markets around the world crashed, they became extremely volatile, leading to investors' loss of confidence.

In the case of Nigeria stock market, the total market capitalisation has been increasing from ₦5 billion in 1981 and by 1995 it crossed the ₦100 billion mark and to ₦281.9 billion in 1996. The market capitalisation hit the ₦1 trillion marks in 2003 at exactly ₦1.359 trillion and as a result of banking industry re-capitalisation in 2004/2005, the market capitalisation increased to ₦2.9 trillion and crossed the ₦10 trillion mark in 2007 at ₦13.181 trillion. Due to the financial meltdown of 2008-2009, the market capitalisation reduced below the ₦10 trillion in 2008 and further reduced to ₦7.030 trillion in 2009. This indicates that between 2007 and 2009 the market capitalisation on the Nigerian stock market has reduced by almost 50%. After the financial meltdown, the market capitalisation has been increasing from ₦9.918 trillion in 2010, to ₦10.275 trillion in 2011 to ₦14.8001 trillion in 2012, ₦19.077 trillion in 2013 but reduced to ₦16.875 trillion in 2014 and increased to ₦17.003 trillion in 2015.

The policy reaction and activities taken by the government and the Nigerian stock market authority to alleviate the effect of the meltdown of 2008-2009 include:

- The inauguration of the Presidential Steering Committee on the meltdown on January 2009;
- The set-up of the Presidential Advisory team to consider the measures to reverse the negative impact of the meltdown 2008-2009 on the Nigerian stock market;
- The reduction of the transaction fees on the Nigerian stock market by 50%;

- The trading rule was put up for review and the “rule book” as a compilation of all the Rules, Regulations and Guidelines (“Rules”) of The Exchange in one (1) document was produced in 2015;
- 1% maximum share price loss limit on daily price movement and 5% Share price gain limit was imposed but was later put at 5% in October 2008 for either way. This has now been reviewed in the rule book afterwards;
- The regulatory body also released guidelines/rules on market making;
- The strict enforcement of listing requirements with zero tolerance for infractions and subsequent de-listing of nineteen (19) inactive companies;
- Introduction of rules on share buy back with a limit of 15.0%.

In addition, the Nigerian stock exchange has been rebranded and reformed to include three (3) boards comprising of the main board, premium board and the Alternative Securities Market (ASeM). The depository receipt, securities lending, unit trust listing, exchange traded fund are some of the initiatives of the Securities and Exchange Commission (SEC) and the Nigerian Stock Exchange (NSE) during and after the 2008-2009 meltdown. In 2014 NSE established X-Whistle to secure an effective reporting of information on violations of rules and regulations on the Nigerian stock market. The NSE became a member of the Inter-market Surveillance Group (ISG) in 2013. ISG is an international group comprising of securities exchanges, market centers and market regulators that perform front-line market intelligence gathering within their jurisdictions.

However, studies prior to the financial meltdown of 2008-2009 tested the efficiency or the form of efficiency exhibited by the Nigerian stock market (Adelegan, 2003 & 2004; Afego, 2012; Agwuegbo, Adewole & Maduegbuna, 2010; Ekechi, 2002; Emenike, 2008; Inegbedion, 2009; Nwosa & Oseni, 2011; Okpara, 2010; Olowe, 1999; Oludoyi, 1998; Vitali & Mollah,

2010; Ajao & Osayuwu, 2012; Ayadi, 1984; Azeez & Sulaiman, 2012; Rapuluchukwu, 2010; Samuels & Yacout, 1981) indicated that the Nigerian stock market efficiency is inconclusive with inconsistent results.

During the financial crisis, studies by Ajibola, Prince and Lenee (2014), Gimba (2012), Isenah and Olubusoye (2014), Obayagbona and Igbinsola (2015) and Osazevaru (2014) showed that Nigerian stock market is not efficient in the weak form. Nwidobie (2014 & 2015); Nwosa and Oseni (2011); Yadirichukwu and Ogochukwu (2014); Oke and Azeez (2012) used data covering periods before and during the crises, provides conflicting results of the Nigerian stock market efficiency. These findings are cause for concern for the diverse audience of practitioners, researchers, investors and policy makers because the Nigerian stock market efficiency is not well understood.

Also, there is the issue of a paradigm shift and thinking that the financial crisis of 2008-2009 has dealt major setbacks to academic theories, most particularly the efficient stock market hypothesis. Financial crisis of 2008-2009 may devalue an academic hypothesis but the proponents suffer no material loss while by their nature (academic theories) operate to solicit contradiction (Thomas, 1962). In a study by Gilson and Kraakman (2014), two things make the restatement of theory and response different in the post-financial crisis of 2008-2009 in the framework of the efficient stock market hypothesis. The first is that it has moved beyond the academic community to prompt debate as well as policy challenges at the hands of the much larger political and professional communities. Second, this permutation of blame (fault) and response (reaction) gives rise to the interaction between the efficient stock market hypothesis and the financial crisis as real and not just an academic significance.

The best minds in the field of finance have devoted research to explain the efficiency of the Nigerian stock market but the phenomenon remain a puzzle in the perfect world as shown in the time frame and models used. This study revolves around the market efficiency and the financial crisis of 2008-2009. It tested the underlying prediction of the market efficiency before and after the meltdown of the 2008-2009 and expands the range of the phenomenon in the light of the Nigerian stock market.

In view of the above, there is the need to undertake an evaluation of the Nigerian stock market efficiency in the post financial crisis 2008-2009 because the meltdown has information which affects the prices of share on the Nigerian stock market. More so, in order to ascertain which model can best predict the informational efficiency, volatility persistence, response to information and risk-return relationship on stock return in Nigerian stock market after the financial meltdown becomes expedient.

1.3 Research Questions

Arising from the above established problems, the following research questions are pursued.

- i. Is the Nigerian stock market efficient and in what form before and after the financial meltdown of 2008-2009?
- ii. What is the extent of the risk-return relationship in the Nigerian stock market before and after the financial meltdown of 2008-2009?
- iii. What is the magnitude of volatility persistence in the Nigerian stock market before and after the financial meltdown of 2008-2009?
- iv. What is the impact of good or bad news on return volatility in the Nigerian stock market before and after the financial meltdown of 2008-2009?

1.4 Objectives of the Study

The global objective of this study is the evaluation of the Nigerian stock market efficiency in the pre and post financial meltdown of 2008-2009.

The specific objectives of the study were to:

- i. examine the efficiency form exhibited by the Nigerian stock market before and after the 2008-2009 financial meltdown;
- ii. determine the extent of risk-return relationship in the Nigerian stock market in pre and post 2008-2009 financial meltdown;
- iii. examine the magnitude of volatility persistence in the Nigerian stock market in pre and post 2008-2009 financial meltdown; and
- iv. investigate the impact of good or bad news on return volatility in the Nigerian stock market in pre and post 2008-2009 financial meltdown.

1.5 Research Hypotheses

In order to provide a framework for evaluating the efficiency of the Nigerian Stock Exchange, the following hypotheses were formulated:

- Ho₁: The Nigeria stock market is not significantly efficient in any form before and after the financial meltdown of 2008-2009.
- Ho₂: There is no significant risk-return relationship in the Nigerian stock market in pre and post 2008-2009 financial meltdown.
- Ho₃: There is no significant magnitude of volatility persistence in the Nigerian stock market in the pre and post 2008-2009 financial meltdown.
- Ho₄: There is no significant impact of good or bad news on return volatility in the Nigerian stock market after the financial meltdown.

1.6 Significance of the Study

The financial crisis of 2008-2009 led to renewed inquiry and condemnation of the efficient stock market hypothesis which had long dominated academic thinking about stock markets. This as a result of unexpected calamities, wild greed and other apparently irrational behaviours the efficient market hypothesis could not possibly elucidate (Milner, 2012). Rational expectation and efficient market hypothesis is one of the major causes of the financial meltdown of 2008-2009 (Volcker, 2011). Seigel (2010) opines that it requires strong evidence to believe in the efficient market hypothesis after the event of the 2008-2009 financial meltdown.

The efficient-market hypothesis has unable to empirically and theoretically explain financial markets imperfection attributable to behavioural and psychological traits of investors. Imperfections in financial markets can be attributed to perceptive biases such as overreaction, overconfidence, information biases and other human factor/errors in thinking and handling of information. Lui and Chong (2013) pointed out that there is variance of performance between experienced and rookie traders in a controlled experiment. If the market actually walks randomly, there would be no difference amongst these two kinds of traders. However, traders who are more well-informed on technical analysis significantly beat those who are less knowledgeable.

Simkovic (2009, 2013) observed that critics of the efficient market hypothesis have submitted that financial institutions and corporations have been able to lessen the efficiency of the stock markets. Critics pointed out that private information, inaccurate conventional disclosures, and new and complex products are challenges for most market participants when evaluating and correctly pricing stock. Ball (2009) claimed that the efficient market hypothesis, like all worthy theories, has major restrictions, even though it continues to be the source of

significant and enduring perception. Despite the theory's definite limitations, the claim that it is responsible for the 2008-2009 worldwide financial crises seems wildly exaggerated. As a result of the foregoing support and disapproval of the market efficiency theory, the justification of this study is seen from three (3) least perspectives.

First important significance is that the 2008-2009 meltdown has been found to have impact on the Nigerian stock market (Arunma, 2010; Ayuba, 2011; Njiforti, 2015; Ujunwa, Salami & Umar, 2011; Yahya, Abdulraheem, Babaita, Aliu, & Yisau 2011), this is because the meltdown has information which affect the prices of share on the Nigerian stock market. Thus, there is the need to evaluate the efficiency of the Nigerian stock market with regard to the financial meltdown of 2008-2009.

Second, the policy response of the Nigerian stock market regulators to the impact of the meltdown on the stock market also propelled the need for this study. This include the introduction of new market segmentation, new pricing policy, delisting of inactive stocks, review of the rule book, introduction of uniform accounting year for the financial services sector. Others include the introduction of whistle blowing, market making, rebranding of the market listing into three (3) boards (Main Board, Alternative securities Market (ASEM), Premium Board), share buy-back, security lending, listing of depositary receipt, increase in the trading hours by 2hours from 9.30am to 2.30pm among others. This study will reveal the difference in the efficiency of the Nigerian stock market with regards to the policy responses and measures in the market regarding the meltdown of 2008-2009.

Third, the debate in literature among students, researchers, practitioners and investors for/against the efficient market theory and behavioural finance is also an important gap in the literature. This study will contribute to the debate from the Nigerian stock market perspective.

Although the Nigerian stock market is the second-largest financial centre in Africa (Onyema, 2017) but it's still relatively small, classified as an emerging stock markets. The Nigerian stock market has become a full member of the World Federation of Exchanges, part of the United Nations Sustainable Stock Exchanges Initiative, signed on NASDAQ OMX to provide a new trading platform for the market and achieved the ISO 27001:2013 Certification, among others. These are efforts to incorporate the Nigerian stock market with the world markets.

The evaluation of the efficient market hypothesis is of particular interest in Nigeria because of its implication for policy makers, researchers, practitioners, foreign and local investors who make decision based on current values and the expected risk-return trade-off that are associated with investments. In addition, in the wake of the various market reforms introduced by the Securities and Exchange Commission (SEC) which centered on factors that affect market efficiency (such as market participants, limits to trading, information availability and financial disclosure) in order to jump start the stock market from its decline state following the global financial crisis of 2008-2009 is also a motivation.

Thus, the above developments indicate that the Nigerian stock market has grown and it has experienced a paradigm shift in policy during the pre and post-meltdown period of 2008-2009. In addition, the efficient market theory is faced with intense criticism because of 2008-2009 meltdown. Therefore, the Nigerian stock market deserves further study as a result of the impact of the 2008-2009 meltdown, and the debate of market efficiency and behavioural finance. This study will consequently contribute to the study of stock market efficiency from the perspective of the Nigerian stock market. In addition, the study would aid investors and financial analyst in portfolio selection and management, via proper investment analysis. Lastly, it would

aid the stock market regulators and policy makers in formulating appropriate policies that will facilitate further growth and development of the stock market.

1.7 Scope of the Study

The scope of this research is on stock market efficiency, making Nigeria stock exchange the reference point and examined the Efficient Capital Market Hypothesis (ECMH) in the post financial meltdown, using the All Share Index (ASI). Weekly data of the ASI was used covering the period of January 2001 till December 2016. The data was divided into pre-financial crisis period (January 2001 till March 2008) and the post financial crisis period measuring the effect of policy response to the meltdown of 2008-2009 (April 2009 till December 2016).

The All Share Index was used based on Pandey (1999) that in practice, the market return is approximated by a well-diversified share price index and that the return of the market index may be measured on a weekly or monthly basis. The period of January 2001 till March 2008 (pre financial crisis) and April 2009 till December 2016 (post financial crisis) was determined by the event window (financial crisis of 2008-2009) as indicated by Oludoyi (1997).

1.8 Structure of the Study

The thesis is organized into five (5) chapters. The first chapter includes the background of the study, statement of the problem, research questions, objectives of the study, research hypotheses, significance of the study, scope of the study and structure of the study.

The second chapter presents the reviews of relevant literature and it is divided into conceptual, theoretical and empirical reviews. The concept of capital market, market efficiency, market efficiency theory and related theories, summary of literature reviewed and gaps identified was also discussed.

Chapter three shows the methodology employed in the study. It includes the model specification such as the ADF and PP unit root models, the mean equation, the ARCH and GARCH models and the distributional assumptions. Others discussed are measurement of variables and nature of data, methods of data analysis, ethical considerations, delimitations of the study and the chapter summary and justification for methodology

The chapter four presents the summary statistics and properties of the data, the ARCH and GARCH model results, diagnostic checking and the discussion of findings.

The fifth chapter includes the summary of findings, conclusion, recommendations, contribution to knowledge and suggestions/directions for further research.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

Investors and researchers have disputed the efficient stock market hypothesis both empirically and theoretically especially during crises times. Behavioural economists attribute the imperfections in the capital markets to a combination of cognitive biases. This chapter therefore reviews relevant literatures on the concept of capital market, efficient stock market hypothesis with some other relevant theories on stock market and review empirical studies on efficient stock market hypothesis.

2.1 Conceptual Issues

Capital markets are financial markets for the buying and selling of long-term debt or equity-backed securities. These markets channel the wealth of savers to those who can put it to long-term productive use, such as companies or governments making long-term investments. Capital markets are defined as markets in which money is provided for periods lengthier than a year (Sullivan & Steven, 2003). Capital markets are for the buying and selling of equity and debt instruments. Capital markets transmit savings and investment amongst suppliers of capital such as retail investors and institutional investors, and users of capital like businesses, government and individuals. Capital markets naturally involve supplying instruments such as stocks and bonds for the medium-term and long-term. In this respect, capital markets are distinct from money markets, which refer to markets for financial instruments with maturities not exceeding one year (Olowe, 2011).

Contemporary capital markets are practically always hosted on computer-based electronic trading systems; most can be accessed only by entities within the financial segment or

the treasury divisions of governments and corporations, but some can be accessed directly by the public. There are thousands of such systems serving only small parts of the general capital markets. Bodies hosting the systems comprise the stock exchanges, investment banks, and government divisions. Physically the systems are hosted all over the world, though they incline to be focused in financial centres like London, Accra, Johannesburg, New York, Hong Kong, Lagos and Abuja (Ezike, 2002).

Efficient stock market hypothesis means that stock prices responds very quickly to fresh (new) information, so that stock prices at any given time contains the entirety of all investors' assessments of the stock price in the market (Manasseh, 2017). For example, financial time newspaper report that a quoted company on the Nigerian Stock Exchange is to release new product or offer new service that will give it an edge against competitors. The efficient stock market hypothesis postulates that a new investor willing to buy the stock of this company as a result of the information is too late. This is because investors that are shrewd have bought the stock earlier and the price has already increased, it doesn't matter whether or not new product or service is finally introduced. Since trading in stock is competition where no strategy will always win, the shrewd investors also have to work for the information.

The efficient stock market hypothesis does not postulate that the market is continuously accurate but the market signifies the totality of the available information and selections made by investors and can be incorrect (Lo, 2005). When the market is temporarily wrong, opportunity is provided to savvy investors to discover the variance between the market value and the perfect value of stock ahead of other investors. One strategy adopted by investors and analyst is the mean reversion, based on the idea that the market is not perfectly (100%) efficient. The market is

expected to overreact to bad news and price will go down further than it should and investors will position (buy) the stock at this time and expect the stock price to move back to normal.

Stock return is extensively known to display both stochastic volatility and jumps from time-series studies of stock prices and cross-sectional studies of stock options (Bakshi, Cao, & Chen, 1997; Bates, 2000). Volatility denotes the extent of uncertainty (risk) on the magnitude of deviations in share price or return (Campbell, Lettau, Malkiel, & Yexiao, 2001; Shiller, 2000; Pastor & Veronesi, 2006). It is a statistical extent of the dispersion of returns for a given share price or market index. Volatility can be measured by using the standard deviation or variance between returns from same share price or market index (Chao, Liu, & Guo, 2017). An increased volatility denotes that a share price can possibly be spread out over a higher range of prices, indicating that the share price can change radically over a short time period in any direction. A decreased volatility denotes that share price vary at a stable speed over a period, the higher the volatility, the riskier (Fostel & Geanakoplos, 2012).

The associationship amongst risk and return is the basic behind of the field of financial economics. When the rates of returns are independent and identically dispersed there is an expected positive relationship between return and risk given the risk aversion of investors. When returns are not independent and identically dispersed, the relationship between return and risk will include additional terms to recognize the hedging behavior of investors (Merton, 1973). Empirical viewpoint has found both positive and negative relationship between return and risk (Alonso & Restoy, 1995; Campbell, 1987; Campbell & Hentschel, 1992; French, Schwert & Stambaugh, 1987; Glosten, Jagannatham & Runkle, 1993; Guo & Whitelaw, 2003; Leon, Nave & Rubio, 2007; Lettau & Ludvigson, 2003; Nelson, 1991; Raputsoane, 2009).

The cause of the 2008-2009 financial crisis was the market in mortgage-backed securities. An extensive increase in global liquidity led to a drop in the price of credit and in turn led to an increase in demand and price of mortgages. The important piece of information inherent in the mortgage market was the knowledge of the existence of a housing bubble and that sooner or later residential prices were likely to fall. The information knowledge (bubble and burst) was not enough to induce investors to result to shorting mortgage-backed securities markets. The investors who short sale their mortgage-backed securities were assumed to be lucky rather than savvy (Gorton, 2011).

The other serious and important missing information are a useful forecast of when the bubble will burst and the consequence of the burst for relevant and related securities connected to the mortgage-backed securities boom (Gilson & Kraakman, 2014). The least predictable market to play an essential role in the subprime crisis was the stock market. The underwriters of Collateralised Debt Obligations (CDOs) were publicly quoted banks (Countrywide Financial Corporation) and some financial institutions (AIG, Lehman Brothers and the monoline insurer Ambac Financial Group) that sold Credit Default Swap (CDS) insurance on CDO were also publicly quoted. Nevertheless, the stock market was very late in identifying signals of the crisis and why share prices did not reflect decline in the quality of CDO securities and mortgages, and agency ratings before the Crisis? (Gilson & Kraakman, 2014). The most reasonable answer is that the cost of obtaining and interpreting information about quoted stock prices was not stress-free for traders in the equities markets (Bartlett, 2010).

2.1.1 Types of Capital Market

McLindon, (1996) and Iyiegbuniwe (1998) identifies that a key division within the capital markets is between the primary markets and secondary markets.

In primary markets, new stock or bond issues are sold to investors, frequently through underwriting. The main bodies looking for long-term funds on the primary capital markets are governments (which may be national, state or local) issuing only bonds and business enterprises (companies) issuing either equity or bonds. The bodies acquiring the bonds or stock include pension funds, hedge funds, sovereign wealth funds, and less commonly wealthy individuals and investment banks trading on their own behalf (McLindon, 1996). Iyiegbuniwe (1998) defines primary market as a market that issues new securities on an exchange. Companies, governments and other groups acquire financing through debt or equity based securities. Primary markets are eased by underwriting groups, which comprise of investment banks that will set a beginning price range for a given security and then oversee its sale directly to investors.

McLindon, (1996) defines the secondary markets as where existing securities are traded among investors, typically on an exchange, over-the-counter, or elsewhere. The presence of secondary markets intensifies the liquidity of investment in primary markets, as investors know that they are likely to be able to quickly cash out their investments if the need arises. Secondary market is where investors trade securities, rather than through issuing companies. The national exchanges such as the New York Stock Exchange, Nigerian Stock Exchange, Johannesburg Stock Exchange, and the NASDAQ are secondary markets. Secondary markets exist for other securities as well, such as when funds, investment banks, or entities purchase mortgages from issuing lenders. In any secondary market trade, the cash proceeds go to an investor rather than to the underlying company/entity directly (Iyiegbuniwe, 1998).

A second vital split falls between the stock markets (for equity securities, also known as shares, where investors acquire ownership of companies) and the bond markets (where investors become creditors) (McLindon, 1996). Capital markets are vital to the functioning of an economy,

since capital is a serious component for generating economic output. Capital markets include primary markets, where new stock and bond issues are sold to investors, and secondary markets, which trade existing securities (Ezike, 2002). The size of the capital market and the size of any country's economy are directly related (the world's largest economy (United States) has the biggest and deepest markets). Therefore, as a result of the integration of the global economy, crunch/crisis in one country can have major influence in another country. This issue is represented by the crisis of 2007-09, triggered by the collapse in U.S. mortgage-backed securities. The effects of this meltdown were globally transmitted by capital markets (Kothari, 2014).

2.1.2 Overview of the Nigerian Stock Exchange

The Nigerian Stock Exchange was founded in 1960 as the Lagos Stock Exchange, a registered company limited by guarantee, was licensed under the Investments and Securities Act (ISA) and regulated by the Securities and Exchange Commission (SEC) of Nigeria. It started operations in Lagos in 1961 with 19 securities listed for trading. In December 1977 it became known as The Nigerian Stock Exchange and it was deregulated in 1993, with branches established in some other cities of the country. As of December 31, 2013, it has about 200 listed companies with a total market capitalisation of about N19.08 trillion with all listings included in the Nigerian Stock Exchange All Shares Index.

Table 2.1: Annual Market Capitalisation on the Nigerian Stock Exchange (N'Billion)

Year	Government Stocks/Securities	Debt/Bonds	ETF	Equities	Total
1981	3.1	0		1.9	5
1982	3	1		1	5
1983	3.5	0		2.2	5.7
1984	2.9	0.2		2.4	5.5
1985	3.5	0.4		2.7	6.6
1986	2.7	0.4		3.7	6.8

1987	4.2	0		4	8.2
1988	4.5	0.4		5.1	10
1989	4.2	0.6		8	12.8
1990	3.4	0.8		12.1	16.3
1991	3.3	1.4		18.4	23.1
1992	3.2	1.8		26.2	31.2
1993	3.6	2.1		41.8	47.5
1994	3.2	2.1		61	66.3
1995	3.2	2.1		175.1	180.4
1996	3	3		279.8	285.8
1997	2.8	2.8		276.3	281.9
1998	2.7	3.1		256.8	262.6
1999	2.4	3.1		294.5	300
2000	2.1	4.1		466.1	472.3
2001	8.3	5.8		648.4	662.5
2002	12.7	3.5		748.7	764.9
2003	25.2	8.4		1325.7	1359.3
2004	178.1	7.9		1926.5	2112.5
2005	365.47	9.83		2523.5	2900.06
2006	902.99	3.49		4227.134	5120.9
2007	2976.58	16.98		10180.293	13181.69
2008	2558.96	16.41		6957.454	9562.97
2009	2030.76	10.05		4989.39	7030.84
2010	1939.27	56.37		7913.752	9918.21
2011	2400.465	1341.292	0.988	6532.58	10275.345
2012	4425.048	1400.434	1.0128	8974.449	14800.944
2013	4456.895	1393.998	0.28005	13226	19077.418
2014	5247.963	145.958	4.52036	11477.661	16875.103
2015	6942.874	205.89	4.01865	9850.61	17003.392

Note: Exchange Trust Fund (ETF) is an investment instrument introduced in 2011

Source: Central Bank Statistical Bulletin, 2015

Table 2.1 shows the trend in the annual market capitalisation on the Nigerian Stock Exchange from 1981 – 2015. In 1981, the total market capitalisation was ₦5billion and it increased to ₦10billion in 1988. By 1995 it crossed the ₦100billion mark to ₦180.4billion and increased by additional ₦100billion the next year (1996) to ₦281.9billion. In 1999 the market capitalisation was ₦300billion which continues to increase and hit the ₦1trillion marks in 2003

at exactly ₦1.359trillion which indicates that the market capitalisation has increased by more than 350% between 1999 and 2003.

During the capitalisation of the banking industry in 2004/2005, the market capitalisation increased to ₦2.1125trillion in 2004 and further increased to ₦2.9trillion in 2005 amounting to over 100% increase in the figure of 2003. Market capitalisation crossed the ₦10trillion mark in 2007 to ₦13.181trillion an additional 350% increase to the value of 2005. But as a result of the economic/financial meltdown of 2008/2009, the market capitalisation reduced below the ₦10trillion mark to ₦9.563trillion in 2008 and further reduced to ₦7.030trillion in 2009 which shows that between 2007 and 2009 the market capitalisation on the Nigerian Stock Exchange has reduced by almost 50%.

Soludo (2009) posits that the negative outlook of the Nigerian Stock Exchange indicators is caused by the global credit crunch of 2008-2009. The crisis led to reduction in capital flows and remittances, foreign portfolio investment withdrawals and withholdings increased. The pulling out of institutional investors led to stock price reduction. Consequently, the Nigerian stock market was depressed as foreign investors withdrew their fund (the All Shares Index (ASI) shed more than 70% of its value between March 2008 and April 2009).

Since 2010 to 2015 (periods after the economic/financial meltdown) the market capitalisation has been increasing from ₦9.918trillion in 2010, ₦10.275trillion in 2011 to ₦14.8001trillion in 2012, ₦19.077trillion in 2013 but reduced to ₦16.875trillion in 2014 and increased to ₦17.003trillion in 2015. The Exchange Traded Fund (ETF) was introduced in 2011 to encourage portfolio diversification by providing investors the platform to diversify their portfolios without going through the rigours of choosing individual securities. The market capitalisation values on the Nigerian Stock Exchange have many times been dominated by the

equities capitalisation followed by government securities and then the bond market. The Nigerian Stock Exchange (NSE) is steadfast in implementing the highest levels of international standards in all its transactions with its stakeholders. To support this commitment, the Exchange has joined a number of international and regional organizations that promote the development of standards and best practices in its operations, such as the International Organization of Securities Commissions (IOSCO); the World Federation of Exchanges (WFE) and the African Securities Exchanges Association (ASEA) as founding member; the SIIA's Financial Information Services Division (FISD), Sustainable Stock Exchanges, Financial Services Regulation Coordinating Committee (FSRCC) Nigeria and the Intermarket Surveillance Group (ISG) (NSE, 2015).

The Nigeria Stock Exchange is an automated exchange that offers listing and trading services, as well as market data dissemination services, market indices, and much more. Through the Central Securities Clearing System Plc. (CSCS), an associate company, it is able to offer electronic Clearing, Settlement and Delivery (CSD) services and custodian services (NSE, 2015). In order to boost foreign investment into Nigeria, the government has abolished legislation preventing the flow of foreign capital into the country. This has permitted foreign brokers to register as dealers on the Nigerian Stock Exchange, and investors of any nationality are allowed to invest. Nigerian companies are also allowed multiple and cross border listings on foreign markets (Ezike, 2002). The Nigeria Stock Exchange is regulated by the Securities and Exchange Commission (SEC), which has the mandate of surveillance over the exchange to envision breaches of market rules and to prevent and identify unfair trading manipulations and practices. Transactions on the Exchange are regulated by the Nigerian Stock Exchange, as a self-regulatory organization, and the Securities and Exchange Commission (SEC) as the apex regulator, which administers the Investments and Securities Act of 2007 (Olowe, 2011).

Resultant of the 1993 deregulation of the Nigerian capital market, prices of new issues are determined by issuing houses and stockbrokers, while on the secondary market prices are made by stockbrokers only. The market/quote prices, along with the All-Share Index and the Nigerian Stock Exchange 30 and Sector Indices, are available in The Stock Exchange Daily Official List, The Nigerian Stock Exchange CAPNET (an intranet facility), newspapers, and on the stock market page of the Reuters Electronic Contributor System (Ezike, 2002). On October, 2014 the Nigeria Stock Exchange received Africa Investor (AI) Investment and Business Leader Awards for Best Initiative in Support of Small and Medium scale Enterprises and the Millennium Development Goals, Nigerian Stock Exchange was also named the African Regulator of The Year at the 6th African Business Leadership Forum and Awards which took place on July 25, 2015 in London, United Kingdom (UK) (NSE, 2015).

The equities market has been the most active product on the Nigerian Stock Exchange for years with provisional figures of 955,517 deals valued at ₦960.78billion out of 955,650 total transactions valued at ₦961.222billion for year 2015 (see Table 2.2). As at December 2013, the value of the equities market capitalization was ₦13.226trillion out of total market capitalization of 19.077trillion. In 2015, the equities market capitalization was ₦9.851trillion out of total market capitalization of ₦17.003trillion (CBN Bulletin, 2015).

Table 2.2: Equities Transactions at the Nigerian Stock Exchange

Year	Number of Deals		Value (N' Million)	
	Equities	Total	Equities	Total
1981	-	10199	-	304.8
1982	-	10014	-	215
1983	-	11925	-	397.9
1984	-	17444	-	256.5
1985	-	23571	-	316.6
1986	-	27718	-	497.9
1987	20189	20525	-	382.4
1988	21460	21560	624.8	850.3
1989	33273	33444	27.9	610.3

1990	39103	39270	66.9	225.4
1991	41716	41770	143.4	242.1
1992	48944	49029	400	491.7
1993	40331	40398	456.2	804.4
1994	42010	42074	793.6	985.9
1995	49549	49564	1788	1838.8
1996	49489	49515	6916.8	6979.6
1997	78078	78089	10222.6	10330.5
1998	84931	84935	13555.3	13571.1
1999	123505	123509	14071.2	14072
2000	256515	256523	28145	28153.1
2001	426149	426163	57648.2	57683.8
2002	451847	451850	59404.1	59406.7
2003	621697	621717	113882.5	120402.6
2004	973510	973526	223772.5	225820
2005	1021943	1021967	254683.1	262935.8
2006	1367948	1367954	468588.4	470253.4
2007	2614983	2615020	1074884	1076020
2008	3535493	3535631	1675614	1679144
2009	1738306	1739365	683932.1	685717.3
2010	1924125	1925314	799194.3	799911
2011	1235181	1235467	638753.9	638925.7
2012	1146932	1147174	808420.6	808991.4
2013	3222478	3224639	2350499	2350876
2014	1211069	1211269	1334476.1	1334783.1
2015	955517	955650	960780.4	961221.5

Source: Central Bank of Nigeria Statistical Bulletin, 2015.

The Nigerian Stock Exchange runs an Automated Trading System (ATS) policy with a central order book which lets dealing members to participate on equal terms, competing on the classified basis of Price, Cross and Time priority. The Exchange runs a hybrid market, permitting dealing members to submit orders and market makers to submit two-sided quotes into the order book. According to Oludoyi (1999) in order to ensure that share are properly priced, the Securities and Exchange Commission (SEC) and the Nigerian Stock Exchange (NSE) impose limits (caps) on the extent to which opening share price can fall or rise on any trading day. As at year 2000, three price limit (caps) regimes has been introduced; +/-10kobo before April 1995, +/-20k from April 1995 to April 1996 and +/-5% since May 1996 to August 2008.

In August 2008, the pricing regime was amended to cushion the effect of the financial meltdown on the Nigerian Stock Exchange to 1% maximum downward limit on daily price movement and 5% maximum upward limit on daily price movement. This policy was reverted to 5% either way from the end of October 2008. By April 2012 the pricing limit was changed to +/- 10% which was applicable to only those equities in the market makers basket. Another important policy shift is the change from the 50k per value of equities to 1k per value effective from June, 2015 (Onyema, 2013; Abiodun, 2013 & “Shareholders say”, 2015) while the transaction circle is T+3. The trading schedule and the pricing information of equities trading can be found in the Nigerian Stock Exchange Equities Market Structure.

The equities market on the Nigerian Stock Exchange market segmentation was reduced from 33 sectors to 12 and became operational in November, 2011. Most listed companies were reclassified for better grouping within the 12 sectors comprising almost 200 listed shares. Some of the longstanding sectors were fused under one sector, while others were modified. These changes will enable more accurate market related analyses at the local and global levels, including analysis of local economic sector performance versus market sector performance versus global sector performance. The changes will also facilitate the development of new investment instruments, such as indices, ETFs, etc. (NSE, 2015). The new sectors classifications are: Agriculture, Construction/Real Estate, Consumer Goods, Financial Services, Healthcare and ICT (Information and Communications Technology). Others are Industrial Goods, Natural Resources, Oil & Gas, Services, Utilities and Conglomerates

The Exchange maintains an All-Share Index formulated in January 1984 (January 3, 1984 = 100). Merely common stocks (ordinary shares) are involved in the computation of the index. The index is value-weighted and is computed daily (Ezike, 2002). The maximum value of

66,371.20 was recorded on March 3, 2008. Also, The Exchange has introduced the NSE-30 Index, which is a sample-based capitalization-weighted index and other sectoral indices. These are NSE-Food/Beverages Index, (Later renamed NSE – Consumer Goods Index) NSE Banking Index, NSE Insurance Index, NSE Industrial Index, NSE ASEM Index, NSE Lotus Islamic Index and NSE Oil/Gas Index, NSE Pension Index, NSE Premium index and NSE Main-Board Index.

The Nigerian Stock Exchange offers access to range of debt instruments from local and international issuers, such as multinational bonds, sovereign bonds, state bonds, municipal bonds and corporate bonds. The retail bond trading policy of the Nigerian Stock Exchange benefits retail investors with efficient and transparent access to on-screen secondary market in listed debt instruments (NSE, 2015). According to Ezike (2002), a bond is a loan in which the borrower receives funds from a number of people and from institutions for a given number of periods at a fixed rate of interest known as coupon rate. The fixed income trading platform was introduced as response to growing demand from retail investors for portfolio diversification from traditional equities; as investors can now add debt instruments in smaller volumes to their portfolios. (NSE, 2015). As at May, 2015, there was about sixty (60) listed bond comprising of federal, state and corporate entities on the Nigeria Stock Exchange.

The pricing and trading in bond on the Nigerian Stock Exchange is contained in the Nigerian Stock Exchange retail bond market structure. There is no limit up or down on daily price changes of bond and prices are quoted on a 'clean' basis. This means that the price showing does not include any accrued interest. When an investor buys a bond however, they pay the bond's 'dirty' price which is the clean price plus the accrued interest (NSE, 2015). All settlement of order book trades takes place within the Central Securities Clearing System (CSCS). Settlement of order book trades is instructed automatically by the Automated Trading System

(ATS) post-trade router into central securities clearing system. Automated trading system will calculate the accrued interest payable and will instruct settlement in central securities clearing system on behalf of the counterparties. The normal settlement timetable for fixed income securities is T+2 (NSE, 2015).

The Nigerian Stock Exchange announced the Exchange Traded Fund (ETF) in 2011 as a type of fund that trails the performance of an index, or a commodity. They trade like shares on the Nigerian Stock Exchange and develop their value from the index or commodity they track. Exchange traded fund offer investors the opportunity to spread their portfolios without going through the rigours of picking individual securities. For example, when an investor buys an Exchange traded fund that tracks the NSE 30 Index, it gives the investor the ownership of a portfolio of shares of all the securities listed in the NSE 30 Index. Investors can buy and sell Exchange traded fund through their stockbroker (NSE, 2015).

2.1.2.1 Listing on the Nigerian Stock Exchange

According to the Nigerian Stock Exchange web site (2015), companies can be listed on three boards:

(1) The Main Board

The Main Board was a rebranding of the formerly known First Tier Securities Market where companies from diverse sectors are given the opportunity to raise capital from the public. In Nigeria's increasingly global market place, companies listed on this board enjoy access to a deep pool of local and international investors. Entry into this board is centered on profitability and market capitalization benchmarks. Sectors on this board were formerly 32 but was reduced to a more comprehensive and competitive 12 (broad) sectors in Nov, 2011, and listing on any of this board's sectors requires high standards of disclosure, corporate governance and internal

regulation. To maintain market transparency and integrity, companies are closely monitored for adherence to their post-listing obligations.

(2) The Alternative Securities Market (ASeM)

This board was a rebranding of the formerly known Second Tier Securities Market as a result of the decline in number of issuers owing to numerous degrees of non-compliance with the Nigerian Stock Exchange's post listing requirements thereby leading to both voluntary and compulsory delisting from the former Second Tier Securities Market. The alternative securities market is a dedicated board for emerging businesses (small and mid-sized companies) with high growth prospect. It provides the companies a platform of raising long-term capital from the capital market at fairly low cost, thereby allowing the companies to institutionalize and grow.

There is no bound to the volume of capital a company listed on Alternative Securities Market (ASeM) can raise, as long as the company meets regulatory requirements including those of the Corporate Affairs Commission (CAC) and the Securities and Exchange Commission (SEC). Companies that list on the alternative securities market are supported by three (3) main pillars:

(i) The Designated Advisers: Designated adviser provides professional resources to qualifying issuer companies for direction and intelligence on securities-related matters. They ensure compliance with all the requirements and obligations of the alternative securities market board. Designated advisers include dealing members of the Nigerian Stock Exchange, issuing houses, capital market consultants and any other groups of professionals as from time to time be permitted by the Nigerian Stock Exchange with proficiency on corporate finance and investment, in-depth knowledge of capital market rules and operations, intimate acquaintance with the

disclosure, listing and post listing requirements of the Nigerian Stock Exchange, among other requirements.

(ii) The Growth Ambassadors: The Growth Ambassador (GA) programme was introduced to the Nigeria Stock Exchange in order to support the objectives of ASeM in nurturing Small and Medium scale Enterprises (SMEs) progress from businesses into institutions. Growth ambassadors are selected based on their influence within the entrepreneurial and small and medium scale enterprises space, their close alliances within capital markets and their strong passion to develop Nigeria's small and medium scale enterprises sector. They are influential in projecting the Nigerian Stock Exchange alternative securities market brand to target stakeholders and contribute to small and medium scale enterprises growth via the alternative securities market platform.

(iii) The NSE's institutional services: These are other Nigerian Stock Exchange institutional value added services such as X-Value introduced in Nov. 2013 which has now included X-Gen, X-Issuer, X-Whistle, etc. These are key elements of sales and retention efforts by the Nigerian Stock Exchange. These services are aimed to entice new listings, generate a competitive edge for listed companies, maintain current listings, expand investor interest in the market through enhanced information, and assist listed companies in observing with post listing obligations and retaining their listing status.

(3) The Premium Board

In order to promote the next generation of Nigeria and African investors, the Nigerian Stock Exchange is creating a Premium Board. The elite groups of issuers who will list on this board are leaders in their respective sectors. They will be required to meet demanding standards for corporate governance, capitalization and liquidity; in return, they will enjoy unparalleled

visibility to the global investors' community. Table 2.3 shows some of the basic requirements for listing equity securities on the Exchange.

Table 2.3: Basic Requirements for Listing on the Nigerian Stock Exchange

Subject	Main Board	ASeM Board
Pre Tax Profits	Cumulative consolidated pre-tax profit of at least N600m within 1 or 2 years or the option of consolidated pre-tax profit of at least N300m for the last 3years, with a pre-tax profit of at least N100m in 2 of those years.	Medium term (at least 2 years) comprehensive business plan.
Market Capitalisation	At least N4bn at the time of listing based on the issue price and issued share capital.	Capital to be raised & anticipated market capitalization.
Operating Record	3 years' operating track record of company and/or core investor.	Company must have been in operation for at-least 2 years.
Financials	3 years financials and date of last audited accounts must not be more than 9 months.	2 years financials and date of last audited accounts must not be more than 9months.
Public Float	Minimum of 20% of share capital must be offered to the public.	Minimum of 15% of share capital must be offered to the public.
Public Shareholder	At least 300 for equity shares	At least 51 shareholders
Continuing Obligations	Promoters to retain 50% of shares pre-Initial Public Offer (IPO) for 12 months. Submission of quarterly, semi- annual and annual statements.	Promoters to retain 50% of shares pre-IPO for 12 months. Submission of quarterly, semi-annual and annual statements. Companies must retain a Designated Adviser to assist with regulatory compliance.
Accounting Standard	All financial accounts are to be prepared following the International Financial Reporting Standard (IFRS)	All financial accounts are to be ready following the International Financial Reporting Standard (IFRS)

Source: The Nigerian Stock Exchange, 2015.

However, the board in which any company is listed is determined by the size, scope and growth stage of such company. The boards are governed by the Nigerian Stock Exchange's listing requirements and rules as contained in the Nigerian Stock Exchange Green Book. The rules and requirements makes the process of raising fund from the public a cost-effective practice and are also designed to enhance investor confidence. In the same vein, companies wanting to be

admitted to the official list of the Nigerian Stock Exchange, in addition to satisfying the Nigerian Stock Exchange's requirements for listing, must conform with the applicable provisions of the Companies and Allied Matters Act CAP C20 LFN 2004, Investment and Securities Act 2007 and the Securities and Exchange Commission Rules and Regulation made thereon and other germane statutory requirements.

2.2 Theoretical Clarification

This section reviews the various theories that have been put forward by practitioners and academia in the field of security analysis, risk-return relationship and informational efficiency on capital market.

2.2.1 Random Walk Theory

This theory states that stock prices chart no predictable form, inferring that future prices have no relationship with historical prices of the same stock (Nneji, 2013). According to Mbat (2001), the random walk theory implies a statistically independent relationship amongst future prices of stock and their past prices. According to Fama (1965; 1995), a stock market where consecutive price variations in individual securities are independent, is by definition a random walk. Stock prices resulting a random walk suggest that the price variations are independent of one another as the gains and losses (Kendal, 1953). Fama (1968, 1970) argued that the random walk model is an extension of the expected return or fair game model. Explicitly, the fair game model just specifies that the situations of market equilibrium can be stated in terms of predictable returns while the random walk model gives the details of the stochastic procedure generating returns. Therefore, he concluded that empirical tests of the random walk model are more

powerful in support of the efficient market hypothesis than tests of the fair game model. The Random Walk model can be stated in the following equation:

$$P_{t+1} = P_t + e_{t+1}$$

Where P_{t+1} is Price of share at time $t + 1$; P_t price of share at time t ; e_{t+1} is random error with zero mean and predictable variance. The equation above indicates that the price of a share at time $t + 1$ is equal to the price of a share at time t plus given value that depends on the new information arriving between time t and $t + 1$. In other word, the change of price $e_{t+1} = P_{t+1} - P_t$ is independent of past price changes.

One of the first tests of the random work hypothesis was developed by Cowles and Jones (1937); Cootner (1962; 1964); Fama (1963, 1965); Fama and Blume (1966); and Osborne (1959), who compared the frequency of sequences and reversals in historical stock returns, where the former are pairs of serial returns with the same sign, and the latter are pairs of consecutive returns with opposite signs. All of these articles except Cowles and Jones (1937) indicate support for the random work hypothesis using historical stock price data. Cowles, (1960) subsequently recognized an error in the analysis of Cowles and Jones (1937).

Moreover, Lo and MacKinlay (1988), exploit the fact that return variances measure linearly under the random work hypothesis and construct a variance ratio test which rejects the random work hypothesis for weekly US stock returns indexes from 1962 to 1985 but individual stocks generally do satisfy the random work hypothesis and that variances grow faster than linearly as the holding period increases, implying positive serial correlation in weekly returns.

Fama and French (1988) and Poterba and Summers (1988) find negative serial correlation in United States stock returns index using data from 1926 to 1986. However, a number of statistical articles documented by Kim, Nelson and Startz (1991) and Richardson (1993) cast

severe suspicion on the reliability of these longer-horizon inferences. Lo (1991) studies another aspect of stock market prices long thought to have been a departure from the random walk hypothesis: long-term memory. Time series with long-term memory display an unusually high degree of persistence, so that observations in the distant past are non-trivially connected with observations in the distant future, even as the time extent between the two observations increases.

2.2.2 Modern Portfolio Theory

Modern Portfolio Theory (MPT) or portfolio theory was introduced by Markowitz in 1952. Preceding Markowitz's work, investment theory focused on measuring the risks and rewards of individual securities. Standard investment guidance was to pinpoint those securities that offered the best opportunities for return with lowest risk and then build a portfolio but investors don't actually follow the advice in practice. The modern portfolio theory by Markowitz (1952) connected the gap between investment theory and investment practice by evolving a mathematical model for diversification. Investors should concentrate on (when selecting portfolio based on those portfolios' overall risk-return) characteristics instead of merely accumulating portfolio from securities that individually have attractive risk-return characteristics. Single period returns for numerous securities are treated as random variables, and are allocated expected values, standard deviations and correlations. Based on these, the expected return and volatility of any portfolio with those securities are built. Volatility and expected return are taken as proxies for risk and reward respectively. The portfolio that optimally balanced the risk-return is regarded as the efficient frontier of portfolio by Markowitz (1952) and an investor should select a portfolio that lies on this efficient frontier.

Tobin (1958) extended on the work by adding a risk-free asset to the study to enable leverage or deleverage portfolios on the efficient frontier. This led to the idea of super-efficient portfolio and the capital market line. Subsequently, portfolios are leveraged such that portfolio on the capital market line can outperform portfolio on the efficient frontier. Sharpe (1964) formalised the Capital Asset Pricing Model (CAPM) by making some assumptions. Not only does the market portfolio is on the efficient frontier, but it is the super-efficient portfolio.

Modern portfolio theory provides a context for understanding the interaction of systematic risk and reward, it has shaped how institutional portfolios are accomplished and it has inspired the use of reflexive investment techniques. The arithmetic of modern portfolio theory is used in financial-risk-management and was a theoretical sign for today's value at risk measures.

2.2.3 Arbitrage Pricing Theory (APT)

Arbitrage Pricing Theory (APT) is an asset pricing model that states that stock return is a linear function of various financial market and macro-economic indices represented by factor-specific beta (β_i) coefficients. The APT propounded by Ross (1976) claims that stock returns on assets are approximately linearly linked to the factor loadings (betas) which are proportional to the returns' covariance with the factors, thus, equilibrium prices offer no arbitrage opportunities over static portfolios of the assets. APT insinuates that every investor believes that the stochastic properties (shock or error term) of returns are consistent with a factors (β_i).

APT proclaims that there is linear relationship between stock returns and the return's covariance with other random variables (stochastic properties). The covariance (error term) is construed as risk size that investors cannot diversify while the slope coefficient (in the linear relationship) is interpreted as the risk premium, which is strictly tied to mean-variance efficiency. The resulting estimates of return from the model are used to value the asset, and it

should equal the expected end period value of the asset discounted at the rate implied by the model. If the asset value deviates then arbitrage activities (short selling) should correct the deviation in value.

The practice of earning returns from overvalued or undervalued stocks in an inefficient market without any additional risk and investments is known as Arbitrage. Arbitrage involves the trading in at least two mispriced assets (each over valued and undervalued). The arbitrageur sells the overvalued asset and uses the proceeds to buy an undervalued asset. The linear model of returns following a factor intensity structure is expressed as:

$$R_i = \alpha_i + \beta_1 f_1 + \beta_2 f_2 + \beta_3 f_3 + \beta_4 f_4 + \cdots + \beta_n f_n + \varepsilon_i$$

Where α_i is constant (slope coefficient) for asset i , f are specific factors, β are the factor loading (sensitivity) of asset i and ε_i are random shock (error term) of asset i with zero mean and ε_i is assumed to be uncorrelated across assets and with the factors.

The number of assets is assumed to be much larger than the number of factors and there must be perfect competition in the market. The resulting linear estimates of expected return and the factor sensitivities are expressed as:

$$E(R_i) = r_f + \beta_1 R p_1 + \beta_2 R p_2 + \beta_3 R p_3 + \beta_4 R p_4 + \cdots + \beta_n R p_n$$

Where $R p$ is the risk premium of each factor and r_f is the risk-free rate.

Asset is overvalued or undervalued if current price departs from the price predicted by the APT model. Current price of asset should equal the addition of discounted future cash flows (at the APT rate), when the return of the asset is sensitivity to changes in the factor estimated by the specific beta (β_i) coefficient.

Arbitrage is possible by creating portfolio and identifying assets that are rightly priced (one per factor plus one), then weighting the assets to ascertain that the portfolio beta per factor

is the same for both rightly priced assets and for mispriced assets. When prospect for positive expected return is recognized (the difference between asset return and portfolio return) with zero exposure to any sensitivity factor (risk free) the arbitrageur thus has a position to make risk-free return by short selling. Where stock or portfolio is undervalued, the suggestion of APT is that at the end of the period, the portfolio would have appreciated at the rate implied by the APT estimates but the mispriced asset would have value more than the APT rate. Therefore, the arbitrageur is predicted to short sell the portfolio and buy the mispriced asset with the earnings. At the end of the period, the arbitrageur sell the mispriced asset, use the earnings to buy back the portfolio and earn the difference as return.

Identified macro-economic factors that are significant in explaining stock returns are inflation, financial crisis, Gross National Product (GNP), change in premium in corporate bonds, yield curve. Market indices that are recognized include short-term interest rates, the difference in long-term and short-term interest rates, expanded stock index, oil prices, gold prices, foreign exchange rates, among others (Chen, Roll & Ross, 1986).

2.2.4 Efficient Capital Market Hypothesis

According to Lo (2007), the roots of the efficient capital market hypothesis can be traced back to the work of two individuals in the 1960s: Eugene F. Fama and Paul A. Samuelson. Remarkably, they independently established the same basic concept of market efficiency from two rather different research programs. These differences would push them along two distinct routes leading to several other innovations and milestones, all originating from their point of connection, the efficient capital market hypothesis.

The theory states that markets make prompt amendments to stock price fluctuations. These changes in stock price arise due to the advent of new information relating to that particular

stock (Nneji, 2013). A school of thought in the theory of financial econometrics that is widely accepted by financial economists is the Efficient Capital Market Hypothesis (ECMH). They believe commonly that financial markets are very efficient in replicating information about individual securities traded in the markets and about the market as a whole (Isenah & Olubusoye, 2014).

According to Ongorn (2009) prices of securities traded, for example: stocks, bonds, or properties reflects all identified information and are unbiased in the sense that they reflect the joint prospects of all investors about the future prices. Under the efficient capital market hypothesis, information is rapidly and efficiently incorporated into asset prices at any point in time, so that the price history cannot be used to forecast future price movements of the assets. In general, an asset price, denoted by P_t already incorporates all pertinent information, and the only cause for the prices to change between time t and time $t + 1$ will be due to shocks. The efficient capital market hypothesis therefore postulates that the assets price process follow a random walk. The random walk model without drift parameter is expressed as:

$$P_t = P_{t-1} + \varepsilon_t$$

Where ε_t is a white noise process; $t = 1, 2, 3, \dots, n$. When ε_t is not a white noise process, the price series is said to have memory which violates the efficient capital market hypothesis (Shiriaeve, 1999).

The efficient capital market hypothesis arises when the active market participants all have access to significant information, employing this information to participate rationally in order to maximise profit on their buy and sell decisions. This ultimately leads to the position where the actual price of a security is a good evaluation of the intrinsic value of that security. This implies that no stock is overpriced or underpriced and as such there is no possibility of making gains by

outperforming the market. It is therefore evident that the efficient capital market hypothesis supports the random walk theory. If information is not used by all concerned, the theory breaks down as prospects emerge for one or more market participants to make hay while the sun is still shining, this phenomenon is called information arbitrage (Nneji, 2013).

According to Fama (1965, 1995) a stock market where consecutive price changes in individual securities are independent, exhibit a random walk process. Stock prices succeeding a random walk suggest that the price changes are independent of one another (Kendal, 1953). The independence of the random walk or the efficient capital market hypothesis is binding as long as the time series (data) on the price deviations of the securities does not have memory (Isenah & Olubusoye, 2014).

Otaniyi and Makina (2010), also explain that the efficient capital market hypothesis evolved from the random walk theory and the fair game model in which researchers like Kendal (1953) found that “in a sequence of prices that are witnessed at fairly close intervals, the random changes from one term to the next term are so large as to beat any systematic effect which may be present. The data behave like nomadic series”. Fama (1965, 1970) later developed the efficient capital market hypothesis classifying efficient capital markets into three types: weak form, semi-strong form, and strong form of efficiency.

However, studies over the years have showed that concept of efficient capital market hypothesis may almost certainly be false due to various abnormalities and anomalies (Malkiel 2003; Schwert, 2002; Shiller, 2003; Gilson & Kraakman, 2014), such anomalies include the evidence of volatility of returns on investments, data snooping (Lo & MacKinlay, 1988, 1990), size effect (Banz, 1981 and Reinganum, 1981), the weekend effect (French, 1980), the value effect (Basu, 1977) and the momentum effect (Fama & French, 1996) among others.

2.2.4.1 The Weak Form of Efficiency

The weak form of the efficient capital market hypothesis claims that prices fully reflect the information implicit in the sequence of past prices. This weak-form of hypothesis asserts that stock prices already reflect all information that can be derived by examining market trading data such as the history of past prices, trading volume, or short interest. This version of the hypothesis implies that trend analysis and the developing of trading rules by financial analyst in predicting future stock price movement that would allow investors to earn abnormal rate of return is fruitless (Fama, 1970).

The Weak form of capital market efficiency implies that prices of assets always fully reflect all historical, publicly available information. Thus, prospect share prices cannot be determined by simply analyzing data on past share prices. It totally kicks against technical analysis, but lends credence to fundamental analysis as it implies that one can outperform the market if one undertakes research into the financial statements of the company under scrutiny. A capital market is therefore a weak form efficient if there is no discernible pattern that can be identified in its stock prices over time. Therefore, no amount of chart reading is likely to outperform the buy and hold strategy (Olowe, 1999).

Studies on the weak-form hypothesis established that changes in the price of stock price follow a random walk. This implied that changes in stock price are impossible to predict from available information and thus consistent with the notion of an efficient market (Nwosa & Oseni, 2011). The weak form of efficient capital market hypothesis states that:

I. No excess returns can be earned by using investment strategies based on historical share prices or other financial data.

II. Weak form efficiency suggests that technical analysis will not be able to yield excess returns.

III. To test the weak form efficiency, it is sufficient to use statistical investigations in time series data of prices. Current share prices are the best, unbiased, estimate of the value of the security under the weak form efficient market. News is generally assumed to occur randomly, so share price changes must also therefore be random (Oke & Azeez, 2012).

In a study by Okwoli and Kpelai (2008), the weak form of capital market efficiency is a situation where the security prices reflect all the past information as reported by the press. It is therefore, not possible for an investor to predict future security price by analyzing historical prices, and achieve a performance (return) better than the stock market index. It is so because the capital market has no memory, and the stock market index has already incorporated past information about the security prices in the market.

In another study by Azeez and Sulaiman (2012), in the weak form efficiency, investors believe that the market reflects all historical information such as prices, trading volume past financial statements, news, stories, etc. Market is believed to be efficient in the weak form if everybody have access to such information and no opportunity or gap is available for abnormal profits, as such, all historical price information would be useless to an analyst. As past price is reflected in current prices, this form of efficiency discredits technical analysis. The weak form of efficient capital market hypothesis is the form of efficiency that explains a market as being efficient if current prices fully reflect all information contained in past prices. This form implies that past prices cannot be used as a predictive tool for future stock price movements. Therefore, it is not possible for a trader to make abnormal returns by using only the past history of prices (Gimba, 2012).

2.2.4.2 The Semi-strong Form of Efficiency

According to Nneji (2013), the semi-strong form of efficiency holds that a capital market is efficient, when the prices of stocks reflect, all publicly available information. “All publicly available information” implies both historical and current information whether financial or non-financial as long as it concerns the stock in question. Therefore the prices of stock experience a quick change in order to accommodate any new information that is publicly available. The declaration is that one should not be able to profit from something everyone else knows.

Semi strong efficiency is in opposition to both fundamental and technical analysis. The semi-strong form of capital market hypothesis suggests that all publicly available information about the company’s past performance as well as the prospects of the company is already reflected in the stock price. Such information includes, in addition to past prices, fundamental data on the firm’s product line, quality of management, balance sheet composition, patents held, earnings forecasts, and accounting practices (Nwosa & Oseni, 2011).

In Oke and Azeez, (2012), the semi-strong form of the hypothesis asserts that prices reflect all relevant information that is publicly available, i.e. all relevant publicly available information is quickly reflected in the market price. The semi-strong form of capital market hypothesis perhaps appeals most to common sense. It states that no investor can earn excess returns from trading rules based on publicly available information. If the capital market is semi-strong form efficient, then stock price reacts so fast to all public information that no investor can earn an above normal return by acting on this type of information. Tests of semi-strong form efficiency have revealed that no investor can earn an abnormal return as a result publicly available information such as annual accounting reports, block trades (Fama, Fisher, Jensen, & Roll, 1969), earnings announcements, stock split announcements, dividend announcements, and

repurchase of stock announcement (Olowe, 1996, 1999; Oludoyi, 1998). For example, if an investor purchases the stock on the date of announcement and still do not make an abnormal return, the market is semi-strong form efficient. Under the semi-strong form of capital market efficiency, the following are assumed:

- I. Share prices change rapidly and in an unbiased style to publicly available fresh information so that no abnormal or excess returns can be earned by trading on that information.
- II. Semi-strong form efficiency implies that fundamental analysis will not be able to produce excess return.
- III. To test for semi-strong efficiency, the changes to previously known news/information must be of a sensible size and must be prompt. If there are steady rising or sinking adjustments, it would suggest that investors had interpreted the information in a biased approach and hence in an inefficient way (Olowe, 1996).

Semi-strong form of capital market efficiency hypothesis enhances information sets to include all current and publicly available information. Under this form, all publicly available information is quickly incorporated to stock prices to prevent investors trading on this piece of information from extra profits in a stock market (Azeez & Sulaiman, 2012). This level of efficiency assumes that all publicly available information about a given security has been accurately factored into the present price of that security (Russel & Torbey, 2003). Okwoli and Kpelai (2008) looked at semi-strong efficiency as a situation where the security prices reflect not only past information but all other published information. Gimba (2012), posit that the semi-strong form of the efficient capital market hypothesis states that current market prices reflect all publicly available information, such as information on money supply, exchange rate, interest rates, announcement of dividends, annual earnings, stock splits, etc. If by increasing the

information set to comprise private information, it is not probable for an investor to earn abnormal profits.

2.2.4.3 The Strong Form of Efficiency

The strong form of capital market efficiency states that the current price of a stock fully reflects all existing information (both public and private) about that stock (Nneji, 2013). Olowe (1999) stressed that, in a strongly efficient market, no individual can out-perform the market from any information available to him or her and this can only persist to be true even if that person is the only one with access to the information. Nwosa and Oseni (2011) explain that the strong-form version of the efficient market hypothesis, states that stock prices reflect all information relevant to the firm, even with information available simply to company insiders and those who have access to the company's policies and plans.

Pandey (1999) equally observed that in this form of efficiency, the security prices reflect all published and unpublished information. This suggests that even the member of a company's top management staff, who is advantaged to have insider information, cannot use such information to out-perform the market. In the same vein, the research team of a company cannot gain abnormally if they invest in the company's shares immediately after making a discovery that is bound to be of immense benefit to the company.

The strong form of market efficiency asserts that information that is known to any participant is reflected in market prices, Otaniyi & Makina, (2010) and Azeez and Sulaiman, (2012) wrote that the strong-form of capital market efficiency is when stock prices reflect all information whether publicly available or not. Strong-form efficiency indicates that no insider information is useful to yield excess profit or earn abnormal return by investors in an efficient capital market. This is a situation where the security prices reflect not only public information

but all information that can be acquired by painstaking analysis of the company and the security (Okwoli & Kpelai, 2008).

According to Oke and Azeez (2012) in its strongest form, the efficient capital market hypothesis says a market is efficient if all information relevant to the value of share, whether or not generally available to existing or potential investors, is quickly and accurately reflected in the markets price. It is the most satisfying and compelling form of efficient capital market hypothesis in a theoretical sense, but it suffers from one big drawback in practice. It is difficult to confirm empirically as the necessary research would be unlikely to win cooperation of the relevant section of the financial community insider. The financial points hold in the strong-form of efficient capital market hypothesis is:

- I. Share prices reflect all information and no one can earn excess returns.
- II. To test for the strong form efficiency, a market needs to happen where investors cannot steadily earn excess returns over a long period of time. When the topic of insider trading is presented where an investor trades on information not yet publicly available, the idea of a strong-form efficient capital market seems impossible.
- III. If there are fund to be managers who have steadily beaten the market, then it cannot be described as being strong-form efficient capital market. Common sense and empirical evidence advocate that stock markets are unlikely to be of strong form efficient (Oke & Azeez, 2012).

The view of relative efficiency may be a more worthwhile than the presence-or-absence of information efficiency as suggested by the traditional market efficiency literature (Campbell, Lo & MacKinlay, 1997). Gilson and Kraakman (2003) advance the three forms of informational efficiency into four ways/forms by which share prices could reflect information. The level of market efficiency with respect to information can either be; universally informed, professionally

informed, derivatively informed, or uninformed forms of market informational efficiency that can be operated and revealed in market share price. The form of the efficiency can then hinge on the coverage (scope) of the information delivery as a function of the cost structure of the stock market for such information. Thus, the lower the cost of information, the wider its distribution, the more operative efficiency and effectiveness of the information mechanism, the more the market becomes efficient (Gilson & Kraakman, 2003).

First form is a situation where all professional and non-professional investors simultaneously learn of new information and reacted (a publication by the Central Bank of Nigeria (CBN) on a major change in its quantitative monetary policy), to make instantaneous stock price response unavoidable. The second form is where a much reduced (but still adequate) portion of professional investors learn of new information within a short time (minutes or hours) and subsequently trade on such information before it is fully reflected in stock prices. The two forms allows stock price to reflect new information speedily, but the second is less speedy compare to the first form. The differences in efficiency are caused by the costs of analyzing and trading on new information in order to enable shrewd investors earn normal stock return on average (Grossman & Stiglitz, 1980). The second form is relatively less efficient than the first form. Both scenarios are still efficient since prices still reflect new information that are available and acted on by moderately informed investors as rapidly as information that is known to the entire market (Fox, Fox & Gilson, 2016).

The third form is when private information known only by insiders is available and the stock price gradually responds. This steady price response (to the content of insider information) can be deduced by savvy investors (outsider) after observing trades and unexpected price movements as a result of insider's trading activities based on the information. Lastly, the fourth

form is when share price responds to noisy information transmitted through relative inefficient market mechanism even though no investor ascertains such information to be true. Here, the market prices reflect collective share price forecast of combined autonomous investors (with varied information) that are better informed rather than the forecast of any individual investor. Consider Where the CBN's quantitative monetary policy announcement was well forecasted and priced into stock prices before the announcement of such policy. The share price only averages the incomplete information and estimation of investors in popularly accepted forecast because the correct content of the information is unknown.

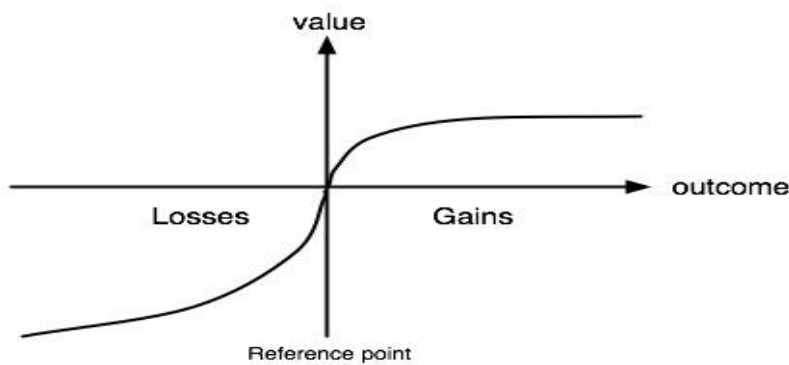
2.2.5 Prospect Theory

The prospect theory is a theory developed by Kahneman and Tversky (1979) as a critique of the expected utility theory (rational choice) as descriptive (behavioural) model of decision making under probability and risk. The theory model real life choices and was based on the pervasive effect exhibit when making choice among risky prospects. The certainty effect (underweighing outcome that is probable in comparison with outcome that is certain) contributes to risk aversion choices involving sure gains or losses and the isolation effect (people discard information component that are shared by all) lead to inconsistent preferences when faced with same choice in different form.

The essential feature of the prospect theory is that value are measure by changes in wealth rather than final states (absolute magnitude) which is compatible with the basic principles of perception and judgement of information. For example, the same level of wealth to someone may imply abject poverty to another person depending on their current state of wealth. Value is treated as a function of the asset position of the reference point and the magnitude of the change from the reference point thus, representing value in one argument provides an approximation.

The difference in value between a gain of 100 and 200 appears to be greater than the difference between a gain of 1,100 and 1,200 and the difference between a loss of 100 and 200 appears to be greater than the difference between a loss of 1,100 and 1,200 unless the larger loss is not acceptable. Therefore, the value function for changes in wealth is concave above the reference point ($v''(x) < 0$, for $x > 0$) and often convex below it ($v''(x) > 0$, for $x < 0$). That is, the marginal value of gains and losses decreases with their magnitude.

Figure 2.1: Value Function Passing Through Reference Point



Source: Kahneman and Tversky (1979)

The formula that Kahneman and Tversky (1979) assume for the evaluation phase is given by:

$$V = \sum_{i=1}^n \pi(p_i) v(x_i)$$

Where V is the overall utility of the outcomes to the individual making the decision, $x_1, x_2, x_3, \dots, x_n$ are the potential outcomes with $p_1, p_2, p_3, \dots, p_n$ their respective probabilities and v is a function that assigns a value to an outcome. The value function that passes through the reference point is S-shaped and asymmetrical depicting that loss hurt more than gain feel good (loss aversion) which differs from expected utility theory, where rational agent is indifferent to the reference point (do not care how the outcome of losses and gains are framed).

π is the probability weighting function which captures the individual's overreaction to small probability events and underreaction to large probability events. The value function is thus defined on deviations from the reference point as concave for gains, convex for losses and steeper for losses than for gains. This means that for a fixed ratio of probabilities the decision weights are closer to unity when probabilities are low than when they are high thus π is never linear, it is possible that prospect A dominates B, B dominates C and C dominates A, but direct violations of dominance never happen in prospect theory.

Table 2.4: SUMMARY OF THEORETICAL LITERATURES, CRITICS AND REASON FOR USAGE IN THE STUDY

S/N	THEORY	FOCUS	CRITICISM	WHY USING IT
1	Random Walk Theory	The random walk theory insinuates a statistically independent relationship between future prices of stock and their past prices. This theory states that stock prices follow no predictable pattern, implying that future prices have no relationship with historical prices of the same stock.	The inefficiencies of the market that make it possible to anticipate with better than random accuracy what a stock can do under certain circumstances. These inefficiencies include incomplete or even conflicting information about companies as well as the market's propensity to under and overreact to different types of new information.	The theory is consistent with the efficient capital market hypothesis.
2	Modern Portfolio Theory	Modern portfolio theory provides a context for understanding the interaction of systematic risk and reward. It has shaped how institutional portfolios are managed and it motivated the use of passive investment techniques. The mathematics of modern portfolio theory is used in financial-risk-management and was a theoretical precursor for today's value at risk measures.	There actually isn't any permanent correlation between risk and return. High volatility does not give better result, nor does lower volatility give lesser results.	The theory provides an insight to the mathematical and statistical valuation of risk using price volatility.
3	Arbitrage Pricing Theory	The theory claims that stock returns on assets are approximately linearly linked to the factor loadings (betas) which are proportional to the returns' covariance with the factors, thus, equilibrium prices offer no arbitrage opportunities over static	The identical expectations and agreement on the factor loadings for prior and after the arbitrage period is required for the realizations of return on asset. Thus, in the absence of identical (or homogeneous) anticipations and	The theory is useful because it points to the rational expectation of investor's reaction to underpriced and overpriced asset. The arbitrage reaction of the investor to the

		portfolios of the assets. Arbitrage is possible by creating portfolio and identifying assets that are rightly priced (one per factor plus one), then weighting the assets to ascertain that the portfolio beta per factor is the same for both rightly priced assets and for mispriced assets.	expectations, arbitrage pricing theory will involve earlier analysis of the dynamics of general disequilibrium which will centre on the influence of information on the market.	mispriced assets will lead to short selling and subsequent equilibrium pricing of the assets at the end of the period.
4	Efficient Capital Market Hypothesis	The theory states that markets make instant adjustments to stock price fluctuations. Under the efficient capital market hypothesis, information is quickly and efficiently incorporated into asset prices at any point in time, so that the price history cannot be used to predict future price movements of the assets. The hypothesis occurs when the active market participants all have access to relevant information, utilizing this information to compete rationally in order to maximise profit on their buy and sell decisions. This eventually leads to the situation where the actual price of a security is a good estimate of the intrinsic value of that security. This implies that no stock is overpriced or underpriced and as such there is no possibility of making gains by outperforming the market.	Some financial economists believed that the efficient capital market hypothesis was responsible for the current financial crisis, claiming that belief in the hypothesis caused financial leaders to have a "chronic underestimation of the dangers of asset bubbles breaking". Others said that one major cause of the recent financial crisis was an unjustified faith in rational expectations and stock market efficiencies. Difference of performance between experienced and novice traders in a controlled experiment indicates that the market does not really exhibit random walk. Therefore, traders who are more knowledgeable on technical analysis significantly outperform those who are less knowledgeable. The proponent explained that the hypothesis held up well during crisis, that the markets were a casualty of the recession, not the cause of it. Despite this, Fama and French (1996, 2008) agreed that "poorly informed investors could theoretically lead the market astray" and as stock prices could become "somewhat irrational".	As a result of the criticism and defense put up against and for the efficient capital market hypothesis especially during and after the financial crisis, this study intends to test if the capital market can be said to be efficient after the financial crisis, using the Nigerian capital market as the case study and also add to the body of literatures on the debate of market efficiency and inefficiency.
5	Prospect Theory	The theory is a descriptive (behavioural) model of decision making under probability and risk. The	The original version of prospect theory gave rise to violations of first-order stochastic dominance, a	The theory is important because it explains the way economic agents

		theory model real life choices and was based on the pervasive effect exhibit when making choice among risky prospects. The essential feature of the prospect theory is that value are measure by changes in wealth rather than final states (absolute magnitude) which is compatible with the basic principles of perception and judgement.	revised version, called cumulative prospect theory overcame this problem by using a probability weighting function derived from rank-dependent expected utility theory. Critics from the field of psychology argued that even if Prospect Theory arose as a descriptive model, it offers no psychological explanations for the processes stated in the theory.	subjectively frame an outcome or transaction in their mind which has been widely used in behavioral economics and mental accounting. Behaviors observed such as the reversing of risk aversion/risk seeking, in case of gains or losses are also explained.
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Source: Author's compilation, 2017

2.3 Empirical Review

A stock market is efficient with respect to a set of information if it is impossible to make economic profits by trading on the basis of this information set (Ross, 1987). Fama (1970), categorizes the three types of efficient markets as weak-form, semi-strong form, and strong-form efficient if the set of information includes past prices and returns only, all public information, and any information public as well as private, respectively (Magnus, 2008).

Data used for testing efficient market hypothesis in some emerging stock markets include stock price indices and/or individual stock prices series. Specifically, stock price indices are used in studies of Abraham et al (2002); Abeysekera (2001); Adelegan (2009); Chan, et al. (1992); Dockery and Vergari (1997); Fawson et al. (1996); Gimba (2012); Grieb and Reyes (1999); Hamadu and Ibiwoye (2010); Lima and Tabak (2004); Olowe (2009); Saeedi, Miraskari, and Ara (2014); Sengonul and Degirmen, (n.d); Sharma and Kennedy (1977); Urrutia (1995); while individual stock prices are employed by Chan, et al. (1992); Dickinson and Muragu (1994); Grieb and Reyes (1999); Hamadu and Ibiwoye (2010); Olowe (1996); Oludoyi (1998, 1999);

Wheeler et al. (2002). Branes (1986); Seddighi and Nian (2004), employed both share price indices and individual stock price data for their tests in order to detect the market efficiency.

Another aspect of data used for testing market efficiency hypothesis in emerging stock markets is frequency of time series. Based on this respect, the data consist of daily (Adelegan 2004; Cheung & Coutts 2001; Chow, Hui, Vieito & Zhu 2016; Gimba 2012; Groenewold et al. 2003; Hamadu & Ibiwoye 2010; Lima & Tabak 2004; Mookerjee & Yu 1999; Olowe 1996 2009; Oludoyi 1998, 1999; Saeedi et al. 2014; Seddighi & Nian 2004; Worthington & Higgs, 2003), weekly (Abraham et al. 2002; Dickinson & Muragu 1994; Dockery & Vergari 1997; Gimba 2012; Grieb and Reyes 1999) monthly (Alam et al. 1999; Branes, 1986; Fawson et al. 1996; Karemera et al. 1999; Sharma & Kennedy 1977; Urrutia 1995), and even yearly time series (Chang & Ting, 2000).

Methodologically, Abraham, Sayyed and Alsakran (2002); Adelegan, (2004) and (2009); Barnes (1986); Dickinson and Muragu (1994); Gimba (2012); Karemera, Ojah and Cole (1999); Sharma and Kennedy (1997); Wheeler, Bill, Tadeusz and Steve (2002), employed the runs test. The unit root test was employed by Abeysekera (2001); Chan, et al. (1992); Groenewold, Tang and Wu (2003); and Seddighi and Nian (2004), while Fawson, Glover, Fang and Chang (1996); and Mookerjee and Yu (1999), used both runs test and unit root test in their studies.

Other studies to test market efficiency in the weak form have also used the serial correlation test, including the correlation coefficient test, Q-test, and variance ratio tests are Adelegan, (2004); Gimba (2012); Nwosa and Oseni (2011). Alam, Tanweer, and Palani-Rajan (1999); Chang and Ting (2000); Cheung and Coutts (2001); Dockery and Vergari (1997); Grieb and Reyes (1999); Lima and Tabak (2004); and Urrutia (1995). Spectral analysis was used by Sharma and Kennedy (1977), fractional integration test was adopted by Buguk and Brorsen

(2003), Chan, et al. (1992) used the co-integration test, and Auto-Regressive Conditional Heteroscedasticity (ARCH) test, Chow, Hui, Vieito & Zhu (2016) used martingale hypothesis and the stochastic dominance (SD) test.

According to Engel (1982), an adequate volatility model is the one that sufficiently models heteroscedasticity in the disturbance term and also captures the stylized fact inherent in stock return series such as volatility clustering, Auto-Regressive Conditional Heteroscedasticity (ARCH) effect and asymmetry (Atoi, 2014). The famous volatility models used in most studies include Auto-Regressive Conditional Heteroscedasticity (ARCH) and its extensions, such as Integrated GARCH proposed by Engle and Bollerslev (1986), Generalized ARCH introduced by Bollerslev (1986), Schwert (1989), and Taylor (1986), Threshold GARCH first introduced by Glosten, Jaganathan, and Runkle (1993) known as GJR-GARCH modified by Zakoian (1994), Exponential GARCH proposed by Nelson (1991), Power GARCH generalised by Ding, Engle and Granger (1993), GARCH-in-Mean model introduced by Engle, Lilien and Robins (1987), the standard deviation GARCH model introduced by Taylor (1986) and Schwert (1989), Fractionally Integrated GARCH model of Baillie, Bollerslev, and Mikkelsen (1996) among others.

The ARCH family models such as GARCH, PARCH, TGARCH, TARCH, EGARCH etc was used by Abdmoulah (2009); Atoi (2014); Hamadu and Ibiwoye (2010); Oke and Azeez (2012); Olowe (2009); Seddighi and Nian (2004); Sengonul and Degirmen (n.d); Vyrost and Baumöhl (2009), in order to find evidence for market efficiency. In Most cases, first-order GARCH models have extensively been proven to be adequate for modeling and forecasting financial time series (Atoi, 2014; Ahmed & Suliman, 2011; Alberg, Shalit & Yosef, 2008; Bera & Higgins, 1993; Engle, 2001; Goudarzi, 2013 & 2014; Goudarzi & Ramanarayanan, 2011;

Hamadu & Ibiwoye, 2010; Hansen & Lunde, 2004; Hsieh, 1991; Okpara & Nwezeaku, 2009; Olowe, 2009; Su, 2010; Zivot, 2009). For example, Hamadu and Ibiwoye (2010), examine the volatility of daily stock returns of Nigerian insurance stocks using twenty six insurance companies' daily data from December 15, 2000 to June 9 of 2008 as training data set and from June 10, 2008 to September 9 2008 as out-of-sample dataset. The result of ARCH (1), GARCH (1, 1) TARCH (1, 1) and EGARCH (1, 1) shows that EGARCH is a better model than the other two models in modelling stock price returns evaluation and forecasting.

Empirical tests conducted to verify the various forms of efficiency of the capital market have found capital markets in advanced countries to be efficient in the weak form (Chan, Gup & Pan 1992; Fama, 1970, 1991, Konak & Şeker, 2014), and in the semi-strong form (Fama, et al. 1969). Brown and Easton (1989); Cooper (1974); Samuelson (1965), also emphasized market efficiency of stock market. Findings derived from the studies in emerging stock markets have been mixed. Indeed, some studies provide empirical results to reject the null hypothesis of market efficiency while the others show evidence to support the efficient market hypothesis.

Regarding emerging European and Asian stock markets, for instance, the empirical evidence obtained from Wheeler et al. (2002) fails to support the weak form efficient hypothesis for the Warsaw Stock Exchange (Poland). On the other hand, Dockery and Vergari (1997), document that the Budapest Stock Exchange (Hungary) is efficient in the weak form. In addition, Chan, et al. (1992) suggest that the stock prices in major Asian markets (Hong Kong, South Korea, Singapore, Taiwan, Japan) and the United States are weak-form efficient individually and collectively in the long run. Cheung et al. (1993), Mobarek and Keasey (2000) found that the Korean, Taiwan and Dhaka, Bangladesh Stock Markets were not efficient in the weak form.

Turning to stock markets in the Latin American region, Urrutia (1995) provides mixed evidence on the weak form efficiency for the stock markets in Argentina, Brazil, Chile, and Mexico. Specifically, results of the variance ratio test reject the random walk hypothesis for all markets while findings from the run tests indicate that these markets are efficient in the weak form. Consistent with the results reported by Urrutia (1995), Grieb and Reyes (1999), show empirical findings, which are obtained from the variance ratio tests, to reject the hypothesis of random walk for all stock market indexes and most individual stock in Brazil and Mexico. Moreover, Karemera et al. (1999), find that stock return series in Brazil, Chile, and Mexico do not follow the random walk, based on the results of single variance ratio tests, while Argentina market exhibit random walk. However, when the multiple variance ratio test is applied, the market index returns in Brazil is observed to follow the random walk process while Chile, Mexico and Argentina markets do not exhibit random walk. Worthington & Higgs (2003) posits that Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela exhibit random walks and hence are not weak-form efficient.

In the perspective of Africa, Ayadi (1984), Dickinson and Muragu (1994), Olowe (1996) and Oludoyi (1998), find that the Nairobi and Nigerian Stock Exchanges respectively are efficient in the weak form while Adelegan, (2004) assert that results of the correlation coefficients for each company showed that the majority are consistent with the independence approach and the runs test indicated that share prices of majority of the companies were not random but observed that this is not enough to conclude that the market is inefficient.

Gimba (2012) concluded that the NSE stock market is inefficient in the weak form, given the empirical evidence it is believed that anomalies in stock returns could be existent in the Nigerian capital market. Akpan (1995) found that there is evidence of inefficiency in price

determination on the Nigerian Stock Exchange. However, there is considerable scope for potential gain for the Nigerian investor who is willing to diversify across industries. Future growth and hence thickness of the stock market in Nigeria is feasible if, as investors recognize these portfolio diversification possibilities, a greater demand for shares is provoked and sustained.

Okpara and Nwezeaku (2009) randomly selected forty one (41) companies from the Nigerian Stock Exchange to examine the effect of the idiosyncratic risk and beta risk on returns using data from 1996 to 2005. The result of the EGARCH (1, 3) model shows less volatility persistence and establishes the existence of leverage effect in the Nigeria stock market, implying that bad news drives volatility more than good news. Olowe (2009) investigated the relationship between stock returns and volatility in Nigeria using EGARCH-in-mean model in the light of banking reforms, insurance reform, stock market crash and the global financial crisis. The result indicates that volatility is persistent, there is leverage effect and there is positive but insignificant relationship between stock return and risk. The stock market crash of 2008 is found to have contributed to the high volatility persistence in the Nigerian stock market.

Table 2.5: HIGHLIGHTS OF EMPIRICAL REVIEWS

AUTHOR(S)/YEAR	TITLE	METHODOLOGY	FINDINGS
Fama (1965)	The behaviour of stock market prices	Double log probability graphing, sequential computation of variance, and range analysis.	The result showed that the data is consistent and in strong support of random walk model. This implies that chart reading is no real value to stock market investors.
Sharma & Kennedy (1977)	A comparative analysis of stock price behaviour on the Bombay, London, and New York Stock Exchanges	Used the runs test and spectral analysis.	Results indicated that the stock markets are weak form efficient.
Samuels & Yacout (1981)	Stock Exchanges in developing countries	Applied the serial correlation coefficient test	The result indicated a trace of dependence with a one week lag in only seven shares and a two week lag in four shares which indicated that share prices on the

			Nigerian Stock Exchange follow a random walk.
Ayadi (1984)	The random walk hypothesis and the behaviour of share prices in Nigeria	Wald-Wolfwitz test, runs test and the estimation test	The findings indicated that share prices on the Nigerian Stock Exchange follow a random walk and hence its efficient.
Branes (1986)	Thin trading and stock market efficiency: A case of the Kuala Lumpur Stock Exchange.	Employed the serial correlation coefficient test and runs test.	The Kuala Lumpur Stock Exchange is not efficient in the weak form.
Fama (1991).	Efficient capital markets II	A review of the market efficiency literature	The cleanest evidence on market-efficiency comes from event studies, especially on daily returns, results indicated that on average, stock prices adjust quickly to information, this evidence tilts toward the conclusion that prices adjust efficiently to firm-specific information. There is less new research on whether individual agents (pension fund and mutual fund managers) have private information that is not in stock prices, the data generated by these firms are a resource for tests for private information that academics have hardly tapped. There is a resurgence of interesting research on the predictability of stock returns from past returns and other variables, controversy about market efficiency centers largely on this work. Rational variation in expected returns is caused either by shocks to tastes for current versus future consumption or by technology shocks.
Hsieh (1991)	Chaos and nonlinear dynamics: Application to financial markets	Stationarity test and the ARCH models	The findings indicated that stock returns are not stationary. The evidence points to conditional heteroskedasticity as the cause and that ARCH type models do not fully describe the nonlinearity in stock returns.
Chan, Gup & Pan (1992)	An empirical analysis of stock prices in major Asian markets and the United States.	Unit root test, pair-wise correlation test and higher-order co-integration test	The findings suggested that the stock prices in major Asian markets and the United States are weak form efficient

Bera & Higgins (1993)	ARCH models: Properties, estimation and testing	Used the autoregressive conditional heteroskedasticity (ARCH) models	The models take account of many observed properties of asset prices, and the various interpretations that can be attributed to it. ARCH models have been generalized in different directions to accommodate more and more features of the real world
Dickinson & Muragu (1994)	Market efficiency in developing countries: A case study of the Nairobi Stock Exchange.	Serial correlation test using the number of significant coefficients and the Q-statistic, and the runs test	The results do not categorically say that the Nairobi stock market is weak-form efficient, but rather that the results do not contradict the weak-form of the efficient market hypothesis
Fama (1995)	Random walks in stock market prices	The study described briefly and simply the theory of random walks and some of the important issues it raises concerning the work of market analysts	Empirical evidence indicated that, although price changes may not be strictly independent, the dependence is so slight that a simple buy-and-hold strategy beats any strategy based on mechanical trading rules. The implications is if the market is efficient, stock prices at any point in time represent good estimates of intrinsic value, so additional analysis is useless unless the analyst has new (private) information or insights.
Urrutia (1995)	Test of Random walk and market efficiency for Latin American emerging equity markets.	Variance-ratio and runs tests methodology was used	The variance-ratio tests rejected the random walk hypothesis. However, runs tests indicated that Latin American equity markets are weak-form efficient.
Fawson, Glover, Fang & Chang (1996)	The weak-form efficiency of the Taiwan share market.	The Ljung-Box Q test, the binomial distribution test, the runs test and the unit root test of stationarity in stock prices.	The result suggested that the monthly stock price for the Taiwan stock market exhibits weak-form efficiency.
Olowe (1996)	Semi-strong information efficiency of the Nigerian stock market: Evidence from stock splits.	Residual analysis test, market model, market deducted return model and the mean adjusted return model.	The result indicated that abnormal return can be earned on the Nigerian stock market which showed that the market is inefficient in the semi-strong form.
Oludoyi (1998)	Capital market efficiency and the effects of earnings announcements on share prices in Nigeria	Martingale earnings expectation model, sub-martingale earnings expectation model, Box-Jenkins earnings expectation model	The result indicated mixed and conditional semi-strong efficiency of the Nigerian capital market. This is because the sub-martingale earnings expectation model showed that the Nigerian capital market is semi-strong

			efficient while the martingale earnings expectation model showed that the Nigerian capital market is semi-strong efficient only with portfolios of profit-earning firms. The sub-martingale earnings expectation model has superior predictive ability over the other two models.
Alam, Tanweer, & Palani-Rajan (1999)	An application of variance-ratio test to five Asian stock markets.	Variance ratio test	Results reported in the study indicated that the index return series of Bangladesh, Hong Kong, Malaysia, and Taiwan stock markets do follow a random walk, while the Sri Lanka stock market do not follow random walk.
Grieb & Reyes (1999)	Random walk tests for Latin American equity indexes and individual firms.	The study employed variance ratio tests	The results revealed mean aversion in Mexico at both the index and firm level. In contrast, the Brazil indexes show a greater tendency toward random walk
Karemera, Ojah & Cole (1999)	Random walks and market efficiency tests: Evidence from emerging equity markets.	Serial correlation test, runs test and variance ratio test	Results of single variance ratio tests indicated that equity market in Brazil, Chile, and Mexico is inefficient but the Argentine market is efficient, while the result of multiple variance ratio tests indicated that only the Brazil equity market is efficient.
Mookerjee & Yu (1999)	An empirical analysis of the equity markets in China.	Serial correlation and the runs tests.	The study concludes that there are significant inefficiencies present on both stock markets in Shanghai and Shenzhen.
Oludoyi 1999	Understanding risk in a regulated market: Evidence from the Nigerian stock market.	Adjusted and unadjusted market model	Caps have effect on the beta (systematic risk) and total risk (standard deviation). The highest values of beta are confined to regimes 1 and 2. Total risk, the risk borne by investors appears to rise over time.
Bekaert & Wu 2000	Asymmetric volatility and risk in equity markets	GARCH model	The study indicated volatility feedback at the firm level which is enhanced by strong asymmetries in conditional covariances.
Chang & Ting (2000)	A variance ratio test of the random walk hypothesis for Taiwan's stock market.	Variance ratio test	Result indicated that the Taiwanese stock market is weak form efficient
Abeysekera (2001)	Efficient markets	Runs test, serial	The results rejected the serial

	hypothesis and the emerging capital market in Sri-Lanka: Evidence from the Colombo Stock Exchange – A Note	correlation test and co-integration test	independence hypothesis, leading to the conclusion that the behaviour of stock prices in the Colombo Stock Exchange is not consistent with the weak form Efficient Markets Hypothesis
Cheung and Coutts (2001)	A note on weak form market efficiency in security prices: Evidence from the Hong Kong Stock Exchange	Employed variance ratio tests with both homoscedastic and heteroscedastic error variances	The findings suggested that the Hang Seng follows a random walk model and consequently that the index is weak form efficient
Engle (2001)	GARCH 101: The use of ARCH/GARCH models in applied economic	Employed the ARCH and GARCH models to treat heteroskedasticity as a variance to be modeled.	The analysis of ARCH and GARCH models and their many extensions provides a statistical stage on which many theories of asset pricing and portfolio analysis can be exhibited and tested.
Karolyi (2001)	Why stock return volatility really matters	To understand what is a reasonable amount of volatility and what is not requires an understanding of how to measure volatility.	Macroeconomics factors cannot explain stock return volatility. Trading drives stock market volatility. Stock return volatility is asymmetric. Contagion versus volatility “spillovers” across international markets. Derivatives do not exacerbate volatility
Abraham, Sayyed & Alsakran (2002)	Testing the random walk behaviour and efficiency of the gulf stock markets	Employed the variance ratio test and non-parametric runs test.	The study indicated that both random walk hypothesis and weak form efficiency are rejected for the Gulf markets when the observed index levels are used.
Wheeler, Bill, Tadeusz & Steve (2002)	The efficiency of the Warsaw Stock Exchange: The first few years 1991-1996.	Tests for runs and autocorrelation were conducted.	As the number of Weekly trading days increased, the general level of efficiency, improved (except for the “bubble” period of 1993-1994), though inefficiencies persist in some stocks.
Groenewold, Tang & Wu (2003)	The efficiency of the Chinese stock market and the role of the banks.	The autocorrelation and unit root tests was employed	Findings revealed the evidence of departures from weak form of efficiency in the form of predictability of returns on the basis of their own past values and that efficiency tended to be adversely affected when the bank’s equity were excluded.
Adelegan (2004)	How efficient is the Nigerian stock market? Further evidence.	Employed the serial correlation test and runs test	Nigerian capital market is not efficient in the semi-strong form.
Hansen & Lunde (2004)	A forecast comparison of volatility models: does anything beat a	Compare 330 ARCH-type models in terms of their ability to describe	There was no evidence that a GARCH (1,1) is outperformed by more sophisticated models in

	GARCH (1,1) Model?	the conditional variance	the analysis of exchange rates, but the GARCH (1,1) model is not suitable to measure leverage effect in the analysis of IBM returns.
Lima & Tabak (2004)	Tests of the random walk hypothesis for equity markets: Evidence from China, Hong Kong and Singapore	Used the variance ratio tests, robust to heteroskedasticity and employing a recently developed bootstrap technique to customize percentiles.	It was found that Class A shares for Chinese Stock Exchanges and the Hong Kong equity markets are weak form efficient and the Singaporean is inefficient in the weak form. However, Class B shares for Chinese Stock Exchanges do not follow the random walk hypothesis while that of Singaporean and Hong Kong follows random walk.
Seddighi & Nian (2004)	The Chinese Stock Exchange market: Operations and efficiency.	The Durbin-Watson test, Durbin 'h' test, the Lagrange Multiplier test, the unit root test and the ARCH test	The study acknowledged that the Shanghai Stock Exchange was weak-form efficient in the period of January 2000 – December 2000.
Alberg, Shalit, & Yosef (2008)	Estimating stock market volatility using asymmetric GARCH models	GARCH models, compared the asymmetric GJR and APARCH models.	The results showed that the asymmetric GARCH model with fat-tailed densities improves overall estimation for measuring conditional variance. The EGARCH model using a skewed Student-t distribution is the most successful for forecasting Tel Aviv Stock Exchange indices.
Emenike (2008)	Efficiency across time: Evidence from the Nigerian Stock Exchange	Normality tests and Runs test results	Results from the tests suggested that the Nigerian Stock Exchange was not weak form efficient
Adelegan (2009)	Price reactions to Dividend announcements on the Nigerian stock market	Adapted the Treynor measure and the Sharpe ratio	The Nigerian stock market is not semi-strong efficient, that dividend is important and share prices react to dividend announcements.
Okpara & Nwezeaku, (2009)	Idiosyncratic risk and the cross-section of expected stock returns: Evidence from Nigeria	The time series procedure to determine the beta and idiosyncratic risk for each of the companies and the cross-sectional estimation procedure used on EGARCH model	The result revealed that systematic risk is priced while the idiosyncratic risk is not priced and volatility clustering is not quite persistent but there exists asymmetric effect in the stock market.
Olowe (2009)	Stock return, volatility and the global financial crisis in an emerging market: The Nigerian case	Used the E-GARCH-in-mean model	The study found little evidence on the relationship between stock returns and risk as measured by its own volatility. The study found positive but insignificant

			relationship between stock return and risk. The result shows the banking reform in July 2004 and stock market crash since April 2008 negatively impacts on stock return while insurance reform and the global financial crisis have no impact on stock return.
Zivot (2009)	Practical issues in the analysis of univariate GARCH models	Analysis of univariate GARCH models for financial time series	The study showed that allowing for a time varying conditional variance, GARCH models can generate accurate forecasts of future volatility, especially over short horizons.
Hamadu & Ibiwoye (2010)	Modelling and forecasting the volatility of the daily returns of Nigerian insurance stocks	Used the heteroskedastic conditional volatility models.	The study revealed that the Exponential Generalized Autoregressive Conditional Heteroskedastic (EGARCH) model is more suitable in modelling stock price returns.
Okpara (2010)	Analysis of the weak-form efficiency of the Nigerian stock market: Further evidence from GARCH model	GARCH model was employed	The result showed that the Nigerian stock market follows a random walk and it is therefore weak form efficient except for periods of financial deregulation (1987), privatization period (1988), capital market internationalization (1995) and year 2000-2006.
Su (2010)	Application of EGARCH model to estimate financial volatility of daily returns: The empirical case of China	Employed both GARCH and EGARCH models	Empirical results suggest that EGARCH model fits the sample data better than GARCH model in modeling the volatility of Chinese stock returns. The result also shows that long term volatility is more volatile during the crisis period.
Ahmed & Suliman, (2011)	Modeling stock market volatility using GARCH models evidence from Sudan.	Used the GARCH models to estimate volatility (conditional variance) in daily returns	The result showed strong evidence that daily returns could be characterised by the GARCH models and all GARCH specifications explain that explosive volatility process is present in Khartoum Stock Exchange index returns
Goudarzi & Ramanarayanan, (2011)	Modeling asymmetric volatility in the Indian stock market.	Used the asymmetric ARCH models	The stylized fact indicated that the sign of the innovation has a significant influence on the volatility of returns and the arrival of bad news in the market would result in the volatility to increase more than good news

Nwosa & Oseni (2011)	Efficient market hypothesis and Nigerian stock market	Conducted the stationarity test using the ADF and Philip-Perron test, serial auto-correlation and regression analysis	The result revealed that the Nigeria stock market is informational inefficient, that is stock price does not exhibit random walk
Afego (2012)	Weak form efficiency of the Nigerian stock market: An empirical analysis.	Employed the runs test	The test showed that index returns on the Nigerian Stock Exchange display a predictable component, thus suggesting that traders can earn superior returns by employing trading rules.
Ajao & Osayuwu (2012)	Testing the weak form of efficient market hypothesis in Nigerian capital market.	Serial correlation and runs test	The study concludes that successive price changes of stocks traded on the floor of the Nigerian Capital Market are independent and random therefore, the Nigerian Capital Market is efficient in the weak-form.
Azeez & Sulaiman (2012)	Capital market efficiency: A test of the strong form in Nigeria.	The standard error test and the Nigerian Stock Exchange Composite Index (NSECI) are employed to investigate informational efficiency	The analysis deduced that mutual funds were unable to out-perform the random portfolios created from the index stocks, which thus implies that the strong form of market efficiency holds in the Nigerian Capital Market.
Gimba (2012)	Testing the weak-form efficiency market hypothesis: Evidence from Nigerian stock market.	Autocorrelation test, runs test and variance ratio test.	Concluded that the Nigerian stock market is weak form inefficient.
Fama & French (2012)	Size, value, and momentum in international stock returns	Three-factor asset pricing model and four-factor asset pricing model	The result indicated that Integrated pricing across regions does not get strong support in our tests. For three regions (North America, Europe, and Japan), local models that use local explanatory returns provide passable descriptions of local average returns for portfolios formed on size and value versus growth. Even local models are less successful in tests on portfolios formed on size and momentum.
Oke & Azeez (2012)	A test of strong-form efficiency of the Nigerian capital market.	Employed the ARCH and GARCH models	The findings revealed that the Nigerian capital market is weak-form efficient, suggesting that current market price of securities reflect past or historical information.
Goudarzi (2013)	Volatility mean	The study used ADF test	The study found that the

	reversion and stock market efficiency	and GARCH model	underlying series is stationary and mean reverting. Therefore, the Indian stock market is informational weak-inefficient.
Nneji (2013)	Efficiency of the Nigerian capital market: An empirical analysis.	ADF unit root test, the ARMA Test, the VAR-based granger causality test, the Co-integration analysis and the Vector Error Correction Test	The results revealed that there is still room for improvement of the efficiency level of the Nigerian Capital Market.
Ajibola, Prince & Leney (2014)	Detecting Market Anomalies: Do Evidences hold in Nigeria?	Correlation tests, variance ratio tests and TGARCH	The tests jointly revealed strong presence of inefficiency as anomalies can be traced to persisted volatility, lack of randomness, significant effects of information and heteroskedasticity/leptokurtic nature of stock prices.
Atoi (2014)	Testing volatility in Nigeria stock market using GARCH models	Normal, Student's-t and generalized error distributions tests variants of the GARCH model	The result showed that share price on the Nigerian Stock Exchange responds more to bad news than it does to equal magnitude of good news.
Goudarzi (2014)	Stock market volatility under sanctions	Used the ARCH models	The study found that, despite all sanctions, the Iranian stock market shows major stylized facts of any stock market's volatility i.e. volatility clustering, fat tails and mean reversion.
Isenah & Olubusoye (2014)	Forecasting Nigerian stock market returns using ARIMA and artificial neural network models	The logarithmic returns time series was tested for the presence of memory using the Hurst coefficient, the artificial neural networks TECH (4-3-1), TECH (3-3-1) and ARIMA (3,0,1) models.	The test showed that the logarithmic returns process is not a random walk and that the Nigerian stock market is not efficient. The study also showed that artificial neural network based models is capable of mimicking closely the log-returns as compared to the ARIMA based model.
Nwidobie (2014)	The random walk theory: An empirical test in the Nigerian capital market.	Used the Augmented Dickey-Fuller (ADF) test	The result showed that share price movements on the Nigerian Stock Exchange do not follow the random walk pattern, indicating the existence of market inefficiencies in the Nigerian capital market.
Osazevaru (2014)	Measuring Nigerian stock market volatility	The ARCH and GARCH models were estimated	The estimates indicate that the market exhibits volatility clustering. The rate at which the response function decays is found to be 1.1783 and quite high.
Saeedi, Miraskari, & Ara	The investigation of	Serial Correlation,	The results of all tests do not

(2014)	efficient market hypothesis: Evidence from an emerging market.	Augmented Dickey Fuller, Runs Test.	support that Tehran Stock Exchange daily returns follow a random walk.
Yadirichukwu & Ogochukwu (2014)	Evaluation of the weak form of efficient market hypothesis: Empirical evidence from Nigeria	The study adopted unit root test, t-test, Johansen co-integration test,	The result revealed that there exist random walk model confirming market efficiency base on annual return, and no random walk model in the monthly stock returns confirming market inefficiency in monthly return in the Nigerian Stock Exchange.
Obayagbona & Igbinsola (2015)	Test of random walk hypothesis in the Nigerian stock market.	Serial correlation test, unit root test, runs test and Z-statistics.	The overall results suggest that the emerging Nigerian stock market is not efficient in the weak form.
Nwidobie (2015)	Capital market efficiency: The Nigerian experience.	Used the two-tail one sample sign test for small samples.	The result indicated that Nigeria's capital market is operationally inefficient.
Sengonul & Degirmen (n.d).	Does the recent global financial crisis affect efficiency of capital markets of EU countries and Turkey	Employed the GARCH(1,1) model	The results potentially present that without Hungary and Slovakia, Turkey also performs better after the crisis, in terms of weak-form of market efficiency, than most of the newly joined EU countries.

Source: Author's compilation, 2017

2.4 Summary of Literature Reviewed and Gaps Identified in the Literatures

The study reviewed related literatures and focused on key concepts of capital market and market efficiency such as definition, foundation, assumptions, objectives, market efficiency and forms. The overview of the Nigerian stock market including various reforms introduced by the market regulators over the years in relation to pricing, clearing system, market segmentation and listing requirements was also discussed. Other areas mentioned include the technical analysis theory, fundamental analysis theory, random walk theory, capital asset pricing model, efficient market hypothesis and forms, and prospect theory.

It was observed from the literature reviewed that stock market efficiency is relevant to the performance of capital market but researchers and professionals are still not in agreement as to

what form a market exhibit. Also they are yet to establish a link between rationality (utility) and behavioural attitude of investors towards information on stock returns as a determinant of stock market efficiency. In the same vein, various reforms introduced in the stock markets (including Nigeria) as a result of the financial crisis of 2008-2009 which affected the determinant of market efficiency such as information dissemination, risk-return and volatility persistence has led to renewed scrutiny and criticism of the efficient stock market hypothesis.

Available studies on efficient stock market hypothesis are mainly conducted before and during the financial crisis of 2008-2009 and the results are based mainly on the prevailing stock market condition and environment. There are scanty empirical studies of stock market efficiency after the meltdown of 2008-2009, especially focusing on emerging stock market like Nigeria. Most of the studies reviewed employed various models including GARCH models under normal (Gaussian) distribution while this study employed three (3) asymmetric GARCH models under three (3) distributional assumptions. The study explored the gaps in order to establish the informational efficiency, risk-return relationship, volatility persistence and investor's reaction to news (bad or good) after the meltdown in the wake of the various reforms. The GARCH variant models were used to establish which of the models and under which distributional assumption is suited for the Nigerian stock market analysis, especially after the meltdown of 2008-2009.

This study therefore, was pursued to bridge the gaps based on existing works of many scholars by conducting research on the informational efficiency, risk return relationship, volatility persistence and impact of news (good or bad) on return volatility on the Nigerian stock market after the meltdown of 2008-2009 . In other words, the study evaluated the stock market efficiency with respect to various reforms introduced during and after the meltdown of 2008-2009 to know whether the same result that prevails during the pre-meltdown of 2008-2009 still

holds. In the same vein, the study seeks to ascertain whether the debate on the efficiency hypothesis is relevant in the Nigerian stock market especially after the meltdown of 2008-2009.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter discusses the method that was employed for the research work. It deals mainly with the research procedures used in gathering and analyzing the data which include model specifications, sources and types of data, population and sample size, and method of data analysis to achieve the stated objectives and from the analysis of result, findings served as the basis for recommendations.

3.1 Model Specification

Volatility model should sufficiently capture heteroscedasticity in the error term and also the volatility clustering, the Auto-Regressive Conditional Heteroscedasticity (ARCH) effect and the asymmetry in the series (Engel, 1982). Thus, the Auto-Regressive Conditional Heteroscedasticity (ARCH) and the model extension and variants were adopted for this research works.

3.1.1 Unit Root Model

Many economic and financial time series such as asset prices, GDP, exchange rate exhibit trending behavior or non-stationarity in the mean and an important econometric task is to determine the most appropriate form of the trend in the data (Fuller 1996; Zivot & Wang 2006). This is to avoid spurious regression result, invalid asymptotic analysis and cushion the influence of the behaviour and properties of the data (Bowerman and O'connell, 1979)

As such, before modelling the All Share Index (ASI) return series used in the ARCH models, the series was tested for stationarity (unit root). To achieve this purpose, the Augmented

Dickey–Fuller (ADF) and the Phillips-Perron (PP) unit root test was employed based on the following regressions:

3.1.1.1 The ADF Model

$$\Delta ASI_{rt} = \alpha + \beta_t + \gamma ASI_{rt-i} + \delta_i \sum_{i=1}^n \Delta ASI_{rt-i} + \epsilon_1 \quad (1)$$

Where α is the constant, β_t is the coefficient on a time trend, $t - i$ is the lag order of the auto-regressive process, γ is the unit root coefficient ($\emptyset - 1$), ϵ_1 is white noise error term. The ADF test uses a parametric auto-regression to approximate the Auto-Regressive Moving Average (ARMA) structure. The Augmented Dickey-Fuller (ADF) tests the null hypothesis of a unit root against a trend stationary where ΔASI_t is $I(0)$ i.e $H_0: \gamma = 0$.

3.1.1.2 The PP Model

$$\Delta ASI_{rt} = \alpha + \beta_t + \gamma ASI_{rt-i} + \epsilon_2 \quad (2)$$

Where α is the constant, β_t is the coefficient on a time trend, $t - i$ is the lag order of the auto-regressive process, γ is the unit root coefficient ($\emptyset - 1$), ϵ_1 is white noise error term. The Phillips-Perron (PP) tests correct for any serial correlation and heteroscedasticity in the error term and also tests the null hypothesis of a unit root against a trend stationary where ϵ_2 is $I(0)$ i.e $H_0: \gamma = 0$.

If the ADF and PP test rejects the null hypothesis of a unit root in the ASI return series, that is if the absolute value of ADF and PP t-statistics exceeds the McKinnon critical value, ASI return series are stationary series and then can be used for the analyses.

3.1.1.3 A Priori Expectation of ADF Model

The a priori expectation set by the ADF and PP test is that for the ASI return series to be applicable for analysis, it should be stationary i.e $\gamma = 0$.

3.1.2 Mean Equation

After checking for unit root and before estimating the ARCH models using the ASI return series, it is necessary to check for the presence of ARCH effects and volatility clustering in the residuals of the conditional return equation. The conditional return equation is estimated using the Ordinary Least Square (OLS) regression model as follows:

$$ASI_{rt} = C + \alpha ASI_{rt-1} + \varepsilon_{1t} \quad (3)$$

The equations (3) implies that the current ASI return series depends not only on previous values of ASI_{rt} , but also on the mean/constant (C) value of ASI_{rt} and the error term (ε_{1t}). The error term is tested for ARCH effect and volatility clustering and from which the conditional variance equation are derived for the ARCH models in this research.

3.1.2.1 A Priori Expectation of Mean Equation

The a priori expectation of the mean equation is that the error term should exhibit volatility clustering and ARCH effect at 5% significant level.

3.1.3 The ARCH Models

The conditional variance equation was modeled in a way that it incorporates the ARCH processes of ε_{1t}^2 with (p) lagged. The general form of the conditional variance, including (p) lag of the residuals is as follows:

$$\sigma_t^2 = C + \alpha_1 \varepsilon_{nt-1}^2 + \dots \dots \dots + \alpha_p \varepsilon_{nt-p}^2 \quad (4)$$

Equation (4) is what Engle (1982) referred to as the linear ARCH (p) model because of the inclusion of the (p) lags of the ε_{nt}^2 in the variance equation. Therefore an ARCH (1) model is

$$\sigma_t^2 = C + \alpha_1 \varepsilon_{nt-1}^2 \quad (5)$$

Equation 5 (ARCH (1) model) indicates that the next period's return variance (from the mean equation residual) only depends on last period's squared residual (shock in the return mean equation) so a crisis that caused a large residual would not have the sort of persistence that is observed after actual crises. This has led to an extension of the ARCH model to a GARCH, or Generalized ARCH model, first developed by Bollerslev (1986).

The ARCH variant models that was used in this research to achieve the objectives are the Generalised Auto Regressive Conditional Heteroscedasticity (GARCH) introduced by Bollerslev (1986), the GARCH in Mean (GARCH-M) introduced by Engle, Lilien and Robins (1987), Exponential-Generalised Auto Regressive Conditional Heteroscedasticity (EGARCH) introduced by Nelson (1991), Threshold-Generalised Auto Regressive Conditional Heteroscedasticity (T-GARCH) introduced independently by Zakoïan (1994) and Glosten, Jaganathan, and Runkle (1993) and the Asymmetric-Power Auto Regressive Conditional Heteroscedasticity (APARCH) introduced by Ding, Granger and Engle (1993) as suggested by Chalabi (2008); Reider (2009); Zivot (2009), used by and adopted from the studies of Aliyu, (2012); Goudarzi (2013, 2014); Goudarzi and Ramanarayanan, (2011); Kun (2011) and Olowe (2009) among others.

3.1.3.1 The GARCH Model

The GARCH model derived by Bollerslev (1986) which replaces the Auto-Regressive Moving Average [ARMA(P)] is given as:

$$\sigma_t^2 = \omega + \sum_{i=1}^k \alpha \varepsilon_{t-i}^2 + \sum_{i=1}^q \beta \sigma_{t-i}^2 \quad (6)$$

Where $\alpha, \beta > 0$ and $(\alpha + \beta) < 1$ is to avoid the possibility of negative conditional variance. The above equation (6) states that the current value of the current return variance is a function of a constant and values of the previous squared residual from the mean return equation

plus values of the previous return variance. The mean return equation and the return variance GARCH model that was used in this research are as follows:

$$ASI_{rt} = C + \alpha_t ASI_{rt-1} + \varepsilon_{1t} \quad \text{Mean return equation for } ASI_{rt} \quad (7)$$

$$\sigma_t^2 = \omega + \alpha \varepsilon_{t-1}^2 + \beta \sigma_{t-1}^2 \quad \text{Return variance equation GARCH model} \quad (8)$$

Where σ_t^2 is the return variance (one-period ahead forecast variance based on past information) of the error term from the mean return equations, ω is the constant, ε_{t-1}^2 is the ARCH term depicting the previous period squared error term from the mean return equations and σ_{t-1}^2 is the GARCH term depicting the previous period return variance. The GARCH model implies that the current value of the return variance is a function of a constant and values of the squared residual from the mean return equation plus values of the previous return variance.

Volatility clustering means that period of high volatility will give way to normal (low) volatility and period of low volatility will be followed by a high volatility which implies that volatility come and go. Mean reversion in volatility implies that there is a normal level of volatility to which volatility will eventually return. Long run forecasts of volatility should all converge to this same normal level of volatility, no matter when they are made (Engle & Patton 2001).

The mean reverting form of the GARCH model is given as:

$$\varepsilon_t^2 - \bar{\sigma}^2 = (\alpha + \beta)(\varepsilon_{t-1}^2 - \bar{\sigma}^2) + \mu - \beta \mu_{t-1} \quad (9)$$

Where $\bar{\sigma}^2 = \omega / (1 - \alpha - \beta)$ is the unconditional long run magnitude of volatility persistence and $\mu_t = (\varepsilon_t^2 - \sigma_t^2)$.

The mean reverting rate $\alpha + \beta$ in a good fitted model is usually very close to 1 which controls the magnitude of mean reversion (volatility persistence). If the variance spikes up during a crisis, the number of periods until it is halfway between the first forecast and the unconditional

variance is $(\alpha + \beta)^k = \frac{1}{2} = 0.5$. Thus, the half-life of volatility shock is given by Zivot and Wang (2006) and Reider (2009) as:

$$k(halflife) = \ln(0.5) / \ln(\alpha + \beta) \quad (10)$$

3.1.3.1.1 A Priori Expectation of GARCH Model

According to the GARCH model and the mean reverting model, it is expected that $\alpha, \beta > 0$ and $(\alpha + \beta) < 1$

Indicating that the past squared residual of the mean return and the past return variance information individually and jointly cannot influence the current return variance while the addition (sum) of $\alpha + \beta$ reflect the magnitude of volatility persistence in return series.

3.1.3.2 The GARCH-in-Mean Model

High risk is expected to lead to high return which suggests that there are some interactions between expected return and risk as measured by volatility. The GARCH-in-Mean (GARCH-M) model introduced by Engle et al (1987) extends the basic GARCH model so that the mean return equation can generate a risk premium as follows:

$$\sigma_t^2 = C + \alpha_t g(\sigma_t) + \varepsilon_{1t} \quad (11)$$

Where $g(.)$ can be an arbitrary function of volatility σ_t , the GARCH-M was specified with GARCH conditional variance specification and the function $g(\sigma_t)$ is the standard deviation in mean (σ). If α_t is positive then higher risk will cause the average return to increase and vice versa.

3.1.3.2.1 A Priori Expectation of GARCH-in-Mean Model

The risk-return relationship can either be positive or negative according to theories, as such $0 > \alpha_t > 0$.

3.1.3.3 The Exponential GARCH Model

According to Brooks (2002), it has been argued that a negative shock to financial time series is likely to cause volatility to rise by more than a positive shock of the same magnitude. In the case of equity returns, such asymmetries are typically attributed to leverage effects, whereby a fall in the value of a firm's stock causes the firm's debt to equity ratio to rise

The Exponential GARCH (EGARCH) model was proposed by Nelson (1991) to model the above stated phenomenon. The model allows for asymmetric effects between positive and negative news on asset returns. The specification of the EGARCH model according to Nelson (1991) is:

$$\log(\sigma_t^2) = \omega + \sum_{i=1}^p \alpha_i \left| \frac{\varepsilon_{t-i}}{\sigma_{t-i}} \right| + \sum_{k=1}^r \gamma_i \frac{\varepsilon_{t-k}}{\sigma_{t-k}} + \sum_{j=1}^q \beta_j \log(\sigma_{t-i}^2) \quad (12)$$

When ε_{t-i} is good or positive news the total effect is measured by $(1 + \gamma_i)|\varepsilon_{t-i}|$ and when ε_{t-1} is bad or negative news the total effect is measured by $(1 - \gamma_i)|\varepsilon_{t-1}|$. The EGARCH covariance stationary is provided by $\sum_{i=1}^q \beta_j < 1$. Bad news can have a larger impact on volatility, and the value of γ_k is expected to be negative. The mean return equations and the return variance EGARCH model used in this research is as follows:

$$ASI_{rt} = C + \alpha_t ASI_{rt-1} + \varepsilon_{1t} \quad \text{Mean return equation for } ASI_{rt} \quad (13)$$

$$\log(\sigma_t^2) = \omega + \alpha_i \left| \frac{\varepsilon_{t-1}}{\sigma_{t-1}} \right| + \gamma_i \frac{\varepsilon_{t-1}}{\sigma_{t-1}} + \beta_j \log(\sigma_{t-1}^2) \quad \text{Return variance equation EGARCH} \quad (14)$$

3.1.3.3.1 A Priori Expectation of EGARCH Model

The EGARCH model stipulates that to measure the impact of negative news on volatility persistence in return, $\gamma_i < 0$

3.1.3.4 The Threshold GARCH Model

The Threshold GARCH (TGARCH) model also known as the GJR-GARCH was introduced by Glosten, et al (1993) and the Threshold ARCH (TARCH) model proposed independently by Zakoïan (1994) allows for asymmetric effects between positive and negative news on asset returns. The general specification of the TGARCH/TARCH model is given as:

$$\sigma_t^2 = \omega + \sum_{i=1}^q \alpha_i \varepsilon_{t-i}^2 + \sum_{i=1}^{\gamma} \gamma_i \varepsilon_{t-i}^2 d_{t-i} + \sum_{j=1}^q \beta_j \sigma_{t-i}^2 \quad (15)$$

$$\text{Where } d_{t-i} = \begin{cases} 1 & \text{if } \varepsilon_{t-i} < 0 \\ 0, & \text{if } \varepsilon_{t-i} \geq 0 \end{cases}$$

In equation (15), depending on whether ε_{t-i} is above or below the threshold value (d_{t-1}) of zero, ε_{t-i} has different effects on the return variance σ_t^2 : when ε_{t-i} is positive news, the total effect is given by $\alpha_i \varepsilon_{t-i}^2$ and when ε_{t-i} is negative news, the total effect is given by $(\sigma + \gamma_i) \varepsilon_{t-1}^2$. Therefore, it is expect that the value of γ_i is to be positive for bad news to have a larger impact on volatility. The mean return equation and the return variance TGARCH/TARCH model used in this research is as follows:

$$ASl_{rt} = C + \alpha_t ASl_{rt-1} + \varepsilon_{1t} \quad \text{Mean return equation of } ASl_{rt} \quad (16)$$

$$\sigma_t^2 = \omega + \alpha_i \varepsilon_{t-1}^2 + \gamma_i \varepsilon_{t-1}^2 d_{t-1} + \beta_j \sigma_{t-1}^2 \quad \text{Return variance equation TGARCH/TARCH} \quad (17)$$

Where $d_{t-1} = 1$ if $\varepsilon_{t-1}^2 < 0$ and $d_{t-1} = 0$ if $\varepsilon_{t-1}^2 > 0$.

3.1.3.4.1 A Priori Expectation of TGARCH Model

The TGARCH model stipulates that to measure the impact of negative news on volatility persistence in return, $\gamma_i > 0$

3.1.3.5 The Power GARCH Model

The Power GARCH/Asymmetric Power ARCH (PGARCH/APARCH) was introduced by Ding et al (1993) also measures the impact of negative return news on the magnitude of

volatility which is referred to as leverage effect. The general specification of the PGARCH/APARCH model is given as:

$$\sigma_t^\delta = \omega + \sum_{i=1}^p \alpha_i (|\varepsilon_{t-1}| - \gamma_i \varepsilon_{t-1})^\delta + \sum_{j=1}^q \beta_j \sigma_{t-j}^\delta \quad (18)$$

Where $\delta > 0$ and $-1 < \gamma_i < 1$. The effect of ε_{t-1} upon σ_t is through the function γ_i . If $\gamma_i = 0$, a positive news $\varepsilon_t > 0$ has a higher impact on volatility than negative news $\varepsilon_t < 0$. The mean return equation and the return variance PGARCH/APARCH model that was used in this research is as follows:

$$ASI_{rt} = C + \alpha_t ASI_{rt-1} + \varepsilon_{1t} \quad \text{Mean return equation of } ASI_{rt} \quad (19)$$

$$\sigma_t^\delta = \omega + \alpha_i (|\varepsilon_{t-1}| - \gamma_i \varepsilon_{t-1})^\delta + \beta_j \sigma_{t-j}^\delta \quad \text{Return variance equation PGARCH/APARCH} \quad (20)$$

3.1.3.5.1 A Priori Expectation of PGARCH Model

The PGARCH/APARCH model stipulates that to measure the impact of negative news on volatility persistence in return, $\gamma_i > 0$

3.1.4 Distributional Assumptions

GARCH models are estimated using the Maximum Likelihood Estimation (MLE) process (Coffie 2015) assumes that the error distribution is normal (Gaussian), though Nelson (1991) opined that the error exhibits non-normal distribution densities. Thus, to estimate the ARCH model, there is the need for the assumption of conditional distribution for the error terms.

In this study, three (3) conditional distributions for the standardized residuals of returns innovations; the Gaussian distribution, student's-t distribution, and the Generalised Error Distribution (GED) are used in the empirical analysis.

The Gaussian (normal) distribution is expressed as:

$$f(x) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{-(x-\mu)^2/\sigma^2}$$

Where μ is the mean value and σ^2 is the variance of the error from the return equation. The standard Gaussian distribution considers the mean value (μ) = 0 and variance (σ^2) = 1.

The student's-t distribution is given as:

$$f(x) = \frac{\Gamma[\frac{v+1}{2}]}{\sqrt{v\pi[\frac{v}{2}]}(1 + \frac{x^2}{v})^{\frac{v+1}{2}}}$$

Where v is the degree of freedom ($v > 2$), if v tend to ∞ , the student-t distribution converges to the Gaussian distribution with an implied kurtosis of $k = \left(\frac{6}{v} - 4\right) + 3$ for all $v > 4$.

The Generalised Error Distribution (GED) is a symmetric distribution and platykurtic with the following density function:

$$f(x) = \frac{ve^{\frac{1}{2}|\frac{x}{\lambda}|}}{\lambda 2^{\frac{v+1}{v}} \Gamma(1/v)}$$

Where $\lambda = \left[\frac{2^{-2/v} \Gamma(1/v)}{\Gamma(3/v)}\right]^{1/2}$

It includes the normal distribution if the parameter v has a value of two and when $v < 2$ indicates fat tail distribution.

3.2 Measurement of Variables and Nature of Data

The type of data used for this research work is mainly secondary which are sourced through the Nigerian Stock Exchange. The research population is the Nigerian Stock Exchange, using the All Share Index return as the performance indicators and the return series is defined as:

$$ASI_{rt} = \frac{(ASI_t - ASI_{t-1})}{ASI_{t-1}}$$

Where ASI_t is All Share Index at time t (particular/current week in this case) and ASI_{t-1} is All Share Index at time $t - 1$ (current/particular week minus previous week).

The sample size was the weekly All Share Index for the period of 2001 till 2016 divided into pre and post financial meltdown. The period was chosen based on the event window (the 2008-2009 financial crisis) of the research which tested the efficient capital market hypothesis in the context of the Nigerian Stock Exchange. The financial meltdown of 2008-2009 showed significant effect on the Nigerian stock market between March 2008 and April 2009. The choice of 2001 as the commencement period is to have an even year for pre and post financial meltdown. This approach is judgmental sampling because the researcher selected the period based on his knowledge of the period of financial meltdown effect on the Nigerian Stock Exchange while the choice of the end period is as a result of the time frame available for the programme.

3.3 Methods of Data Analysis

Any volatility model should be able to forecast volatility aspect of future returns. Volatility models are used to forecast the absolute magnitude of returns, to predict quantiles or, the whole density. The forecasts are useful for risk management, derivative pricing and hedging, market making and timing, portfolio selection and other financial activities. In each GARCH model, it is the predictability of volatility that is paramount (Engle 2001 and Engle & Patton 2001).

The GARCH models are capable of predicting the conditional mean and variance of a univariate (single (scalar) observations recorded sequentially over equal time increments) time series. The GARCH modeled the heteroskedasticity in univariate time series by relating the conditional variance of the disturbance term to the linear combination of the squared

disturbances in the recent past and the GARCH (1,1) model is preferred in most cases (Bollerslev et al 1992) but still cannot capture the asymmetric effect as discovered by Black (1976), French, Schwert and Stambaugh (1987), Nelson (1990), Schwert (1990) among others. As such GARCH model variants such as TGARCH, EGARCH, PGARCH among others were developed to predict, estimate and forecast the impact of good and news on return volatility.

The introduction of the GARCH model by Bollerslev (1982) led to the development of variant GARCH model for formulating, estimating, predicting and forecasting financial market volatility. The GARCH variants that were used in this research are GARCH, GARCH-IN-Mean, while TGARCH, EGARCH, PGARCH. These GARCH variants were used because they provide answers to the research questions and are able to provide evidence for acceptance or rejection of the hypotheses as used in some research such as Ahmed and Suliman (2011); Alagidede and Panagiotidis, (2009); Okpara and Nwezeaku, (2009); Osarumwense, (2015); Osazevbaru, (2014); Zivot (2009); Rahman, Rahman and Hossain (2013); Atoi (2014); Uyaabo Atoi and Usman (2015); Goudarzi, (2014); Su, (2010); Alberg, Shalit and Yosef, (2008); Olowe, (2009); Bala and Asemota, (2013) among others.

The data collected was tested and analyzed with the use of E-views, econometrics software, by applying various ARCH family models as stipulated under model specification section (3.1). This software was used to run the ARCH models to facilitate the answering of the research question by testing the hypotheses in order to achieve the objectives of the research.

The unit root test, the ARCH effect test and volatility clustering attribute of the All Share Index return were tested and analysed. The descriptive statistics of the All Share Index return were explained to determine the suitability of using the data in GARCH variant models. Also, GARCH model and its extensions were estimated and analyzed which provided answers to the

research questions by testing the hypotheses in order to achieve the objectives of the study. This was done through the following GARCH models in the following order:

Objective 1 -To investigate the market efficiency and the form of efficiency exhibit by the Nigerian Stock Exchange after the financial meltdown.

To provide answer to research question 1, GARCH model of equation (7) and (8) was employed.

Objective 2 - To determine the risk-return relationship on the Nigerian Stock Exchange after the financial meltdown.

To provide answer to research question 2, the GARCH-in-Mean model of equation (11) was employed.

Objective 3 – To examine the magnitude of volatility persistence in the Nigerian Stock Exchange after the financial meltdown;

To provide answer to research question 3, the mean reverting and the half-life form of GARCH model stated in equation (9) and (10) was employed.

Objective 4 – To investigate the impact of good or bad news on volatility in the Nigerian Stock Exchange after the financial meltdown.

To provide answer to research question 4, the asymmetric variants of the GARCH model stated in equations (13), (14), (16) (17) (19) and (20) was employed.

Diagnostic checks were also conducted on the residuals of the GARCH models used and selected to ascertain if the models are good for policy consideration and implementation.

Table 3.1 Summary of Research Questions, Objectives, Hypotheses and Statistical Tools Employed

S/N	Research Questions	Research Objectives	Research Hypotheses	Statistical tools employed
1	Is the Nigerian Stock Exchange efficient and in what efficient form after the financial meltdown?	To investigate the Nigerian stock market efficiency and the establishment of the efficiency form exhibited by the market after the financial meltdown.	H ₀₁ : The Nigeria Stock Exchange is not significantly efficient in any form after the financial meltdown.	GARCH model
2	What is the extent of the risk-return relationship in the Nigerian Stock Exchange after the financial meltdown?	To determine the extent of risk-return relationship in the Nigerian Stock Exchange after the financial meltdown;	H ₀₂ There is no significant risk-return relationship in the Nigerian Stock Exchange after the financial meltdown organization.	GARCH-in-Mean model
3	What is the magnitude of volatility persistence in the Nigerian Stock Exchange after the financial meltdown?	To determine the magnitude of volatility persistence in the Nigerian Stock Exchange after the financial meltdown.	H ₀₃ : There is no significant magnitude of volatility persistence in the Nigerian Stock Exchange after the financial meltdown.	The mean reverting and the half-life form of GARCH model
4	What is the impact of good or bad news on return volatility in the Nigerian Stock Exchange after the financial meltdown?	To investigate the impact of good or bad news on return volatility in the Nigerian Stock Exchange after the financial meltdown.	H ₀₄ : There is no significant impact of good or bad news on return volatility in the Nigerian stock Exchange after the financial meltdown.	TGARCH, EGARCH and PGARCH models

Source: Author's compilation, 2017

3.4 Ethical Consideration

This study has followed the laid down ethical standards in the management sciences research, an ethical clearance certificate was secure from the University of Ilorin Ethical Review Committee to conduct the study.

The outcome of the study will contribute positively to the study of corporate finance especially stock market efficiency theory which will improve the assessment of return on the Nigerian stock market and boost investor's confidence in Nigerian Stock Exchange.

3.5 Delimitations of the Study

Despite the contributions of this study to the body of knowledge, this study has its associated limitations, among which are;

The study only employed five (5) variants of GARCH models out of the various GARCH variant models developed by different authors. This was because most of these models are similar and inter-related and may not seriously impair the result.

The data used in the study were weekly data from the All Share Index of the Nigeria stock market thus the efficiency of the Nigerian Stock Exchange discussed is with respect to weekly data.

The study event window is the financial meltdown of 2008-2009, other event windows such as change in government, economic recession, flood, insurgency are other event windows that this study neglect and can also affect the informational efficiency of the market.

Furthermore, because the author works with a private institution, accessing grant for the program from organizations like Tertiary Education Trust Fund (TETFUND) became extremely difficult, though, the author made judicious use of the available resources.

3.6 Chapter Summary and Justification for Methodology

This chapter discussed the methodology adopted for the study, highlighted the All Share Index return of Jan. 2001 till Dec. 2016 as the variable and sample employed to measure the research constructs. The study employed the GARCH variant models since traditional stationary Auto-Regressive Moving Average (ARMA) processes cannot capture the magnitude of volatility persistence in financial time series (Andersen, Bollerslev, Diebold & Labys 2001; Beran 1994; Zivot & Wang 2006). The GARCH models developed by Engle (1982), Bollerslev (1986) and Nelson (1991) among others are capable of modeling time varying volatility, capturing many of

the stylized facts of the volatility and show how to formulate, estimate and predict from various models such as FIGARCH, GARCH, EGARCH, TGARCH, PGARCH, GARCH-in-Mean, HYGARCH, IGARCH among other (Bollerslev, Chou & Kroner 1992).

Prior to estimating the GARCH models, the stationarity test, ARCH effect test and presence of volatility were conducted on the All Share Index return series. The GARCH models were estimated under three (3) distributional assumptions (Gaussian, Student's t and generalized error distributions) while the Schwartz Information Criterion (SIC), Akaike Information Criterion (AIC), Hannan-Quinn (HQ) model selection criteria were used to choose the model that is better fit to the data. The best fit models were subsequently put to diagnostic testing to confirm the model's applicability for policy consideration and recommendations.

CHAPTER FOUR

PRESENTATION OF DATA, ANALYSIS AND DISCUSSION

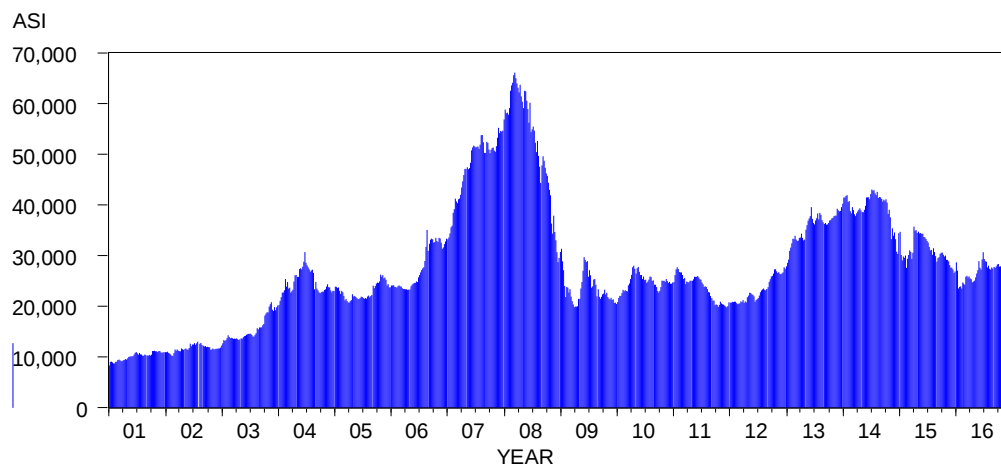
4.0 Introduction

This chapter presents the descriptive statistics of the data, which includes the volatility clustering feature and ARCH effect. The results of the unit root test, the mean and variance equations, the ARCH variant models under various distributional assumptions are presented in order to answer the research hypotheses and achieve the objectives of the study.

4.1 The Data, Summary Statistics and Properties

The All share Index return series used in the study covers the period of Jan 2001 till Dec 2016 and it was divided into periods before and after the meltdown. The segmentation of the periods was determined using the period at which the return started going down as a result of the meltdown as the period before the meltdown while the period the return started picking up gradually as the period after the meltdown. The graphical representation is presented in Figure 4.1.

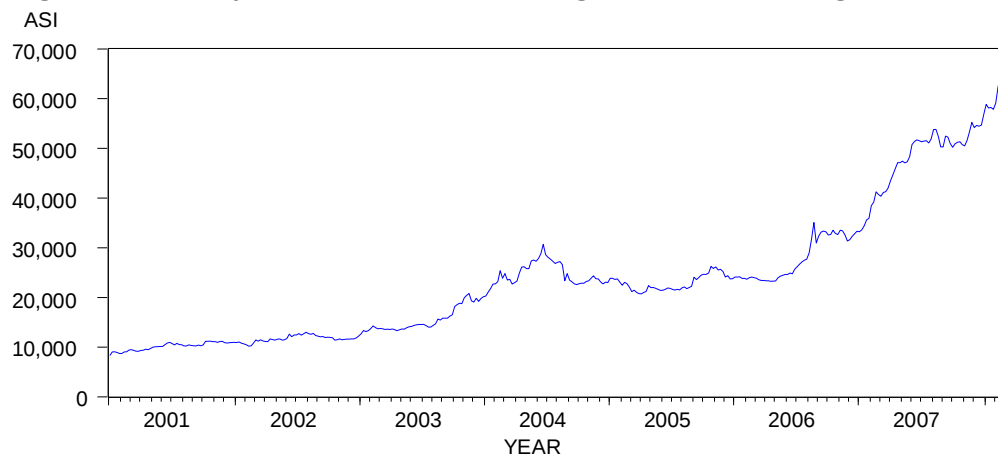
Figure 4.1: Weekly All Share Index on the Nigerian Stock Exchange (Jan 2001 - Dec 2016)



Source: *Author's computations, 2017.*

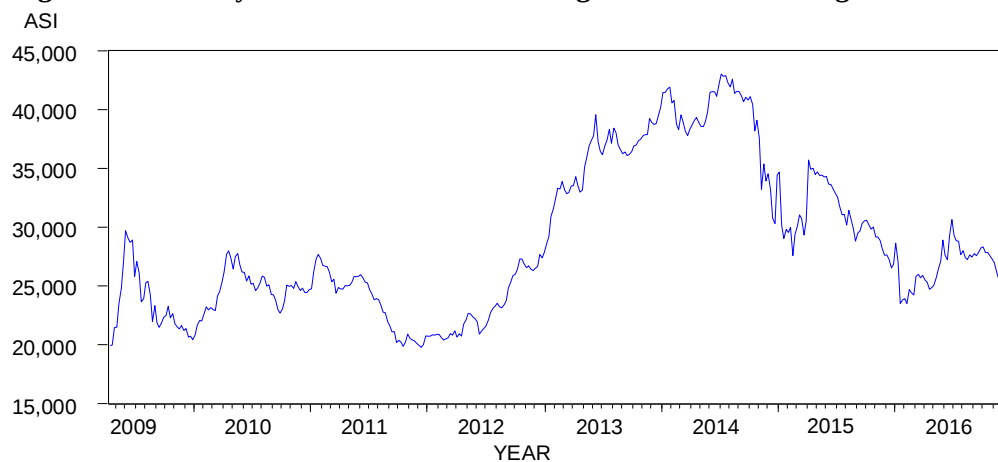
Figure 4.1 indicates that the All Share Index on the Nigerian Stock Exchange increased from less than 10,000 points in Jan. 2001 to the peak at over 60,000 points in March 2008 and then started reducing and got to less than 20,000 points in April 2009. The index started improving gradually by fluctuating between the 20,000 points and 30,000 points between April 2009 and Sept. 2011 and then to more than 40,000 points in April 2009. Therefore, between the period of March 2008 and April 2009 the Nigerian Stock Exchange All Share Index was affected by the global financial meltdown of 2008-2009 crisis and thus the pre meltdown period is Jan 2001 till March 2008 while the post meltdown period is April 2009 till Dec 2016.

Figure 4.2: Weekly All Share Index on the Nigerian Stock Exchange before the Meltdown



Source: *Author's computations, 2017.*

Figure 4.3: Weekly All Share Index on the Nigerian Stock Exchange after the Meltdown



Source: *Author's computations, 2017.*

Figure 4.2 shows the graphical representation of the All Share index on the Nigerian Stock Exchange before the global financial meltdown of 2008-2009 and Figure 4.3 shows the graphical representation of the All Share Index after the global financial meltdown of 2008-2009. It indicates that the All Share Index had been continuously increasing before the meltdown of 2008-2009 but after the meltdown the All Share Index had been fluctuating.

4.1.1 Unit Root Tests

The All Share Index return series was tested to determine the order of integration using Augmented Dickey Fuller (ADF) and the Phillips-Perron unit root test statistics.

Table 4.1: ADF and PP Unit Root Test Result of All Share Index Return (2001-2016)

ASIR (2001-2016)	t-Statistics	P-Value	ASIR (2001-2016)	Adjusted t-Statistics	P-Value
ADF test statistics	-27.04330	0.0000	PP test statistics	-27.58421	0.0000
Critical values: 1%	-3.437976		Critical values: 1%	-3.437976	
5%	-2.864796		5%	-2.864796	
10%	-2.568558		10%	-2.568558	

Source: Author's computations, 2017.

The unit root test results of the entire All Share Index return series covering from 2001 till 2016 indicates that the null hypothesis should be rejected as shown by the P-value of both the ADF and the Phillip-Perron statistics of 0.0000 respectively in table 4.1, which means that the series has no unit root (stationery series).

Table 4.2: ADF and PP Unit Root Test Result of All Share Index Return before the Meltdown

ASIR before meltdown	t-Statistics	P-Value	ASIR before meltdown	Adjusted t-Statistics	P-Value
ADF test statistics	-19.35467	0.0000	PP test statistics	-19.39624	0.0000
Critical values: 1%	-3.447580		Critical values: 1%	-3.447580	
5%	-2.869029		5%	-2.869029	
10%	-2.570827		10%	-2.570827	

Source: Author's computations, 2017.

The unit root test result of the All Share Index returns series that covers the pre-meltdown period of Jan. 2001 till March 2008 as shown in table 4.2 revealed the P-value of the ADF and

Phillip-Perron test statistics is 0.0000 which shows that the null hypothesis should be rejected indicating that the return series before the meltdown is stationery (has no unit root).

Table 4.3: ADF and PP Unit Root Test Result of All Share Index Return after the Meltdown

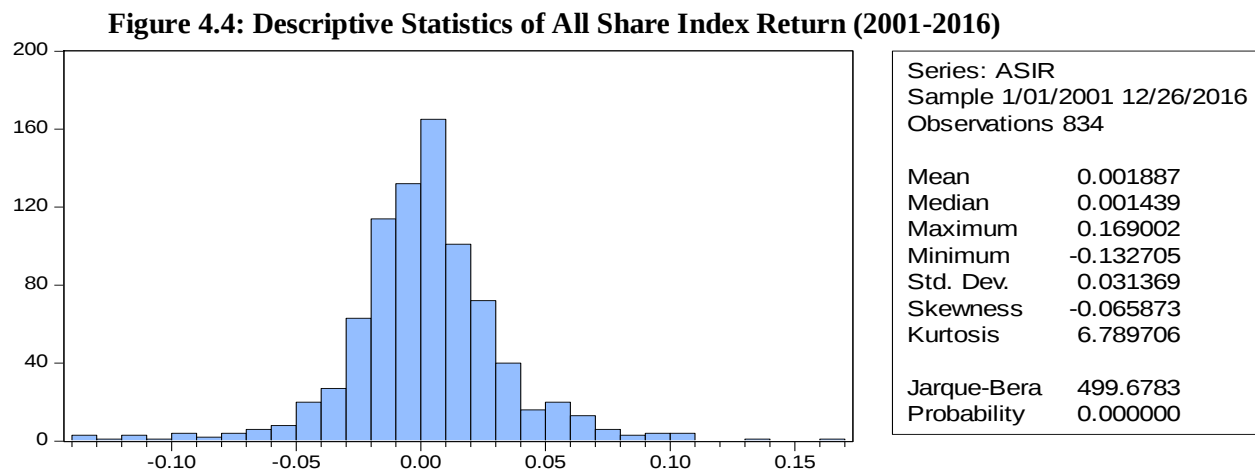
ASIR after meltdown	t-Statistics	P-Value	ASIR after meltdown	Adjusted t-Statistics	P-Value
ADF test statistics	-18.59976	0.0000	PP test statistics	-18.63701	0.0000
Critical values: 1%	-3.446443		Critical values: 1%	-3.446443	
5%	-2.868529		5%	-2.868529	
10%	-2.570558		10%	-2.570558	

Source: Author's computations, 2017.

The unit root test result of the All Share Index return series after the meltdown covering the periods between April 2009 till Dec. 2016 as presented in table 4.3 have a P-value of 0.0000 under the ADF and Phillip-Perron test statistics which means that the null hypothesis is rejected indicating that the return series after the meltdown has no unit root (stationery series) at 5% significant level.

4.1.2 Descriptive Statistics

The summary statistics of the stationary All Share Index returns on the Nigerian Stock Exchange from 2001 till 2016 is presented in Figure 4.4.

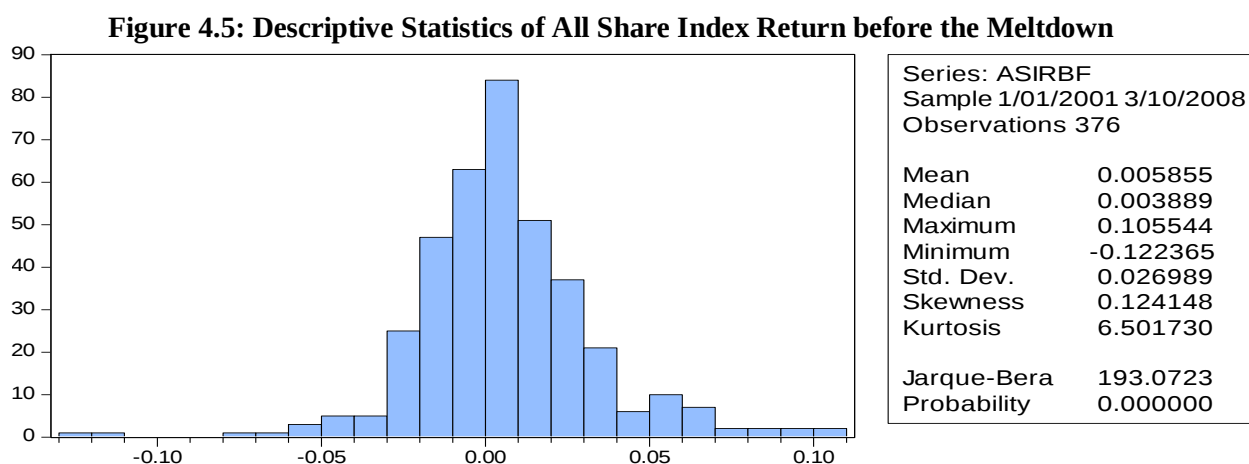


Source: Author's computations, 2017.

Figure 4.4 reveals positive mean weekly returns of 0.001887 and the standard deviation which measures the riskiness of the return was 3.14%. The 21.5% difference between the

minimum and maximum returns shows the level of price variability of return on the Nigerian Stock Exchange over the period. The skewness of -0.065873 is less than 0 (skewness of a normal distribution is 0) which shows that the stationary All Share Index returns on the Nigerian Stock Exchange from 2001 till 2016, on average, is negatively skewed relative to the normal distribution, indicating non-symmetric series. The kurtosis of 6.789706 is higher than 3 (kurtosis of a normal distribution is 3) which shows that the stationary All Share Index returns on the Nigerian Stock Exchange from 2001 till 2016, on average, is leptokurtic. Thus, the negative skewness showing non symmetric series and the relatively large kurtosis suggesting leptokurtic indicates non-normality of the stationary All Share Index returns on the Nigerian Stock Exchange from 2001 till 2016.

To support the skewness and kurtosis, the Jarque-Bera statistics (combination of skewness and kurtosis as asymptotic normality) with a value of 499.68 and a corresponding p-value of 0.0000, the null hypothesis of normal distribution cannot be accepted for the stationary All Share Index returns on the Nigerian Stock Exchange from 2001 till 2016.

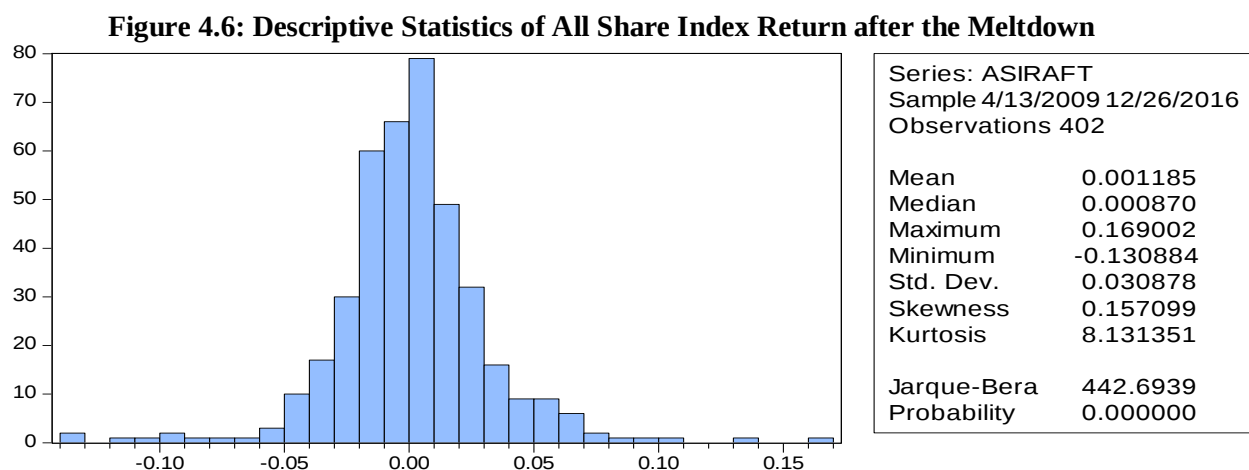


Source: *Author's computations, 2017.*

Figure 4.5 shows a positive weekly mean return of 0.005855 and a standard deviation of 2.7%. The level of price variability of return which is the difference between the minimum and

maximum returns is 15.9% on the Nigerian Stock Exchange before the crisis. The skewness of 0.124148 is higher than 0 (skewness of a normal distribution is 0) which shows that the stationary All Share Index returns on the Nigerian Stock Exchange before the meltdown, on average, is positively skewed showing that the upper tail of the All Share Index returns on the Nigerian Stock Exchange before the meltdown is thicker than the lower tail. This indicates that the returns rise more often than it drops before the meltdown. The kurtosis of 6.501730 is higher than 3 (kurtosis of a normal distribution is 3) which shows that the stationary All Share Index returns on the Nigerian Stock Exchange before the meltdown is leptokurtic. Therefore, the positive skewness showed non symmetric series and the large kurtosis suggested leptokurtic, indicating non-normality of the stationary All Share Index returns on the Nigerian Stock Exchange before the meltdown of 2008-2009 .

In support of the inference from the skewness and kurtosis, the Jarque-Bera statistics (the combination of the skewness and kurtosis as asymptotic normality) with a value of 193.07 and a corresponding p-value of 0.0000 suggest that the null hypothesis of normal distribution should be rejected for the stationary All Share Index returns on the Nigerian Stock Exchange before the meltdown of 2008-2009 .



Source: Author's computations, 2017.

Figure 4.6 shows a positive weekly mean return of 0.001185 with a standard deviation of 3.09%. The level of price variability of return on the Nigerian Stock Exchange after the crisis is 22.6%. The skewness of 0.157099 is more than 0 (skewness of a normal distribution is 0) which shows that the stationary All Share Index returns on the Nigerian Stock Exchange after the meltdown is positively skewed showing the upper tail is thicker than the lower tail of the All Share Index returns on the Nigerian Stock Exchange after the meltdown. This indicates that the returns rise more often than it drops after the meltdown. The kurtosis of 8.131351 is higher than 3 (kurtosis of a normal distribution is 3) which shows that the stationary All Share Index returns on the Nigerian Stock Exchange after the meltdown is leptokurtic. Therefore, the positive skewness showed non symmetric series and the large kurtosis suggested leptokurtic, indicating non-normality of the stationary All Share Index returns on the Nigerian Stock Exchange after the meltdown of 2008-2009 .

To buttress the inference of the skewness and kurtosis, the Jarque-Bera statistics (the combination of the skewness and kurtosis as asymptotic normality) with a value of 442.69 and a corresponding p-value of 0.0000 suggest that the null hypothesis of normal distribution should be rejected for the stationary All Share Index returns on the Nigerian Stock Exchange after the meltdown of 2008-2009.

In summary, the descriptive analysis of the All Share Index returns series for the whole sample, before the meltdown and after the meltdown indicates that the All Share Index returns distributions on the Nigerian Stock Exchange exhibits significant deviations from normality which supports the subjection of the All Share Index return series to ARCH variant models.

4.2 Presentation and Analysis of the Empirical Result on Objectives

Conditional Return/Mean Equation, ARCH Effect Test and Volatility Clustering

The conditional mean return equation of the All Share index return series is given by the OLS regression in equation (3) for the whole series, before the meltdown and after the meltdown. The test for the presence of ARCH effect and check for volatility clustering is also conducted on the residual of the conditional mean/return equations of the whole return series, the pre meltdown return series and post meltdown return series.

Table 4.4a: Conditional Return/Mean Equation of All Share Index Return (2001-2016)

Dependent Variable: All Share Index return 2001-2016				
Variables	Coefficient	Standard Error	t-Statistic	P-Value
C	0.001671	0.001081	1.545181	0.1227
ASIR(-1)	0.068072	0.034435	1.976816	0.0484

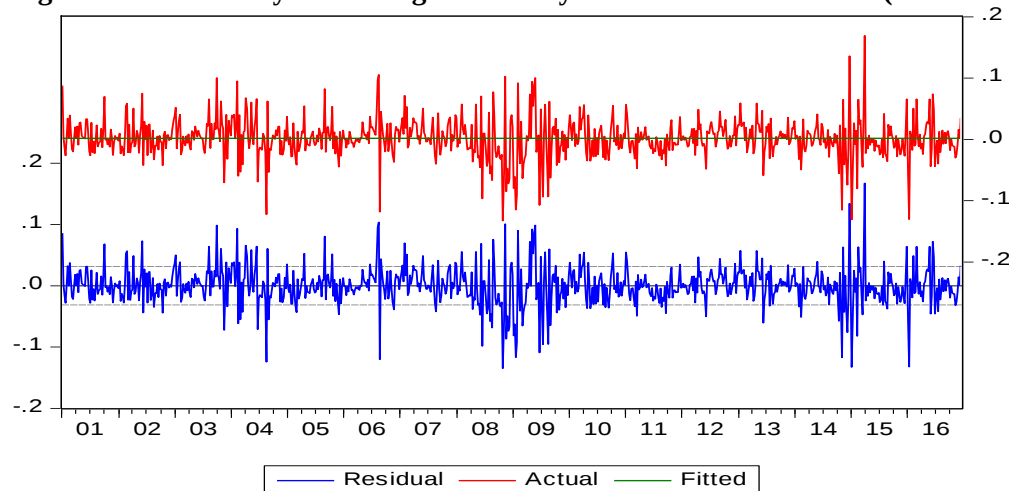
Source: Author's computations, 2017.

Table 4.5a: ARCH Effect Result of All Share Index Return (2001-2016)

Test Statistics	Value	P-Value
F-statistics	47.36208	0.0000
Observed R ²	44.91611	0.0000

Source: Author's computations, 2017.

Figure 4.7a: Volatility Clustering for Weekly All Share Index Return (Jan. 2001-Dec. 2016)



Source: Author's computations, 2017.

The conditional return/mean equation result for the whole All Share Index return series is shown in Table 4.4a. The ARCH effect test on the residual of the conditional return/mean

equation of whole All Share Index return series is also shown in Table 4.5a with the F-Statistics and the observed R square values having corresponding P-values of 0.0000. This indicates that the null hypothesis is rejected meaning that there is ARCH effect in the residuals of the mean equation of All Share Index return series of 2001 till 2016 on the Nigerian Stock Exchange.

In the same vein, the residual of the mean equation also exhibit volatility clustering as shown in Figure 4.7a. Figure 4.7a shows that return series oscillates around the mean value (mean reverting) showing that volatility of stock returns is low for consecutive period till 3rd quarter of 2003 (low volatility followed by low volatility for a prolonged period) and volatility is high for another consecutive period till 3rd quarter of 2004 (high volatility followed by high volatility for a prolonged period). This feature of low volatility followed by low volatility for a prolonged period and periods of high volatility followed by high volatility for a prolonged period is sustained throughout the period.

Table 4.4b: Conditional Return/Mean Equation of All Share Index Return before the Meltdown

Dependent Variable: All Share Index return before meltdown				
Variable	Coefficient	Standard Error	t-Statistic	P-Value
C	0.005581	0.001413	3.950266	0.0001
ASIRBF(-1)	0.009341	0.051184	0.182494	0.8553

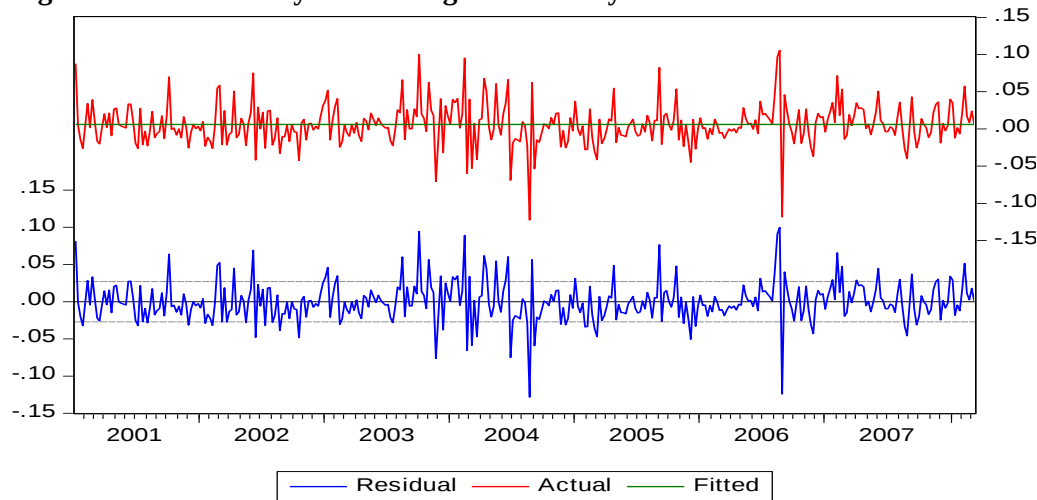
Source: *Author's computations, 2017.*

Table 4.5b: ARCH Effect Result of All Share Index Return before the Meltdown

Test Statistics	Value	P-Value
F-statistics	39.77247	0.0000
Observed R ²	36.12409	0.0000

Source: *Author's computations, 2017.*

Figure 4.7b: Volatility Clustering for Weekly All Share Index Return before the Meltdown



Source: Author's computations, 2017.

Table 4.4b shows the conditional mean/return equation for the All Share Index return before the meltdown. The ARCH effect test result on the residual of the mean equation of the All Share Index return series before the meltdown with the F-Statistics and the observed R square values having corresponding P-values of 0.0000 is presented in Table 4.5b. It indicates that the null hypothesis of no ARCH effect is rejected, meaning that there is ARCH effect in the residuals of the mean equation of All Share Index return series on the Nigerian Stock Exchange before the financial crisis.

In the same vein, the residual of the mean equation also exhibits volatility clustering as shown in Figure 4.7b, indicating that return series oscillates around the mean value (mean reverting). Figure 4.7b reveals that volatility of stock returns before the meltdown is low for consecutive period till 3rd quarter of 2003 (low volatility followed by low volatility for a prolonged period) and volatility is high for another consecutive period till 3rd quarter of 2004 (high volatility followed by high volatility for a prolonged period). This feature of low volatility of return followed by low volatility of return for a prolonged period is sustained throughout the period before the meltdown.

Table 4.4c: Conditional Return/Mean Equation of All Share Index Return after the Meltdown

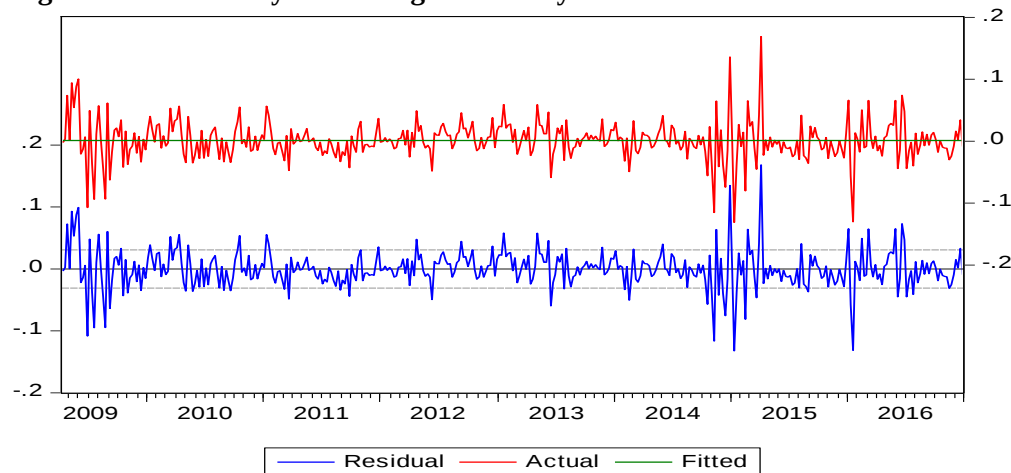
Dependent Variable: All Share Index return after meltdown				
Variable	Coefficient	Standard Error	t-Statistic	P-Value
C	0.001129	0.001540	0.733232	0.4638
ASIRAF(-1)	0.070749	0.049886	1.418215	0.1569

Source: Author's computations, 2017.

Table 4.5c: ARCH Effect Result of All Share Index Return after the Meltdown

Test Statistics	Value	P-Value
F-statistics	6.682433	0.0101
Observed R ²	6.605304	0.0102

Source: Author's computations, 2017.

Figure 4.7c: Volatility Clustering for Weekly All Share Index Return after the Meltdown

Source: Author's computations, 2017.

The conditional mean/return equation result for the All Share Index return before the meltdown is shown in Table 4.4c. The ARCH effect test on the residual of the mean equation of whole All Share Index return series is shown in Table 4.5c with the F-Statistics and the observed R square values having corresponding P-values of 0.0099 and 0.0100 respectively, indicates that the null hypothesis of no ARCH effect is rejected meaning that there is ARCH effect in the residuals of the mean equation of All Share Index return series on the Nigerian Stock Exchange after the meltdown.

In the same vein, the residual of the mean equation also exhibit volatility clustering as shown in Figure 4.7c. Figure 4.7a shows that return series oscillates around the mean value (mean reverting) showing that volatility of stock returns is high for consecutive period till 3rd

quarter of 2009 (high volatility followed by high volatility for a prolonged period) and volatility is low for another consecutive period till 3rd quarter of 2014 (low volatility followed by low volatility for a prolonged period). This feature of high volatility followed by high volatility for a prolonged period and periods of low volatility followed by low volatility for a prolonged period is sustained throughout the period after the meltdown.

In conclusion, as indicated in the phases of All Share Index returns, the existence of ARCH effect signifies that the variance of the All Share Index return series of Nigerian Stock Exchange is non-constant for all periods specified. The presence of volatility clustering which is a stylized fact that financial time series exhibit gives the validity and condition necessary for the application ARCH variant models.

Objective one: Efficiency of the Nigerian Sock Market

The first objective of this study tests the efficiency of the Nigerian stock market and the GARCH model in equation (7) and (8) was employed. To carry out this objective, the result of the GARCH model is presented in Table 4.6a-c for the whole All Share Index return series, the All Share Index return before the meltdown and All Share Index return after the meltdown under the various distributional assumptions.

Table 4.6a: GARCH Result for the All Share Index Return (Jan 2001 - Dec 2016)

Parameters	Gaussian Distribution		Student's-t Distribution		Generalised Error Distribution	
	Estimates	P-Value	Estimates	P-Value	Estimates	P-Value
μ	0.147142	0.0000	0.121028	0.0010	0.124248	0.0003
ω	0.000067	0.0000	0.000106	0.0004	0.000085	0.0004
α_i	0.209177	0.0000	0.306950	0.0000	0.257695	0.0000
β_j	0.731140	0.0000	0.626216	0.0000	0.669422	0.0000
AIC	-4.346110		-4.423912		-4.420061	
SC	-4.317776		-4.389911		-4.386059	
HQ	-4.335247		-4.410876		-4.407025	

Source: Author's computations, 2017.

The result of the GARCH model in Table 4.6a indicates that μ as the mean of past weekly All Share Index return has a positive relationship with present week All Share Index return as derived from the mean equation. The P-value of the mean of past weekly All Share Index return is 0.0000, 0.0009 and 0.0003 under the distributional assumptions indicating that the mean past weekly All Share Index return being positive, is statistically significant at 5% in predicting present week All Share Index return on the Nigerian Stock Exchange. The variance equation which is derived from the residual of the mean equation having α_i and β_j representing the ARCH term and the GARCH term respectively with ω as the constant, all having positive relationship with current week All Share Index return on the Nigerian Stock Exchange.

The result indicates that the ARCH term (previous week return squared residual) and the GARCH term (previous week return variance) with p-values of 0.0000 for the three (3) distributional assumptions are statistically significant in predicting current week variance of All Share index return on the Nigerian Stock Exchange at 5% significant level. The constant also shows that without the ARCH and GARCH terms, current week changes in All Share Index will be close to zero.

This simply implies that an investor can predict current week stock return by reading past week stock return movement on the Nigerian Stock Exchange and attain better return than the market All Share Index return. It points to the fact that past information on stock return quoted on Nigerian Stock Exchange are not reflected in current stock prices. This indicates that the stock market is not efficient in the weak form. The Akaike Information Criterion, Schwarz Criterion and the Hannan-Quinn Criterion all have similar values with no significant difference but the student's-t distribution has the lowest criterion values which indicates that the predictive ability

of the GARCH model under the student's-t distributional assumptions provide the best estimate of weekly return on the Nigerian Stock Exchange

Table 4.6b: GARCH Result for the All Share Index Return before the Meltdown

Parameters	Gaussian Distribution		Student's-t Distribution		Generalised Error Distribution	
	Estimates	P-Value	Estimates	P-Value	Estimates	P-Value
μ	0.119670	0.0501	0.089461	0.1168	0.093611	0.0680
ω	0.000476	0.0000	0.000374	0.0092	0.000372	0.0102
α_i	0.275426	0.0000	0.362653	0.0239	0.311980	0.0246
β_j	0.040516	0.7936	0.206215	0.3119	0.170131	0.4821
AIC	-4.493051		-4.605492		-4.602665	
SC	-4.440692		-4.542661		-4.539834	
HQ	-4.472264		-4.580548		-4.577721	

Source: Author's computations, 2017.

Table 4.7: Wald Test Result

Test Statistics	Gaussian Distribution		Student's-t Distribution		Generalised Error Distribution	
	Value	P-Value	Estimates	P-Value	Estimates	P-Value
F-statistics	8.527081	0.0002	4.433797	0.0125	3.570658	0.0291
Chi-square	17.05416	0.0002	8.867594	0.0119	7.141317	0.0281

Source: Author's computations, 2017.

The result of the GARCH model in Table 4.6b shows that μ as the mean of past weekly All Share Index return before the meltdown has a positive relationship with present All Share Index return as derived from the mean equation. The P-value for the mean past weekly All Share Index return of 5% or more under the three (3) distributional assumptions indicates that the average past weekly All Share Index return being positive is statistically not significant in predicting present week All Share Index return on the Nigerian Stock Exchange before the meltdown at 5% level of significant. The variance equation which is derived from the residual of the mean equation has α_i and β_j representing the ARCH term and the GARCH term respectively with ω as the constant, all having positive relationship with present week All Share Index return on the Nigerian Stock Exchange before the meltdown.

The result indicates that the ARCH term (previous week return squared residual) with p-values of 0.0000, 0.0239 and 0.0246 under the distributional assumptions is statistically

significant at 5% while the GARCH term (previous week return variance) with p-values of 0.7936, 0.3119 and 0.4821 under the distributional assumptions is statistically not significant in predicting current week return variance of All Share Index on the Nigerian Stock Exchange before the meltdown. The constant also shows that without the ARCH and GARCH terms, current changes in All Share Index will be close to zero before the meltdown.

The Wald test in table 4.7 shows the joint significant result of the ARCH and GARCH terms with the F-statistics and Chi-square values under the three distributional assumptions. The p-values of the Wald test statistics result are below 5% significant level which indicates that the ARCH and GARCH terms jointly are significant in predicting present variance in All Share Index return on the Nigerian Stock Exchange before the meltdown.

This implies that by studying the past week stock price movement on the Nigerian Stock Exchange, an investor can predict current week share price movement and achieve a performance better than the market All Share Index return. This reveals that security prices on Nigerian Stock Exchange do not reflect all past information, showing that the market is not efficient in the weak form. The model selection criterion of Akaike Information, Schwarz and Hannan-Quinn provides comparable values but the value of the student's-t distribution is the lowest. This indicates that investors using the GARCH model under the student's-t distributional assumptions can expect the best estimate of weekly returns on the Nigeria Stock Exchange before the meltdown.

Table 4.6c: GARCH Result for All Share Index Return after the Meltdown

Parameters	Gaussian Distribution		Student's-t Distribution		Generalised Error Distribution	
	Estimates	P-Value	Estimates	P-Value	Estimates	P-Value
μ	0.194460	0.0005	0.132957	0.0159	0.140493	0.0090
ω	0.000078	0.0001	0.000085	0.0081	0.000081	0.0016
α_i	0.263188	0.0000	0.251813	0.0020	0.251136	0.0012
β_j	0.651247	0.0000	0.656755	0.0000	0.655032	0.0000
AIC	-4.432640		-4.470225		-4.470240	
SC	-4.382933		-4.410577		-4.410591	
HQ	-4.412959		-4.446609		-4.446623	

Source: *Author's computations, 2017.*

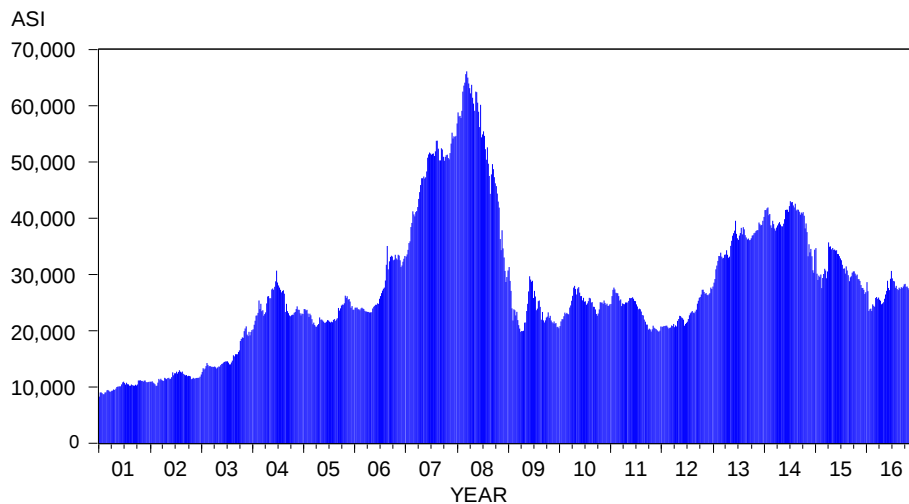
Table 4.6c is the result of the GARCH model of All Share Index return after the meltdown and it indicates that μ as the mean of past weekly All Share Index return has a positive relationship with present week return as derived from the mean equation. The P-value of the mean of past weekly All Share Index return is 0.0005, 0.0159 and 0.0090 under the distributional assumptions indicating that the mean past weekly return is statistically significant at 5% in predicting present week return on the Nigerian Stock Exchange. The variance equation which is derived from the residual of the mean equation with α_i and β_j representing the ARCH term and the GARCH term respectively and ω as the constant, indicates that the ARCH term (previous week return squared residual) and the GARCH term (previous week return variance) with p-values of less than 5% for the three (3) distributional assumptions have positive relationship and are statistically significant in predicting current week variance of All Share index return in the Nigerian Stock Exchange after the meltdown at 5% significant level. The constant also shows that without the ARCH and GARCH terms, current week changes in All Share Index will be close to zero.

This basically means that investor can determine present week share price movement by reviewing past week stock price movement on the Nigerian Stock Exchange in order to realize better return than the market All Share Index return after the meltdown. This signifies that past information on share prices on Nigerian Stock Exchange are not reflected in current share prices,

telling that the market is not efficient in the weak form. The information criteria confirm that the Generalised Error Distribution has the best predictive ability of the GARCH model to estimate weekly return of stocks in the Nigerian Stock Exchange after the meltdown.

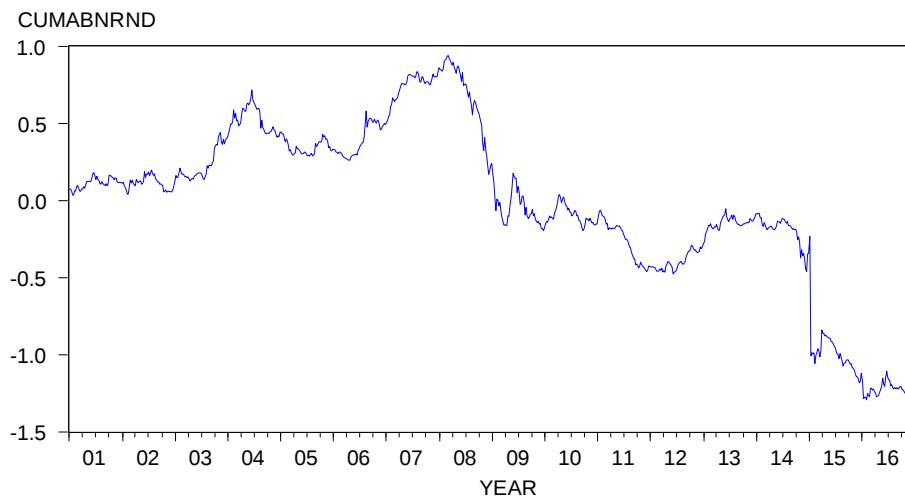
In the same vein, the Nigerian Stock Exchange was also tested for efficiency in the semi-strong form using the meltdown period as the event window.

Figure 4.8: Trend of All Share Index on the Nigerian Stock Exchange (Jan. 2001-Dec. 2016)



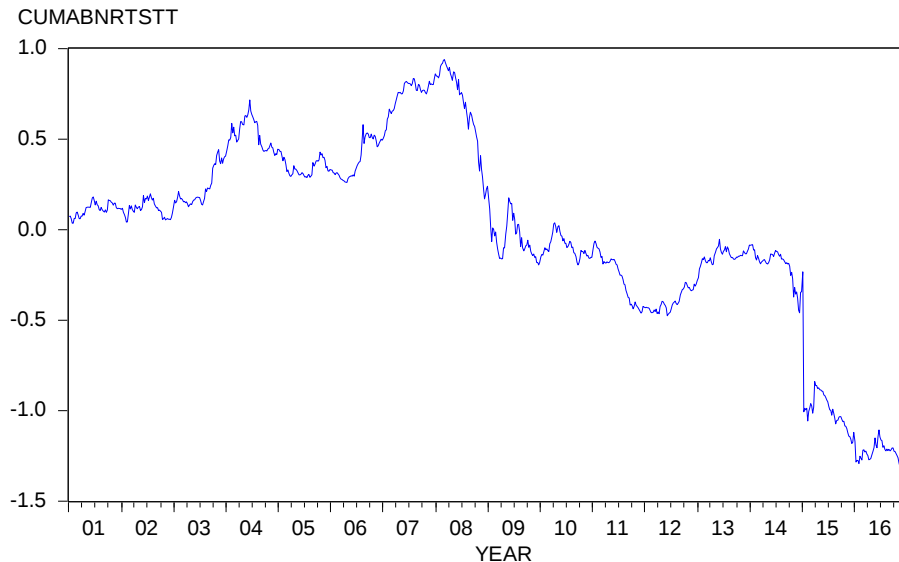
Source: *Author's computations, 2017.*

Figure 4.9a: Cumulative Abnormal return of All Share Index Based on GARCH Model under Normal Distribution (Jan. 2001-Dec. 2016)



Source: *Author's computations, 2017.*

Figure 4.9b: Cumulative Abnormal return of All Share Index Based on GARCH Model under Student's t Distribution (Jan. 2001-Dec. 2016)



Source: *Author's computations, 2017.*

Figure 4.9c: Cumulative Abnormal return of All Share Index Based on GARCH Model under Genaralised Error Distribution (Jan. 2001-Dec. 2016)



Source: *Author's computations, 2017.*

To test if the Nigerian Stock Exchange is efficient in the in the semi-strong form, the market equation model under the three distributional assumption with their characteristics were used to calculate the cumulative abnormal return under each distributional assumptions is graphically depicted in figures 4.9a-c.

The cumulative abnormal returns from the three (3) distributional assumptions shows that cumulative abnormal profit on the Nigerian Stock Exchange have been increasing from zero (0) to positive but during the meltdown the cumulative abnormal profit reduces and started increasing for few weeks after the meltdown. This characteristic is a sign that the Nigerian Stock Exchange is efficient in the semi-strong form. This shows that no investor can outperform the market or earn abnormal return by analysing existing relevant information or event study available in financial dailies or magazines because such information is already impounded in the current security prices.

In addition, the cumulative abnormal return from the normal distribution and student's t distribution shows that cumulative abnormal return was in the positive region before the meltdown but reduced to the negative region during the meltdown and remain in the negative region since 1st quarter 2009 (after the meltdown) till Dec. 2016. The cumulative abnormal returns from the generalized error distribution was in the positive region before the meltdown but reduced during the meltdown and still remain slightly positive after the meltdown but got to the negative region in the early week of Jan. 2015 and remain negative till Dec. 2016.

The trend of the All Share Index as depicted in figure 4.8 and the trends of the abnormal returns and cumulative abnormal returns under the three distributional assumptions are similar for periods before, during and after the meltdown meaning that the All Share index has incorporated all abnormal returns during the periods. The values of the abnormal returns under the three (3) distributional assumptions are shown in appendix III, IV and V.

In summary, the null hypothesis of weak form efficiency is not rejected while the null hypothesis of semi-strong form is rejected; therefore, the Nigerian Stock Exchange is inefficient in the weak-form after the meltdown of 2008-2009 , but was found to be semi-strong efficient

after the meltdown of 2008-2009 . It shows that stock return on the Nigerian Stock market reflect public information relatively instantaneously due to market frictions (cost of information). The market frictions initiate a large block between when information is available and when it seemed to be fully reflected in actual prices. As a result of the level of these frictions, the Nigerian stock market returns reflect different kinds of information with greater or less relative efficiency.

Objective two: Risk-return Relationship

The second objective tests the risk-return relationship of stock prices on the Nigerian Stock Exchange and the GARCH-in-mean model in equation (11) was employed. The result of the GARCH-in-mean model is presented in table 4.7a-c for the whole All Share Index return series, the All share Index return before the meltdown and All Share Index return after the meltdown under the three (3) distributional assumptions.

Table 4.8a: GARCH-in-Mean Result for All Share Index Return (Jan 2001-Dec 2016)

Parameters	Gaussian Distribution		Student's-t Distribution		Generalised Error Distribution	
	Estimates	P-Value	Estimates	P-Value	Estimates	P-Value
μ	0.145401	0.0000	0.125644	0.0005	0.135335	0.0001
σ	-0.267666	0.0188	-0.207513	0.0473	-0.233618	0.0234
ω	0.000062	0.0000	0.000102	0.0005	0.000085	0.0005
α_i	0.199746	0.0000	0.294216	0.0000	0.251381	0.0000
β_j	0.743873	0.0000	0.637449	0.0000	0.673263	0.0000
AIC	-4.349147		-4.425761		-4.422708	
SC	-4.315145		-4.386093		-4.383039	
HQ	-4.336111		-4.410552		-4.407499	

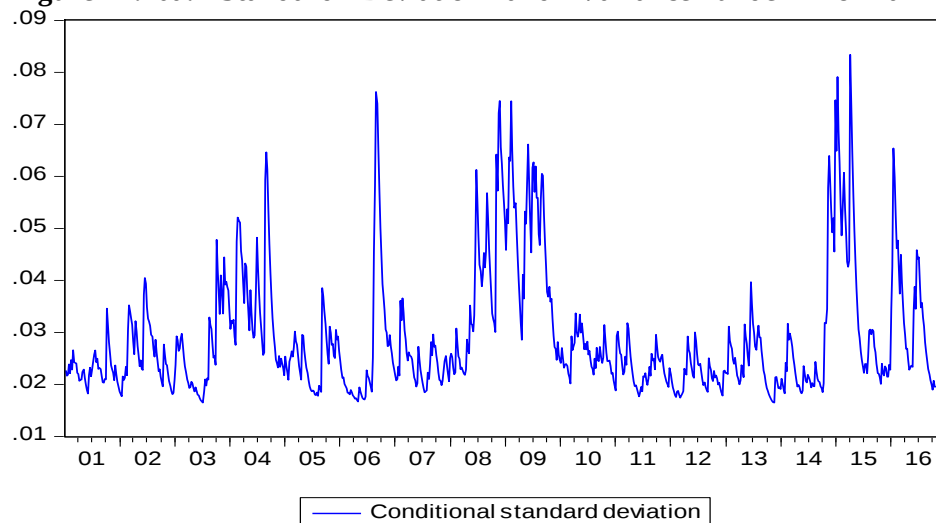
Source: Author's computations, 2017.

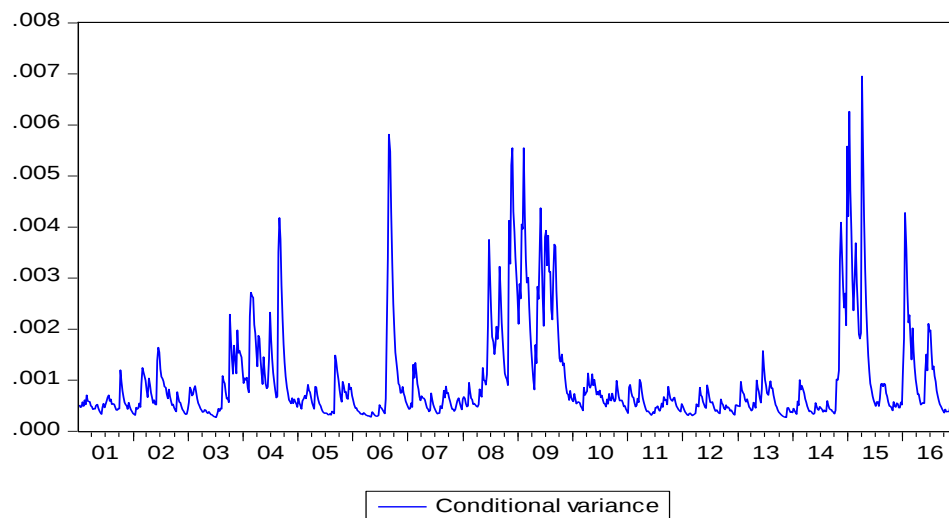
The result of the GARCH-in-Mean model in table 4.8a indicates that σ (standard deviation) measuring the risk, has negative relationship with the All Share Index return on the Nigerian Stock Exchange under the three (3) distributional assumptions. The P-value of the risk is 0.0188, 0.0473 and 0.0234 under the distributional assumptions indicating that the negative risk relationship is statistically significant at 5%.

This simply implies that there exists significant inverse risk-return relationship in the All Share Index on the Nigerian Stock Exchange from Jan. 2001 till Dec. 2016. An increase in risk will lead to a decrease in return and vice versa. The graphical representation of the risk (standard deviation) and return (variance) relationship is presented in figures 4.10a-c for the three (3) distributional assumptions.

The Akaike Information Criterion, Schwarz Criterion and the Hannan-Quinn Criterion all have similar values with no significant difference but the student's-t distribution has the lowest criterion values which indicates that the predictive ability of the GARCH-in-Mean model under the student's-t distributional assumptions provide the best estimate of weekly risk-return relationship of All Share index on the Nigerian Stock Exchange for the period of Jan. 2001 till Dec. 2016.

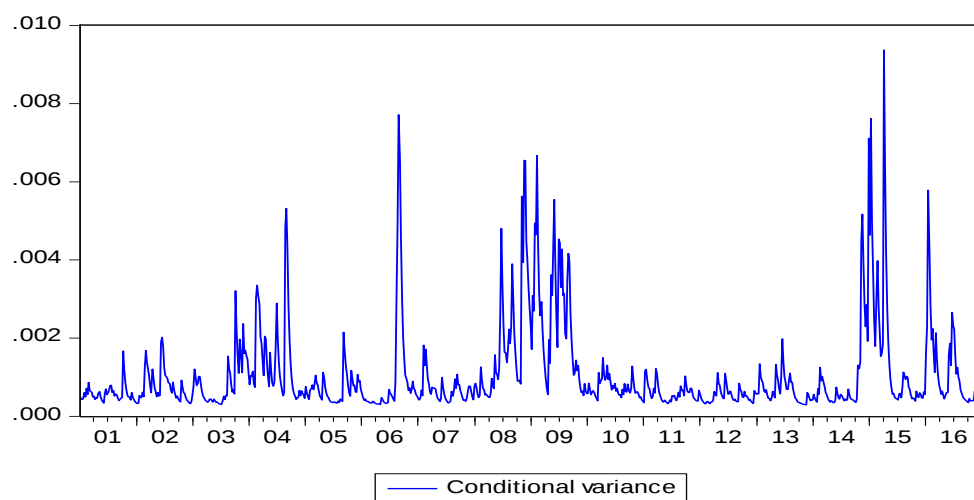
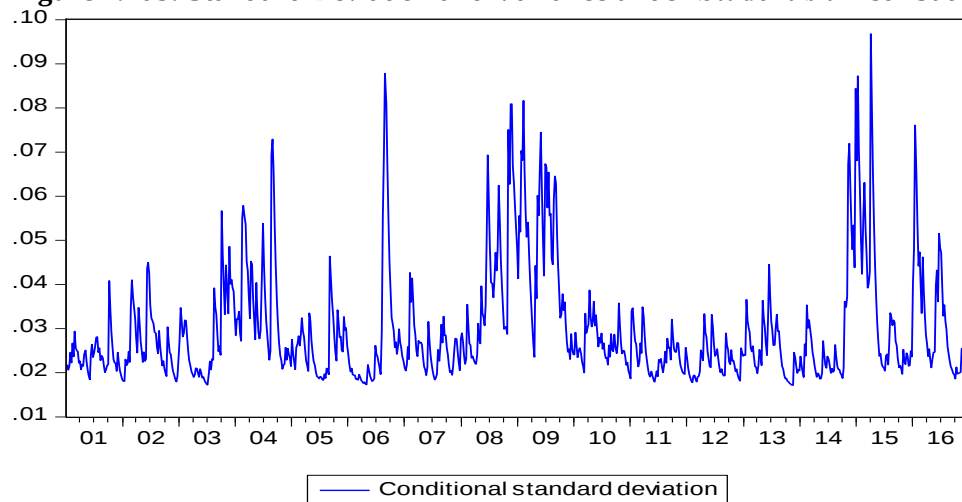
Figure 4.10a: Standard Deviation and Variance under Normal Distribution (2001-2016)





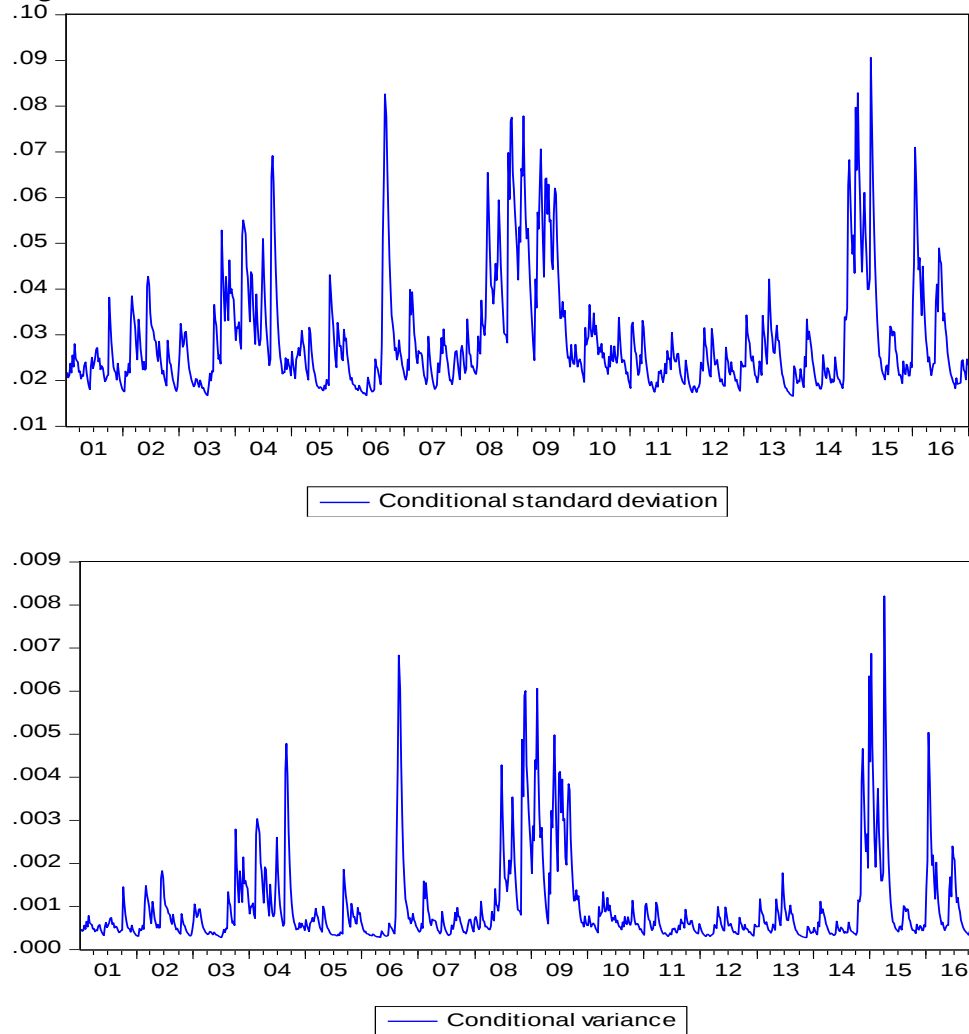
Source: *Author's computations, 2017.*

Figure 4.10b: Standard Deviation and Variance under Student's t Distribution (2001-2016)



Source: *Author's computations, 2017.*

Figure 4.10c: Standard Deviation and Variance under Generalised Error Distribution (2001-2016)



Source: Author's computations, 2017.

Table 4.8b: GARCH-in-Mean Result for the All Share Index Return before the Meltdown

Parameters	Gaussian Distribution		Student's-t Distribution		Generalised Error Distribution	
	Estimates	P-Value	Estimates	P-Value	Estimates	P-Value
μ	0.173348	0.0043	0.103481	0.0728	0.110138	0.0372
σ	-0.919469	0.0023	-0.294432	0.2157	-0.252137	0.3153
ω	0.000576	0.0000	0.000348	0.0102	0.000384	0.0064
α_i	0.284892	0.0000	0.350119	0.0211	0.314871	0.0232
β_j	-0.138679	0.3012	0.231895	0.2577	0.143345	0.5375
AIC	-4.511607		-4.603074		-4.598345	
SC	-4.448776		-4.529772		-4.525043	
HQ	-4.486662		-4.573973		-4.569244	

Source: Author's computations, 2017.

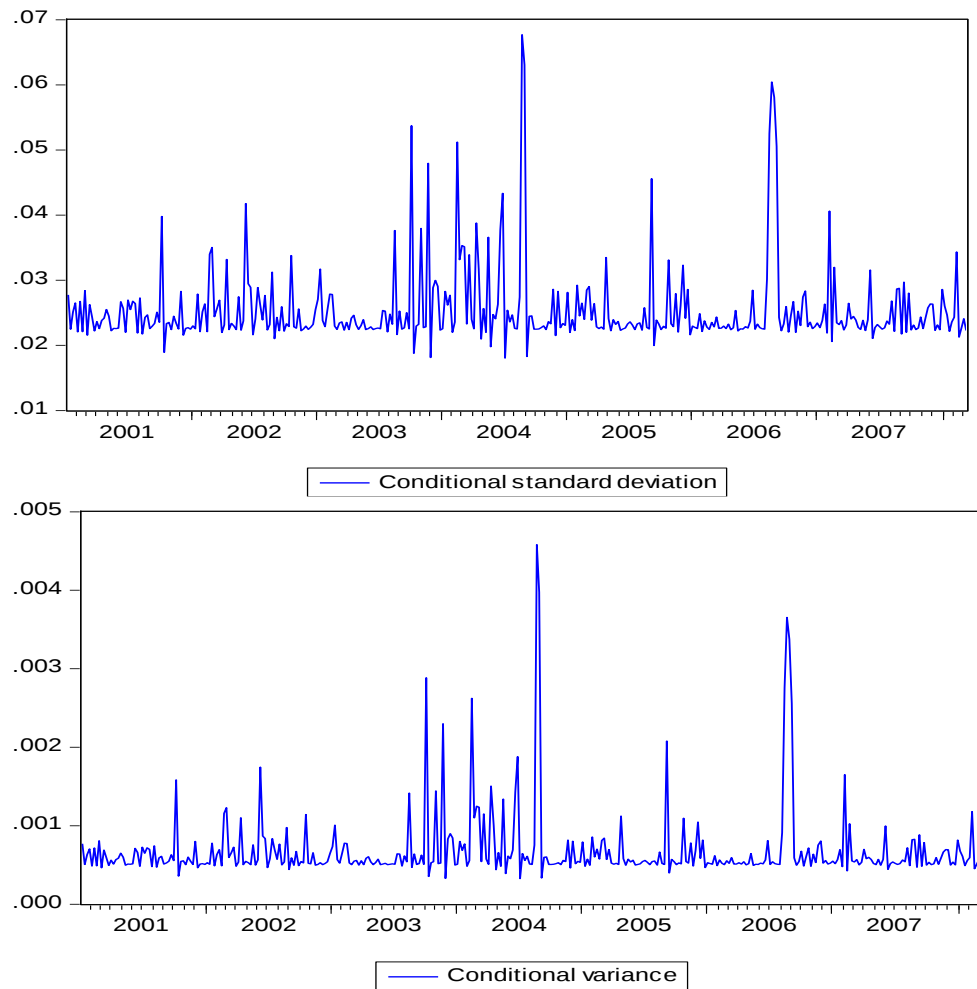
The result of the GARCH-in-Mean model in Table 4.8b shows that σ (standard deviation) has negative relationship with the All Share Index return on the Nigerian

Stock Exchange under the three (3) distributional assumptions. The P-value of the risk is 0.0023 under normal (Gaussian) distribution indicating that the negative relationship is statistically significant at 5% level while the p-value under student's t and generalized error distributional assumption are 0.2157 and 0.3153 respectively indicates that the negative relationship is statistically insignificant at 5% level.

This simply implies that there is inverse significant risk-return relationship in the All Share Index on the Nigerian Stock Exchange before the meltdown under the normal distribution assumption while the inverse relationship is not significant under the student's t and generalized error distribution assumptions for the period. An increase in risk will lead to a decrease in return and vice versa. The graphical representation of the risk (standard deviation) and return (variance) relationship is presented in figures 4.11a-c under the three (3) distributional assumptions.

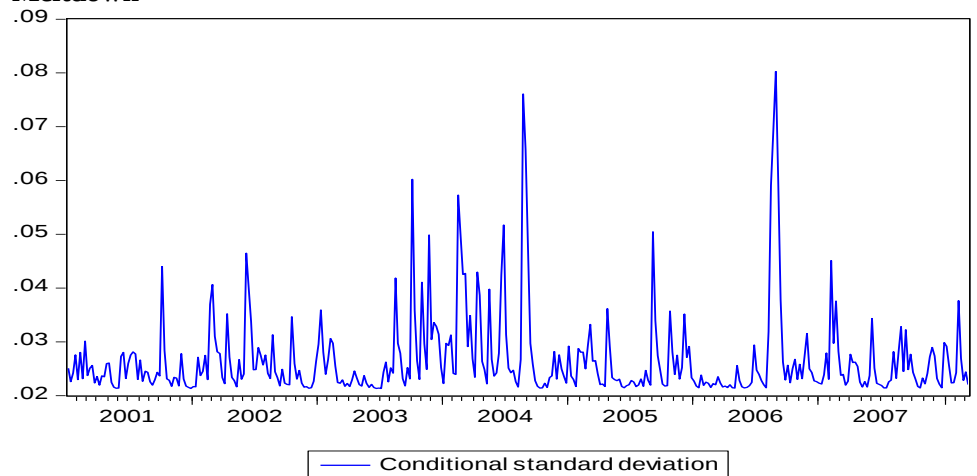
The Akaike Information Criterion, Schwarz Criterion and the Hannan-Quinn Criterion values shows that the estimates on weekly risk-return relationship of All Share index on the Nigerian Stock Exchange before the meltdown under the student's-t distribution has the lowest criterion values, indicating that the predictive ability of the GARCH-in-Mean model under the student's-t distributional assumptions is the best.

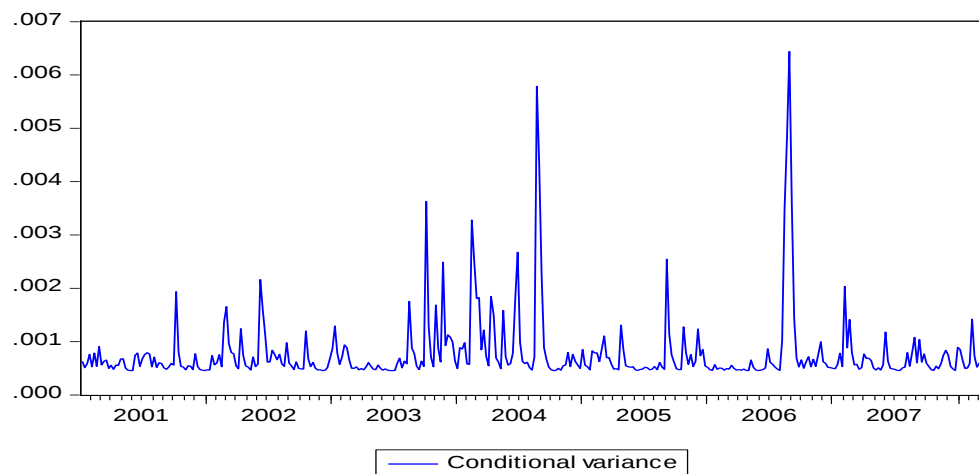
Figure 4.11a: Standard Deviation and Variance under Normal Distribution before the Meltdown



Source: *Author's computations, 2017.*

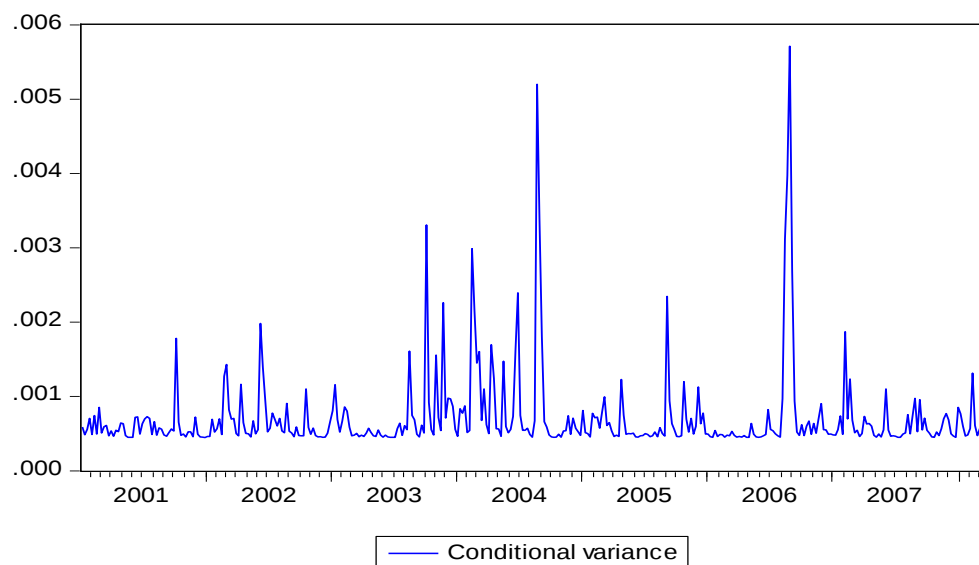
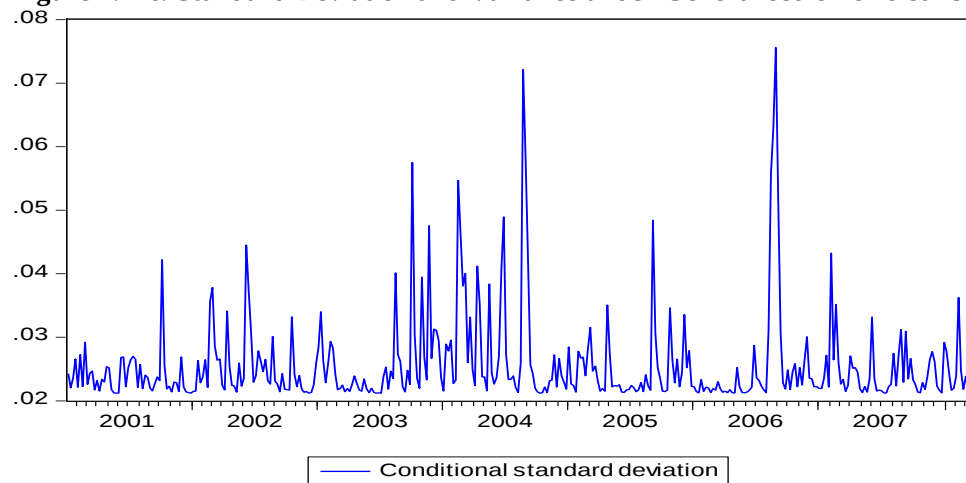
Figure 4.11b: Standard Deviation and Variance under Student's t Distribution before the Meltdown





Source: Author's computations, 2017.

Figure 4.11c: Standard Deviation and Variance under Generalised error distribution before Meltdown



Source: Author's computations, 2017.

Table 4.8c: GARCH-in-Mean Result for the All Share Index Return after the Meltdown

Parameters	Gaussian Distribution		Student's-t Distribution		Generalised Error Distribution	
	Estimates	P-Value	Estimates	P-Value	Estimates	P-Value
μ	0.193016	0.0005	0.133941	0.0149	0.140503	0.0084
σ	-0.120140	0.4110	-0.032694	0.8379	-0.111328	0.4669
ω	0.000076	0.0001	0.000084	0.0082	0.000079	0.0069
α_i	0.259118	0.0000	0.249891	0.0019	0.246734	0.0012
β_j	0.65755	0.0000	0.659479	0.0000	0.661926	0.0000
AIC	-4.428739		-4.465335		-4.466197	
SC	-4.369091		-4.395745		-4.396607	
HQ	-4.405122		-4.437782		-4.438644	

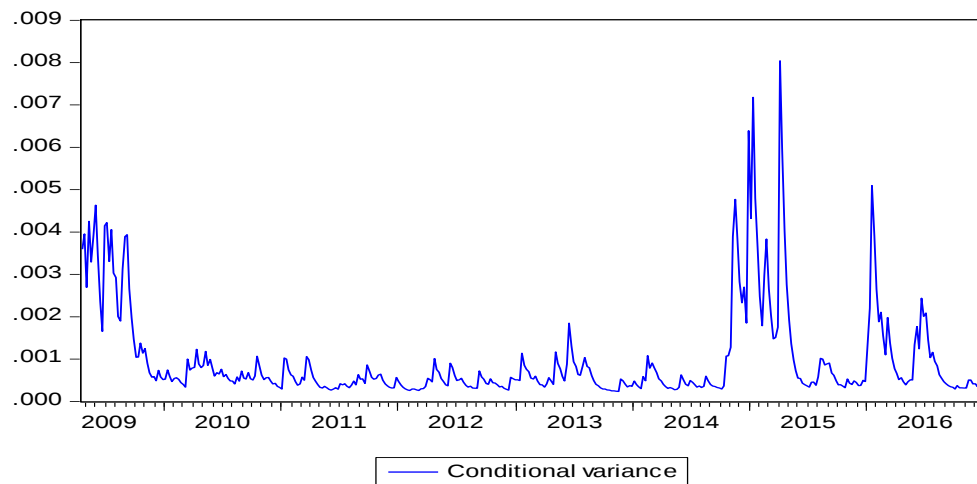
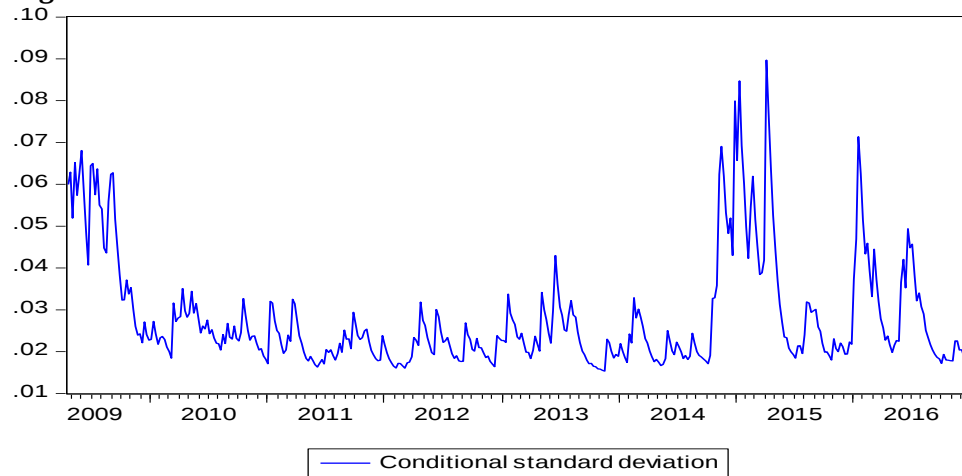
Source: Author's computations, 2017.

Table 4.8c is the result of GARCH-in-Mean model for All Share Index returns after the meltdown. It indicates that σ (standard deviation) as a measure of risk has negative relationship with the All Share Index return on the Nigerian Stock Exchange after the meltdown under the three (3) distributional assumptions. The P-value of the risk is 0.4110, 0.8379 and 0.4669 under the distributional assumptions indicating that the negative risk relationship is statistically not significant at 5% level.

This simply implies that there is insignificant inverse risk-return relationship in the All Share Index on the Nigerian Stock Exchange after the meltdown. An increase in risk will lead to a decrease in return and vice versa. The graphical representation of the risk (standard deviation) and return (variance) relationship is presented in figures 4.12a-c for the three (3) distributional assumptions.

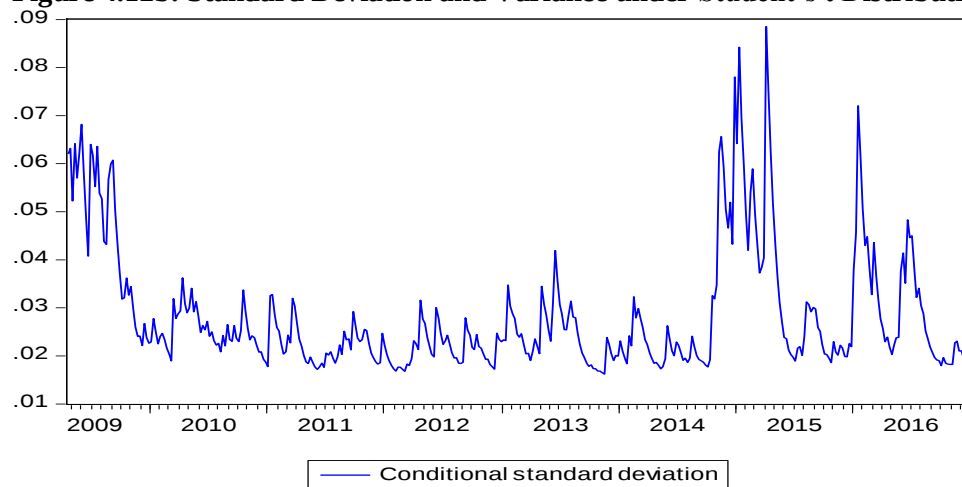
The Akaike Information Criterion, Schwarz Criterion and the Hannan-Quinn Criterion all have similar values with no significant difference but the generalised error distribution has the lowest criterion values which indicates that the predictive ability of the GARCH-in-Mean model under the generalised error distributional assumptions provide the best estimate of weekly risk-return relationship of All Share index on the Nigerian Stock Exchange after the meltdown.

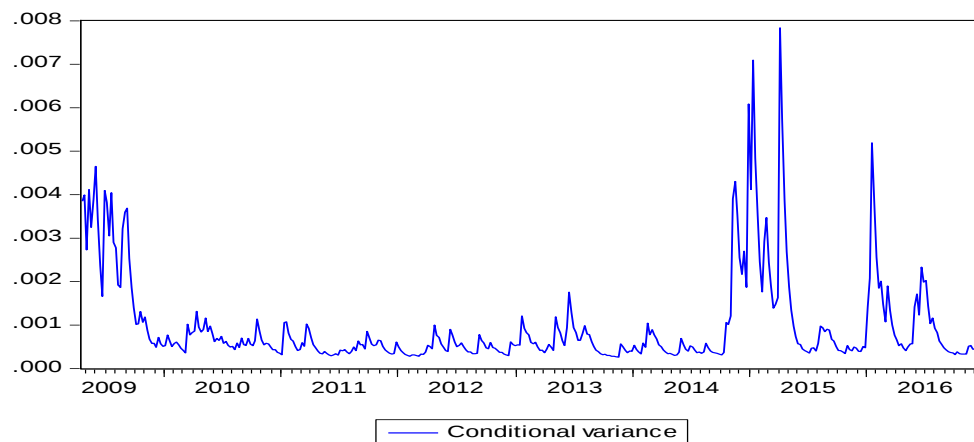
Figure 4.12a: Standard Deviation and Variance under Normal Distribution after the Meltdown



Source: *Author's computations, 2017.*

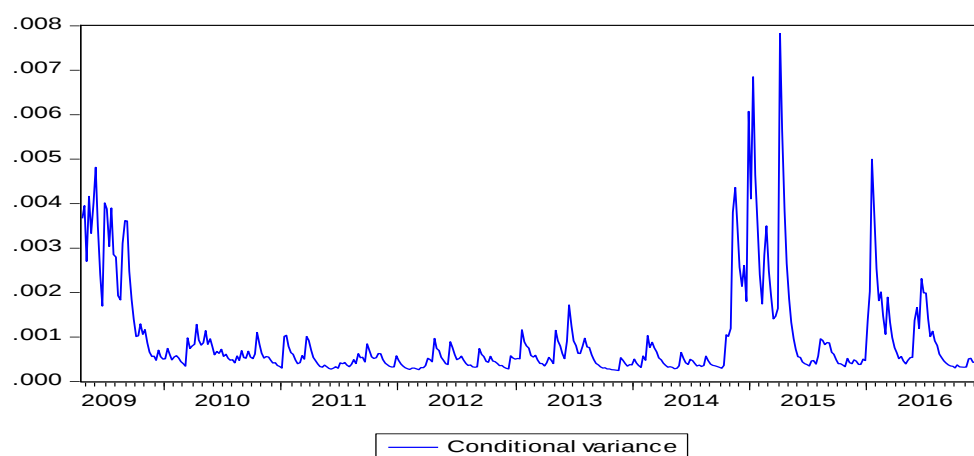
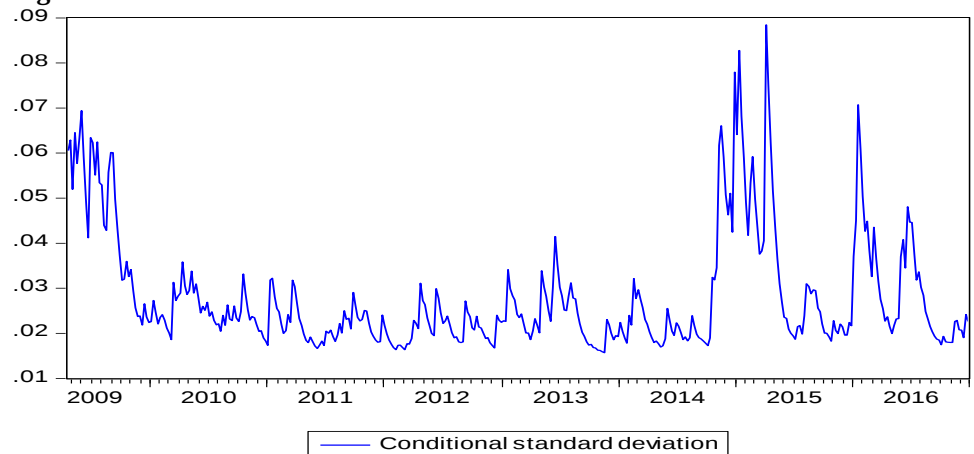
Figure 4.12b: Standard Deviation and Variance under Student's t Distribution after the Meltdown





Source: Author's computations, 2017.

Figure 4.12c: Standard Deviation and Variance under Generalised Error Distribution after Meltdown



Source: Author's computations, 2017.

In summary, the null hypothesis of risk-return relationship is rejected; therefore, there is negative risk-return relationship on the Nigerian Stock Exchange during the sample period (2001 till 2016), before the meltdown and after the meltdown. Indicating that All Share Index risk-

return relationship on the Nigerian Stock Exchange do not follow the traditional positive risk-return relationship but exhibit the behavioural approach which supports the prospect theory as a reasonable explanation for risk-return relationship on the Nigerian Stock Exchange.

Objective three: Magnitude of Volatility Persistence

The third objective of this study determines the magnitude of volatility persistence in All Share Index on the Nigerian Stock Exchange using the mean reverting and the half-life form of GARCH model stated in equation (9) and (10) since $\alpha + \beta$ determine how quickly the variance forecast converges to the unconditional variance. The values of $\alpha + \beta$ from the GARCH model and the half-life estimate are presented in table 4.8a-c for the whole All Share Index return series, the All Share Index return before the meltdown and All Share Index return after the meltdown under the three (3) distributional assumptions.

Table 4.9a: Mean Reversion and Half-life Estimate for All Share Index Return (Jan.2001-Dec.2016)

Parameters	Gaussian Distribution Estimates	Student's-t Distribution Estimates	Generalised Error Distribution Estimates
α	0.209177	0.306950	0.257695
β	0.731140	0.626216	0.669422
Total	0.940317	0.933166	0.927117
Half-life Estimate	11.26368	10.02061	9.159465
AIC	-4.346110	-4.423912	-4.420061
SC	-4.317776	-4.389911	-4.386059
HQ	-4.335247	-4.410876	-4.407025

Source: Author's computations, 2017.

The sum of ARCH and GARCH terms presented in table 4.9a are 0.9403, 0.9332 and 0.9271 (volatility is highly persistent and dying very slowly) under the three (3) distributional assumptions and are close to 1. This suggested that the All Share Index return series from Jan. 2001 till Dec. 2016 on the Nigerian Stock Exchange do not follow random walk which indicated that the return series is mean reverting. The average numbers of weeks for the volatility to revert to its long run level measured by the half-life estimate are 11, 10 and 9 weeks under the normal,

student's t and the generalized error distributions assumptions respectively. The All Share Index returns volatility appears to have quite long memory but it is still mean reverting and that new shock will impact on return for the period of 11, 10 or 9 weeks depending on the distributional assumption used by investor.

The student's t distribution estimates appears to have the lowest values among the model selection criteria suggesting that the estimates under the student's t provides the best prediction on the magnitude of volatility persistence in All Share Index return on the Nigerian Stock Exchange in the period of Jan. 2001 till Dec. 2016.

Table 4.9b: Mean Reversion and Half-life Estimate for All Share Index Return before the Meltdown

Parameters	Gaussian Distribution Estimates	Student's-t Distribution Estimates	Generalised Error Distribution Estimates
α	0.275426	0.362653	0.311980
β	0.040516	0.206215	0.170131
Total	0.315942	0.568868	0.482111
Half-life Estimate	0.601588	1.228752	0.950062
AIC	-4.493051	-4.423912	-4.602665
SC	-4.440692	-4.389911	-4.539834
HQ	-4.472264	-4.410876	-4.577721

Source: Author's computations, 2017.

The results in table 4.9b indicate that the volatility of All Share Index returns is of low persistent (symptomatic of response function to shock dying very fast), with the sum of ARCH and GARCH terms being 0.3159, 0.5689 and 0.4821. The average numbers of weeks for the volatility to revert to its long run level measured by the half-life estimate is one (1) week under the three (3) distributional assumptions. The All Share Index returns volatility on the Nigerian Stock Exchange before the meltdown appears to have short memory and still mean reverting since sum of $\alpha + \beta$ is significantly less than one. This implied that it takes a short time (1 week) for the All Share Index return volatility on the Nigerian Stock Exchange before the meltdown to return to its mean. Indicating that All Share Index return do not follow random walk and new

shock impacted on return for a short period of 1 week on the Nigeria Stock Exchange before the meltdown.

The generalized error distribution estimates appears to have the lowest values among the model selection criteria suggesting that the estimates under the generalized error distribution provides the best prediction on the magnitude of volatility persistence in All Share Index return on the Nigerian Stock Exchange before the meltdown.

Table 4.9c: Mean Reversion and Half-life Estimate for All Share Index Return after the Meltdown

Parameters	Gaussian Distribution Estimates	Student's-t Distribution Estimates	Generalised Error Distribution Estimates
α	0.263188	0.251813	0.251136
β	0.651247	0.656755	0.655032
Total	0.914435	0.908568	0.906168
Half-life Estimate	7.749086	7.228902	7.034845
AIC	-4.432640	-4.470225	-4.470240
SC	-4.382933	-4.410577	-4.410591
HQ	-4.412959	-4.446609	-4.446623

Source: *Author's computations, 2017.*

Table 4.9c shows the sum of the estimated ARCH and GARCH coefficients (persistence coefficients) for the three (3) distributional assumptions as 0.9144, 0.9086 and 0.9067 which is symptomatic of response function to shock dying very slowly (volatility is highly persistent). This suggested that the All Share Index return series on the Nigerian Stock Exchange after the meltdown do not follow random walk which indicated that the return series is mean reverting. The volatility half-life estimate is 8 weeks under the normal distribution and 7 weeks under the student's t and the generalized error distributions assumptions. The returns volatility appears to have long memory but it is still mean reverting such that new shock will impact the All Share Index return on the Nigeria stock Exchange for the period of 7 to 8 weeks after the meltdown depending on the distributional assumption used by investor.

The generalized error distribution estimates appears to have the lowest values among the model selection criteria suggesting that the estimates under the generalized error distribution

provides the best prediction on the magnitude of volatility persistence in All Share Index return on the Nigerian Stock Exchange before the meltdown.

In summary, the null hypothesis of no volatility magnitude is rejected; therefore, the All Share Index return on the Nigeria Stock Exchange exhibit high volatility magnitude during the period of 2001 till 2016 and during the period after the meltdown but exhibit very low volatility magnitude before the meltdown period. Indicating that All Share Index returns on the Nigerian Stock Exchange do not follow random walk and it is mean reverting.

Objective four: Impact of Good or Bad News

The fourth objective of this study investigates the impact of good or bad news on the All Share Index return volatility on the Nigerian Stock Exchange. Three (3) GARCH model variants (TGARCH, EGARCH and PGARCH) in equations (13), (14), (16), (17), (19) and (20) was employed for this purpose. Also the best fit model to measure impact of news was also determined using the information criterion values for the data covering 2001 till 2016, the period before the meltdown and period after the meltdown. The estimates of the GARCH volatility variants model are presented in Table 4.9a - 4.11c under the three (3) distributional assumptions.

Table 4.10a: EGARCH Result for All Share Index Returns (Jan.2001-Dec.2016)

Parameters	Gaussian Distribution		Student-t Distribution		Generalised Error Distribution	
	Estimates	P-Value	Estimates	P-Value	Estimates	P-Value
ω	-0.984091	0.0000	-1.350137	0.0000	-1.179687	0.0000
α_i	0.406681	0.0000	0.503874	0.0000	0.453196	0.0000
β_j	0.904908	0.0000	0.861747	0.0000	0.882789	0.0000
γ_i	0.024886	0.2687	0.009044	0.8418	0.010442	0.7988
AIC	-4.348117		-4.421615		-4.419720	
SC	-4.314115		-4.381946		-4.380051	
HQ	-4.335080		-4.406406		-4.404511	

Source: Author's computations, 2017.

Table 4.10a is showing the EGARCH results of All Share Index return on the Nigerian Stock Exchange from Jan. 2001 till Dec. 2016. The values of γ_i under the three (3) distributional

assumptions are positive and not significant with the p-values of more than 5% under the three (3) distributional assumptions. Since the EGARCH model expect the value of $\gamma_i < 0$ and be significant to show that bad (negative) news impact return volatility. The result therefore, indicates that All Share Index return volatility responds more to positive (good) news than it does to negative (bad) news of equal magnitude on the Nigerian Stock Exchange during the period of Jan. 2001 till Dec. 2016. The best fit estimate is the estimate of student's t distributional assumption as indicated by its lowest values of AIC, SIC and HQ selection criterions.

Table 4.10b: TGARCH Result for All Share Index Returns (Jan. 2001-Dec. 2016)

Parameters	Gaussian Distribution		Student-t Distribution		Generalised Error Distribution	
	Estimates	P-Value	Estimates	P-Value	Estimates	P-Value
ω	0.000065	0.0000	0.000106	0.0005	0.000085	0.0005
α_i	0.222407	0.0000	0.310639	0.0002	0.259409	0.0001
β_j	0.734685	0.0000	0.625814	0.0000	0.669574	0.0000
γ_i	-0.030392	0.4684	-0.006868	0.9440	-0.003670	0.9644
AIC	-4.344112		-4.421520		-4.417666	
SC	-4.310111		-4.381852		-4.377997	
HQ	-4.331076		-4.406311		-4.402457	

Source: *Author's computations, 2017.*

The TGARCH results of All Share Index return on the Nigerian Stock Exchange from Jan. 2001 till Dec. 2016 is shown in table 4.10b. The values of γ_i under the three (3) distributional assumptions are negative and not significant with the p-values of more than 5% under the three (3) distributional assumptions. Since the TGARCH model stipulates that the value of $\gamma_i > 0$ and be significant to show that bad (negative) news impact return volatility. The result therefore, shows that the All Share Index return volatility responds more to positive (good) news than it does to negative (bad) news of equal magnitude on the Nigerian Stock Exchange during the period of Jan. 2001 till Dec. 2016. The best fitted estimates is the student's t

distributional assumption as indicated by its lowest values of AIC, SIC and HQ selection criterions.

Table 4.10c: PGARCH Result for All Share Index Returns (Jan. 2001-Dec. 2016)

Parameters	Gaussian Distribution		Student-t Distribution		Generalised Error Distribution	
	Estimates	P-Value	Estimates	P-Value	Estimates	P-Value
ω	0.002457	0.0000	0.003511	0.0002	0.002914	0.0003
α_i	0.223391	0.0000	0.273960	0.0000	0.246750	0.0000
β_j	0.750645	0.0000	0.684373	0.0000	0.716557	0.0000
γ_i	-0.096434	0.0931	-0.066213	0.4896	-0.064878	0.4909
AIC	-4.353164		-4.423810		-4.422488	
SC	-4.319162		-4.384142		-4.382820	
HQ	-4.340128		-4.408602		-4.407279	

Source: Author's computations, 2017.

Table 4.10c is the PGARCH estimates of the All Share Index return on the Nigerian Stock Exchange from Jan. 2001 till Dec. 2016. The values of γ_i under the three (3) distributional assumptions are negative and not significant with the p-values of more than 5% under the three (3) distributional assumptions. Since the PGARCH model expect the value of $\gamma_i > 0$ and be significant to measure the impact of negative news on volatility persistence in return. The result therefore, implies that the All Share Index return volatility responds more to positive (good) news than it does to negative (bad) news of equal magnitude on the Nigerian Stock Exchange during the period of Jan. 2001 till Dec. 2016. The best fit estimate is that of student's t distributional assumption as indicated by its lowest values of AIC, SIC and HQ selection criterions.

Table 4.11a: EGARCH Result for All Share Index Returns before the Meltdown

Parameters	Gaussian Distribution		Student-t Distribution		Generalised Error Distribution	
	Estimates	P-Value	Estimates	P-Value	Estimates	P-Value
ω	-3.600938	0.0001	-3.357485	0.0027	-3.449198	0.0071
α_i	0.425184	0.0000	0.464896	0.0004	0.447181	0.0016
β_j	0.554590	0.0000	0.589288	0.0001	0.579662	0.0006
γ_i	0.188268	0.0012	0.222173	0.0181	0.201432	0.0386
AIC	-4.510513		-4.617320		-4.613668	
SC	-4.447682		-4.544018		-4.540366	
HQ	-4.485569		-4.588219		-4.584567	

Source: Author's computations, 2017.

Table 4.11a is the EGARCH estimates of the All Share Index return on the Nigerian Stock Exchange before the meltdown. The values of γ_i under the three (3) distributional assumptions are positive and significant with the p-values of less than 5% under the three (3) distributional assumptions. Since the EGARCH model expect the value of $\gamma_i < 0$ and should be significant to measure the impact of negative news on volatility persistence in return. The result therefore, shows that the All Share Index return volatility responds more to positive (good) news than it respond to negative (bad) news of the same magnitude on the Nigerian Stock Exchange before the meltdown. The best fit estiamates is the estimate of the student's t distributional assumption as indicated by its lowest values of AIC, SIC and HQ selection criterions.

Table 4.11b: TGARCH Result for All Share Index Returns before the Meltdown

Parameters	Gaussian Distribution		Student-t Distribution		Generalised Error Distribution	
	Estimates	P-Value	Estimates	P-Value	Estimates	P-Value
ω	0.000539	0.0000	0.000427	0.0002	0.000429	0.0001
α_i	0.508752	0.0025	0.684586	0.0202	0.590221	0.0344
β_j	-0.069307	0.2704	0.080761	0.5758	0.051166	0.7492
γ_i	-0.421652	0.0099	-0.583358	0.0497	-0.496082	0.0828
AIC	-4.511180		-4.617299		-4.611301	
SC	-4.448349		-4.543997		-4.537998	
HQ	-4.486236		-4.588198		-4.582199	

Source: *Author's computations, 2017.*

The TGARCH results of All Share Index return on the Nigerian Stock Exchange before the meltdown is shown in table 4.11b. The values of γ_i under the three (3) distributional assumptions are negative. γ_i is not significant with p-values of more than 5% under the two (2) distributional assumptions (student-t and generalized error distributions) but significant with p-values of less than 5% under Gaussian/normal distributional assumption. Since the TGARCH model stipulates that the value of $\gamma_i > 0$ and be significant to show that bad (negative) news impact return volatility. The result therefore, implies that the All Share Index return volatility responds more to positive (good) news than it does to negative (bad) news of the same

magnitude on the Nigerian Stock Exchange before the meltdown. The best fit estimate is the estimate of student's t distributional assumption as indicated by its lowest values of AIC, SIC and HQ selection criterions.

Table 4.11c: PGARCH Result for All Share Index Returns before the Meltdown

Parameters	Gaussian Distribution		Student-t Distribution		Generalised Error Distribution	
	Estimates	P-Value	Estimates	P-Value	Estimates	P-Value
ω	0.017738	0.0000	0.013260	0.0034	0.013396	0.0076
α_i	0.275832	0.0000	0.296394	0.0008	0.283553	0.0025
β_j	0.098903	0.5644	0.275756	0.1398	0.258257	0.2279
γ_i	-0.594108	0.0000	-0.616583	0.0031	-0.587484	0.0093
AIC	-4.520745		-4.622894		-4.618755	
SC	-4.457914		-4.549591		-4.545452	
HQ	-4.495801		-4.593792		-4.589653	

Source: Author's computations, 2017.

Table 4.11c is the PGARCH estimates of the All Share Index return on the Nigerian Stock Exchange before meltdown. The values of γ_i under the three (3) distributional assumptions are negative and significant with the p-values less than 5%. Since the PGARCH model expect the value of $\gamma_i > 0$ and be significant to measure the impact of negative news on volatility persistence in return. The result therefore, means that the All Share Index return volatility responds more to positive (good) news than it does to negative (bad) news of equal magnitude on the Nigerian Stock Exchange before the meltdown. The best fitted estimates are the estimates of student's t distributional assumption as indicated by its lowest values of AIC, SIC and HQ selection criterions.

Table 4.12a: EGARCH Result for All Share Index Returns after the Meltdown

Parameters	Gaussian Distribution		Student-t Distribution		Generalised Error Distribution	
	Estimates	P-Value	Estimates	P-Value	Estimates	P-Value
ω	-0.896216	0.0000	-1.029234	0.0008	-0.968353	0.0007
α_i	0.396051	0.0000	0.421471	0.0000	0.402033	0.0000
β_j	0.918586	0.0000	0.901778	0.0000	0.909339	0.0000
γ_i	-0.026341	0.5220	-0.033144	0.5654	-0.032853	0.5633
AIC	-4.419304		-4.461270		-4.461114	
SC	-4.359655		-4.391680		-4.391524	
HQ	-4.395687		-4.433716		-4.433560	

Source: Author's computations, 2017.

Table 4.12a is the EGARCH estimates of the All Share Index return on the Nigerian Stock Exchange after the meltdown. The values of γ_i under the three (3) distributional assumptions are negative but not statistically significant with the p-values of more than 5% under the three (3) distributional assumptions. Since the EGARCH model expect the value of $\gamma_i < 0$ and should be significant to measure the impact of negative news on volatility persistence in return. The result therefore, shows that the All Share Index return volatility responds more to negative (bad) news than it respond to positive (good) news of the same magnitude on the Nigerian Stock Exchange after the meltdown but not significant. The best fit estimate is the estimate of the student's t distributional assumption as indicated by its lowest values of AIC, SIC and HQ selection criterions.

Table 4.12b: TGARCH Result for All Share Index Returns after the Meltdown

Parameters	Gaussian Distribution		Student-t Distribution		Generalised Error Distribution	
	Estimates	P-Value	Estimates	P-Value	Estimates	P-Value
ω	0.000076	0.0001	0.000082	0.0093	0.000078	0.0075
α_i	0.227709	0.0011	0.207216	0.0200	0.204319	0.0230
β_j	0.659695	0.0000	0.666262	0.0000	0.666659	0.0000
γ_i	0.057570	0.5081	0.078312	0.4977	0.078015	0.4946
AIC	-4.428428		-4.466387		-4.466420	
SC	-4.368779		-4.396797		-4.396830	
HQ	-4.404811		-4.438833		-4.438867	

Source: *Author's computations, 2017.*

The TGARCH results of All Share Index return on the Nigerian Stock Exchange after the meltdown is shown in table 4.12b. The values of γ_i under the three (3) distributional assumptions are positive and not statistically significant with the p-values of more than 5% under the three (3) distributional assumptions. Since the TGARCH model stipulates that the value of $\gamma_i > 0$ and be significant to show that bad (negative) news impact return volatility. The result therefore, implies that the All Share Index return volatility responds more to negative (bad) news than it does to positive (good) news of the same magnitude on the Nigerian Stock Exchange after the meltdown

but not significant. The best fitted estimates are the estimates of the generalized error distributional assumption as indicated by its lowest values of AIC, SIC and HQ selection criterions.

Table 4.12c: PGARCH Result for All Share Index Returns after the Meltdown

Parameters	Gaussian Distribution		Student-t Distribution		Generalised Error Distribution	
	Estimates	P-Value	Estimates	P-Value	Estimates	P-Value
ω	0.002437	0.0001	0.002703	0.0075	0.002562	0.0066
α_i	0.232733	0.0000	0.233793	0.0000	0.228678	0.0000
β_j	0.733187	0.0000	0.725635	0.0000	0.731003	0.0000
γ_i	0.031381	0.7800	0.037662	0.8017	0.047045	0.7610
AIC	-4.429468		-4.467155		-4.467240	
SC	-4.369820		-4.397565		-4.397650	
HQ	-4.405851		-4.439601		-4.439686	

Source: *Author's computations, 2017.*

Table 4.12c is the PGARCH estimates of the All Share Index return on the Nigerian Stock Exchange after meltdown. The values of γ_i under the three (3) distributional assumptions are positive and not statistically significant with the p-values of more than 5% under the three (3) distributional assumptions. Since the PGARCH model expect the value of $\gamma_i > 0$ and be significant to measure the impact of negative news on volatility persistence in return. The result therefore, means that the All Share Index return volatility responds more to negative (bad) news than it does to positive (good) news of equal magnitude on the Nigerian Stock Exchange after the meltdown but not significant. The best fit estimate is that of the generalized error distributional assumption as indicated by its lowest values of AIC, SIC and HQ selection criterion.

In summary, the results of the EGARCH, TGARCH and PGARCH indicated that positive news impact return volatility on the Nigerian Stock Exchange more than negative news of the same magnitude during Jan. 2001 till Dec. 2016 and for periods before the meltdown while negative news insignificantly impact return volatility more than positive news on the Nigerian Stock Exchange after the meltdown. The students't distributional assumption estimates was

found to be the best fitted estimates under the three (3) models for period of Jan. 2001 till Dec. 2016 and for period before the meltdown with the PGARCH model gives the best estimate for the period of Jan. 2001 till Dec. 2016 and after the meltdown. The student's t estimates was found to be the fitted estimates under the EGARCH after the meltdown while the generalized error distributional assumption estimates was the best fitted under the TGARCH and PGARCH after the meltdown with the PGARCH model providing the best estimate for the period after the meltdown.

Overall, the null hypothesis of no significant impact of good or bad news on return volatility in the Nigerian Stock Exchange is rejected; therefore, the All Share Index return on the Nigeria Stock Exchange respond to good news before the meltdown and for period Jan. 2016 till Dec 2016 while the All Share Index return on the Nigeria Stock Exchange insignificantly respond to bad news after the meltdown.

4.2.1 Diagnostic Checking

The diagnostic tests of serial correlation and ARCH effect was conducted on the residual of the estimates selected as the best fitted model as indicated by the model selection criterion under the various objectives in order to ascertain the desirability and suitability of the model for policy consideration, implementation and professional practice.

The first objective of this study tests the efficiency of the Nigerian Stock Exchange and the GARCH model in equation (7) and (8) was employed. The result of the GARCH model as presented in table 4.6a-c indicated that the estimates of the student's t distributional assumption was the best fitted model for the period Jan. 2001 till Dec. 2016 and before the meltdown while the generalized error distributional assumptions estimate was the best fitted model for the period

after the meltdown. The ARCH effect test and the serial correlation test result of the best fitted GARCH models are presented in Table 4.12a and b.

Table 4.13a: ARCH Effect Test Result of fitted GARCH Models

Test Statistics	GARCH 2001 - 2016		GARCH before Meltdown		GARCH after Meltdown	
	Student's t Distribution		Student's-t Distribution		Generalised Error Distribution	
	Values	P-Value	Values	P-Value	Values	P-Value
F-statistics	0.261879	0.6090	0.146275	0.7023	0.249154	0.6179
Observed R ²	0.262427	0.6085	0.147004	0.7014	0.250247	0.6169

Source: Author's computations, 2017.

Table 4.13a is the ARCH effect test result of the fitted model residuals of the GARCH models used for objective one. The p-values of the f-statistics and the observed R² are more than 5% significant level therefore the null hypothesis of no ARCH effect is accepted. This indicates that the GARCH fitted models under the selected distributional assumptions have no ARCH effect.

TABLE 4.13b: Correlogram of Standardized Residual Square Test Results for Fitted Models

GARCH Model 2001 – 2016					GARCH Model before meltdown				GARCH Model after meltdown			
Lag	AC	PAC	Q-Stat	P	AC	PAC	Q-Stat	P	AC	PAC	Q-Stat	P
1	-0.018	-0.018	0.2636	0.608	-0.020	-0.020	0.1485	0.700	-0.025	-0.025	0.2527	0.615
2	0.017	0.016	0.4973	0.780	-0.020	-0.020	0.2936	0.863	0.032	0.031	0.6667	0.717
3	-0.037	-0.036	1.6278	0.653	-0.002	-0.002	0.2946	0.961	-0.018	-0.016	0.7935	0.851
4	-0.055	-0.057	4.2070	0.379	-0.016	-0.017	0.3973	0.983	-0.031	-0.033	1.1897	0.880
5	-0.031	-0.032	5.0292	0.412	0.025	0.024	0.6356	0.986	-0.028	-0.028	1.5039	0.913
6	-0.052	-0.053	7.2755	0.296	-0.064	-0.064	2.2109	0.899	-0.027	-0.027	1.8063	0.937
7	0.083	0.078	13.041	0.071	0.125	0.124	8.2374	0.312	0.102	0.102	6.1259	0.525
8	-0.003	-0.004	13.048	0.110	0.067	0.069	9.9468	0.269	-0.024	-0.020	6.3659	0.606
9	0.032	0.022	13.901	0.126	0.024	0.033	10.166	0.337	0.008	-0.003	6.3911	0.700
10	0.009	0.009	13.967	0.175	-0.004	-0.002	10.172	0.426	0.004	0.006	6.3981	0.781
11	-0.053	-0.049	16.305	0.130	-0.007	-0.001	10.192	0.513	-0.110	-0.108	11.465	0.405
12	0.037	0.040	17.450	0.133	0.029	0.021	10.510	0.571	0.057	0.058	12.806	0.383
13	-0.002	0.013	17.452	0.179	0.027	0.042	10.791	0.628	-0.040	-0.028	13.486	0.411
14	0.030	0.023	18.242	0.196	0.061	0.057	12.256	0.586	0.061	0.043	15.036	0.376
15	0.014	0.016	18.400	0.242	0.046	0.038	13.075	0.597	-0.001	0.004	15.036	0.449
16	-0.042	-0.046	19.886	0.225	-0.032	-0.039	13.476	0.638	-0.055	-0.067	16.314	0.431
17	-0.029	-0.033	20.616	0.244	-0.048	-0.053	14.394	0.639	-0.016	-0.020	16.422	0.494
18	-0.042	-0.027	22.108	0.227	-0.019	-0.020	14.531	0.694	-0.050	-0.023	17.478	0.490

L, AC, PAC, Q-Stat and P indicate the lags, the autocorrelation function, the partial correlation function, the Ljung–Box Q–Statistic and the probability respectively.

Source: Author's computations, 2017.

The serial correlation test result is shown in Table 4.12b under the autocorrelation function, the partial correlation function, the Ljung–Box Q–Statistic and the probabilities with lag 1 to lag 18 for the residuals of the fitted models. The probability values from lag 1 to 18 are all more than 5% significant level which suggests that the null hypothesis of no serial correlation is accepted. Thus, the diagnostic test of ARCH effect and serial correlation test result indicates that the fitted GARCH model estimates and findings are good for policy consideration, implementation and professional practice.

The second objective of this study tests the risk-return relationship of stock prices on the Nigerian Stock Exchange using the GARCH-in-mean model of equation (11). The result of the GARCH-in-mean models as presented in Table 4.7a-c indicated that the estimates of the student's t distributional assumption was the best fitted model for the period Jan. 2001 till Dec. 2016 and before the meltdown while the generalized error distributional assumptions estimate was the best fitted model for the period after the meltdown. The ARCH effect test and the serial correlation test result of the best fitted GARCH-in-mean models are presented in Table 4.13a and b.

Table 4.14a: ARCH Effect Test Result of Fitted GARCH-in-Mean Models

Test Statistics	GARCH-in-mean 2001 - 2016		GARCH-in-mean before meltdown		GARCH-in mean after meltdown	
	Student's t Distribution Estimates	P-Value	Student's-t Distribution Estimates	P-Value	Generalised Error Distribution Estimates	P-Value
F-statistics	0.136692	0.7117	0.050803	0.8218	0.210305	0.6468
Observed R ²	0.136998	0.7113	0.051069	0.8212	0.211247	0.6458

Source: *Author's computations, 2017.*

Table 4.13a is the result of ARCH effect test on the fitted model residuals of the GARCH-in-mean models used for objective two. The p-values of the f-statistics and the observed R² are more than 5% significant level for the fitted GARCH-in-mean models residual ARCH test result. Thus, the null hypothesis of no ARCH effect is accepted. This indicates that

the GARCH-in-mean fitted models under the selected distributional assumptions have no ARCH effect.

TABLE 4.14b: Correlogram of Standardized Residual Square Test Results for Fitted Models

GARCH-in-mean Model 2001 - 2016					GARCH-in-mean Model before meltdown				GARCH-in-mean Model after meltdown			
Lag	AC	PAC	Q-Stat	P	AC	PAC	Q-Stat	P	AC	PAC	Q-Stat	P
1	-0.013	-0.013	0.1376	0.711	-0.012	-0.012	0.0516	0.820	-0.023	-0.023	0.2133	0.644
2	0.021	0.021	0.5241	0.769	-0.025	-0.025	0.2890	0.865	0.030	0.029	0.5705	0.752
3	-0.039	-0.038	1.7776	0.620	-0.010	-0.011	0.3266	0.955	-0.017	-0.016	0.6909	0.875
4	-0.052	-0.053	4.0066	0.405	-0.015	-0.016	0.4179	0.981	-0.026	-0.028	0.9710	0.914
5	-0.035	-0.035	5.0503	0.410	0.024	0.023	0.6349	0.986	-0.034	-0.034	1.4438	0.919
6	-0.051	-0.051	7.2198	0.301	-0.066	-0.067	2.3174	0.888	-0.021	-0.021	1.6249	0.951
7	0.074	0.070	11.842	0.106	0.123	0.123	8.0917	0.325	0.100	0.101	5.7429	0.570
8	-0.003	-0.004	11.849	0.158	0.061	0.061	9.5299	0.300	-0.024	-0.021	5.9881	0.649
9	0.032	0.022	12.737	0.175	0.028	0.036	9.8357	0.364	0.008	-0.001	6.0174	0.738
10	0.010	0.010	12.824	0.234	-0.006	-0.003	9.8519	0.454	0.006	0.008	6.0320	0.813
11	-0.049	-0.047	14.838	0.190	-0.007	0.003	9.8709	0.542	-0.111	-0.109	11.133	0.432
12	0.034	0.037	15.827	0.199	0.030	0.022	10.210	0.598	0.053	0.055	12.285	0.423
13	-0.000	0.013	15.827	0.259	0.022	0.038	10.407	0.660	-0.039	-0.029	12.935	0.453
14	0.037	0.031	17.022	0.255	0.064	0.058	11.994	0.607	0.068	0.051	14.861	0.388
15	0.015	0.018	17.211	0.306	0.045	0.039	12.773	0.620	0.002	0.008	14.862	0.461
16	-0.046	-0.051	19.000	0.269	-0.036	-0.044	13.295	0.651	-0.058	-0.073	16.284	0.433
17	-0.031	-0.034	19.815	0.284	-0.048	-0.051	14.221	0.651	-0.019	-0.021	16.434	0.493
18	-0.039	-0.024	21.092	0.275	-0.017	-0.016	14.331	0.707	-0.048	-0.023	17.423	0.494

L, AC, PAC, Q-Stat and P indicate the lags, the autocorrelation function, the partial correlation function, the Ljung–Box Q–Statistic and the probability respectively.

Source: *Author's computations, 2017.*

The serial correlation test result in Table 4.13b shows the autocorrelation function, the partial correlation function, the Ljung–Box Q–Statistic and the probabilities with lag 1 to lag 18 for the residuals of the fitted GARCH-in-mean models. The probability values from lag 1 to 18 are all more than 5% significant level, suggesting that the null hypothesis of no serial correlation should be accepted. Thus, the diagnostic test of ARCH effect and serial correlation indicates that the fitted GARCH-in-mean model estimates and findings are good for policy consideration, implementation and professional practice.

The third objective of this study determines the magnitude of volatility persistence in All Share Index return on the Nigerian Stock Exchange using the mean reverting and the half-life

form of GARCH model stated in equation (9) and (10). Since the mean reverting and the half-life estimates were determined from the GARCH model which had been (under first objective above) tested for appropriateness (diagnostic test) means that the estimates and findings of the mean reverting and the half-life form of GARCH model are desirable for policy consideration, implementation and professional practice.

The fourth objective of this study is to investigate the impact of good or bad news on the All Share Index return volatility on the Nigerian Stock Exchange using three (3) GARCH model variants (EGARCH, TGARCH and PGARCH) in equations (13), (14), (16), (17), (19) and (20). The result of the EGARCH, TGARCH and PGARCH model was presented in Table 4.9a-4.11c. Using the data of Jan. 2001 till Dec. 2016, the estimates of the student's t distributional assumption under the EGARCH, TGARCH and PGARCH models was the best fitted model while the student's t distributional assumption estimates under the PGARCH was the overall best fitted model for the period Jan. 2001 till Dec. 2016. Considering the period before the meltdown, the estimates of the student's t distributional assumptions under the EGARCH, TGARCH and PGARCH models are the fitted models while the student's t distributional assumption estimates under the PGARCH was the overall best fitted model for the period before the meltdown. The result of the estimates for the period meltdown shows that the student's t distributional assumption estimate is the fitted model under the EGARCH model and the generalized error distributional assumption estimate is the fitted model under TGARCH and PGARCH models while the overall best fitted model is the generalized error distributional assumptions under PGARCH for the period after the meltdown.

Thus, the diagnostic check was conducted on the residuals of student's t distributional assumption estimates under the PGARCH model for the period of Jan. 2001 till Dec. 2016 and

for period before the meltdown while the residuals of the generalized error distributional assumption estimate under the PGARCH model was check for model appropriateness (diagnostic check) for the period after the meltdown. The ARCH effect test and the serial correlation test results of the fitted PGARCH models are presented in Table 4.13a and b.

Table 4.15a: ARCH Effect Test Result of fitted PGARCH Models

Test Statistics	PGARCH 2001 - 2016		PGARCH before meltdown		PGARCH after meltdown	
	Student's t Distribution Value	P-Value	Student's-t Distribution Estimates	P-Value	Generalised Error Distribution Estimates	P-Value
F-statistics	0.021711	0.8829	0.426350	0.5142	0.065259	0.7985
Observed R ²	0.021762	0.8827	0.428152	0.5129	0.065576	0.7979

Source: *Author's computations, 2017.*

Table 4.13a is the ARCH effect test result of the fitted model residuals of the PGARCH models used for objective four. The p-values of the f-statistics and the observed R² are more than 5% significant level therefore the null hypothesis of no ARCH effect is accepted. This indicates that the fitted PGARCH models estimates under the selected distributional assumptions have no ARCH effect.

TABLE 4.15b: Correlogram of Standardized Residual Square Test Results for Fitted Models

PGARCH Model 2001 – 2016					PGARCH Model before meltdown				PGARCH Model after meltdown			
Lag	AC	PAC	Q-Stat	P	AC	PAC	Q-Stat	P	AC	PAC	Q-Stat	P
1	-0.005	-0.005	0.0219	0.882	0.034	0.034	0.4326	0.511	-0.013	-0.013	0.0662	0.797
2	0.040	0.040	1.3653	0.505	0.012	-0.013	0.4897	0.783	0.045	0.045	0.8897	0.641
3	-0.042	-0.041	2.8195	0.420	-0.018	-0.017	0.6105	0.894	-0.028	-0.027	1.2133	0.750
4	-0.050	-0.053	4.9597	0.291	-0.013	-0.012	0.6750	0.954	-0.022	-0.024	1.4034	0.844
5	-0.031	-0.028	5.7491	0.331	0.021	0.022	0.8500	0.974	-0.022	-0.020	1.5969	0.902
6	-0.051	-0.049	7.9466	0.242	-0.056	-0.058	2.0434	0.916	-0.022	-0.021	1.7977	0.937
7	0.097	0.095	15.837	0.027	0.050	0.054	2.9992	0.885	0.103	0.104	6.1816	0.519
8	-0.005	-0.005	15.860	0.044	0.031	0.026	3.3680	0.909	-0.022	-0.020	6.3847	0.604
9	0.040	0.026	17.212	0.045	0.018	0.016	3.4875	0.942	0.011	-0.001	6.4334	0.696
10	0.011	0.014	17.316	0.068	-0.002	-0.003	3.4889	0.967	0.010	0.016	6.4754	0.774
11	-0.052	-0.050	19.649	0.050	-0.015	-0.009	3.5725	0.981	-0.110	-0.110	11.543	0.399
12	0.045	0.050	21.377	0.045	-0.000	-0.004	3.5726	0.990	0.087	0.090	14.682	0.259
13	-0.004	0.013	21.394	0.065	0.026	0.031	3.8418	0.993	-0.046	-0.033	15.578	0.273
14	0.043	0.029	22.951	0.061	0.097	0.095	7.4895	0.914	0.049	0.025	16.595	0.278
15	0.023	0.028	23.420	0.076	0.051	0.044	8.4937	0.902	-0.010	0.001	16.634	0.341
16	-0.038	-0.046	24.629	0.077	-0.023	-0.026	8.7042	0.925	-0.059	-0.073	18.114	0.317
17	-0.028	-0.031	25.293	0.088	-0.051	-0.047	9.7223	0.915	-0.019	-0.018	18.260	0.373
18	-0.050	-0.029	27.438	0.071	-0.022	-0.017	9.9166	0.935	-0.055	-0.027	19.561	0.358

L, AC, PAC, Q-Stat and P indicate the lags, the autocorrelation function, the partial correlation function, the Ljung–Box Q–Statistic and the probability respectively.

Source: *Author’s computations, 2017.*

The serial correlation test result is shown in Table 4.13b under the autocorrelation function, the partial correlation function, the Ljung–Box Q–Statistic and the probabilities with lag 1 to lag 18 for the residuals of the fitted PGARCH models. The probability values from lag 1 to 18 are all more than 5% significant level, suggesting that the null hypothesis of no serial correlation is accepted. Thus, the diagnostic test of ARCH effect and serial correlation of the fitted PGARCH model estimates and findings are good for policy consideration, implementation and professional practice.

In summary, the diagnostic check results of ARCH effect and serial correlation test indicated that the GARCH model and its variant do not have ARCH effect and no serial correlation in the residuals of the fitted model.

4.3 Discussion of Findings

The first objective tests the efficiency of the Nigerian Stock Exchange and the objective was achieved with GARCH model in equation (7) and (8). Findings shows that the previous week return squared residual and the previous week return variance with p-values of 0.0000 for the three (3) distributional assumptions are statistically significant in predicting current week variance of All Share index return on the Nigerian Stock Exchange at 5% significant level. Implying that investor can predict current week stock return by studying past week stock return movement on the Nigerian Stock Exchange and achieve a performance better than the market All Share Index return.

It points to the fact that security return on Nigerian Stock Exchange do not reflect all past information during Jan. 2001 till Dec. 2016, before and after the meltdown indicating that the market is not efficient in the weak form which is in line with the submission of Adelegan (2004), Emenike (2008), Agwuegbo, et. al (2010), Ogege and Mojekwu (2013), Afego (2012), Nwosa and Oseni (2011), Ogege and Udoka (2012) Rahman, Simon and Hossain (2016) but in contrast with oke and Azeez (2012), Ogundina and Omah (2013), Ajao and Osayuwu (2012), and Udoka (2012). The student's t distribution having the best estimate for the period of Jan. 2001 till Dec. 2016 and period before the meltdown while the generalized error distributional assumption provide the best fitted estimate for the return series after the meltdown on the Nigerian Stock Exchange.

To test for the semi-strong form efficiency, the market model (mean equation) developed by Fama et. al (1969) was used to calculate the abnormal and cumulative abnormal returns using the meltdown as the event window. The cumulative abnormal returns values from the three (3) distributional assumptions shows that cumulative abnormal profit on the Nigerian Stock

Exchange have been increasing from zero (0) to positive but during the meltdown the cumulative abnormal profit reduces and started increasing for few weeks after the meltdown. This characteristic is a sign that the Nigerian Stock Exchange is efficient in the semi-strong form.

This shows that no investor can outperform the market or earn abnormal return by analysing existing relevant information or event study available in financial dailies or magazines because such information is already impounded in the current security prices which is supported by the findings of and Manasseh (2014) Manasseh, Ozuzu and Ogbuabo (2016), Oludoyi (1997) and Mukora (2014) but in disagreement with the findings of Adelegan (2009), Eleke-Aboagye and Opoku (2013), Nneji (2013) and Osei (2002). The trends of the abnormal returns under the three (3) distributional assumptions are similar when the financial meltdown period is used as the event window meaning that the All Share index has incorporated all abnormal returns during the periods.

The second objective of this study examines the risk-return relationship of stock prices on the Nigerian Stock Exchange and the objective was achieved with the GARCH-in-mean model of equation (11). Findings show that there is statistically significant negative relationship between σ (standard deviation) measuring the risk and All Share Index return on the Nigerian Stock Exchange under the three (3) distributional assumptions with p-values of less than 5% significant level during the period of Jan. 2001 till Dec. 2016, the pre meltdown and post meltdown period.

This suggests that investor face higher risk in relation to return as a result of the significant inverse risk-return relationship on the Nigerian Stock Exchange. The finding is supported by Mahmood and Shah (2015), Jegers (1991), Treacy, (1980), Feigenbaum and Thomas (1985), Bettis and Mahajan, (1985), Brockett, Cooper, Kwon, Ruefli (2003), Godlewski

(2007), Han (2013), Song, An, Yang, and Huang (2012) and Lettau and Ludvigson (2003). This is in tandem with the assertion of prospect theory, found empirically by Fisher and Hall (1969); Neuman, Bobel and Haid (1979), Kahneman and Tversky (1979), Raputsoane (2009), Guo and Whitelaw (2003) but in contrast with the standard finance studies of positive risk-return relationship. The student's-t distributional assumptions of the GARCH-in-mean model provide the best estimate of weekly risk-return relationship of All Share index on the Nigerian Stock Exchange for the sample period (Jan. 2001 till Dec. 2016) and before the meltdown. The generalized error distributional assumptions provide the best estimate of weekly risk-return relationship of All Share index on the Nigerian Stock Exchange after the meltdown.

The third objective of this study is to determine the magnitude of volatility persistence in All Share Index on the Nigerian Stock Exchange using the mean reverting and the half-life form of GARCH model stated in equation (9) and (10). Findings show that volatility is highly persistent under the three (3) distributional assumptions for the period of Jan. 2001 till Dec. 2016 and period after the meltdown while volatility is low under three (3) distributional assumptions for the period before the meltdown. The average numbers of weeks for the volatility to revert to its long run level measured by the half-life estimate are 11, 10 and 9 weeks under the normal, student's t and the generalized error distributions assumptions respectively for the period of Jan. 2001 till Dec. 2016. The average number of week for volatility to revert after the meltdown is 8 weeks under the normal distribution and 7 weeks under the student's t and the generalized error distributions assumptions while it takes 1 week during the period before the meltdown.

This implies that investor face higher volatility persistence in return on the Nigerian Stock Exchange during the sample period (Jan. 2001 till Dec. 2016) and after the meltdown. This finding is in agreement with Ahmed and Suliman (2011), Goudarzi (2013), Osazevbaru (2014),

Yin, Tsui and Zhang (2011). However, investors face lower volatility persistence before the meltdown in agreement with Okpara and Nwezeaku (2009) but still mean reverting in contrast with Okpara (2010), Nwidobie (2014). The findings is in agreement with Olowe (2009) who ascertain that the market crash accounted for sudden change in variance but in contrast with Goudarzi (2014) that volatility cannot be attributed to effect of sanction on Iran. The student's-t distributional assumptions of mean reverting and the half-life form of GARCH model provide the best estimate to measure the magnitude of volatility persistence in All Share Index on the Nigerian Stock Exchange for the sample period (Jan. 2001 till Dec. 2016). On the other hand, the generalized error distributional assumptions provide the best estimate for the period before and after the meltdown.

The fourth objective of this study investigates the impact of good or bad news on the All Share Index return volatility on the Nigerian Stock Exchange and the objective was achieved three (3) GARCH model variants (TGARCH, EGARCH and PGARCH) in equations (13), (14), (16), (17), (19) and (20). Findings shows that All Share Index return volatility responds more to positive (good) news than it does to negative (bad) news of equal magnitude on the Nigerian Stock Exchange during the period of Jan. 2001 till Dec. 2016 and for period before the meltdown as indicated by the estimates of EGARCH, TGARCH and PGARCH. The result is in contrast with Ahmed and Suliman (2011), Atoi (2014), Alagidede and Panagiotidis (2009), Emenike (2010), Goudarzi and Ramanarayanan (2011), Okpara and Nwezeaku (2009), Olowe (2009), Su (2010). Volatility responds more to negative (bad) news than it respond to positive (good) news of the same magnitude on the Nigerian Stock Exchange after the meltdown which is against the findings of Bekaert and Wu (2000), Coffie (2015), Emenike and Aleke (2012), Mun, Sundaram and Yin (2008), Uyaabo, et. al (2015), but not significant.

Student's t distributional assumptions estimates was found to give best result in tandem with the findings of (Atoi 2014) for periods of 2001 till 2016 and before the meltdown while the generalized error distribution gives the best estimate after the meltdown. The APARCH model provides the overall best estimate for all the periods which is in agreement with Atoi 2014, Rahman, et. al (2013), but contrast the findings of Su (2010), Alberg, Shalit and Yosef (2008), Coffie (2015), Onwukwe, Bassey and Isaac (2011). In general the findings of objective four follows the assertion of Osarumwense (2015) that impact of good or bad news on return volatility do not only depend on the asymmetric model but also the choice of the error distribution matters.

4.4 Chapter Summary

This chapter discussed the presentation of data, analysis and discussion of the empirical result. The data used for this research work is the All Share Index return of the Nigerian Stock Exchange from Jan. 2001 till Dec. 2016. The data was divided into periods before and after the financial meltdown of 2008-2009 crisis. The period before the meltdown cover Jan. 2001 till March 2008 while the period after the meltdown cover the period April 2009 till Dec. 2016. The return series was generated by $ASI_{rt} = \frac{(ASI_t - ASI_{t-1})}{ASI_{t-1}}$ where ASI_t is All Share Index at time t (particular/current week in this case) and ASI_{t-1} is All Share Index at time $t - 1$ (current/particular week minus previous week). The return series was tested for unit root using two (2) methods namely the ADF and the PP unit root tests. The whole, before and after the meltdown samples were found to be stationary at level $[I(0)]$ which is a major requirement of econometrics analysis such as the GARCH model used in this study.

The descriptive statistics of the series were done and it was found that the whole, before and after the meltdown samples have positive mean weekly returns. The standard deviations are

3.14%, 2.7% and 3.09% for the whole, before and after the meltdown samples respectively. The skewness indicates non-symmetric series for the whole samples, before and after the meltdown. The kurtosis also indicates leptokurtic for the whole samples, before and after the meltdown return series. The Jarque-Bera statistics shows that the null hypothesis of normal distribution should be rejected. Thus, the descriptive analysis of the All Share Index returns series for the whole sample, before the meltdown and after the meltdown exhibits significant deviations from normality. The residual of the mean equations for the whole, before and after the meltdown return series also exhibit the presence of ARCH effect and volatility clustering which are requirements for the application of the GARCH family models.

Objective one evaluates the efficiency of the Nigerian stock market using the GARCH model under three (3) distributional assumptions. Past week return squared residual and return variance are statistically significant at 5% level in predicting current week variance return of All Share index on the Nigerian Stock Exchange. Therefore, past information on stock prices quoted on the Nigerian Stock Exchange are not reflected on stock prices for the sample period (Jan. 2001 till Dec. 2016), before and after the meltdown of 2008-2009. However, the cumulative abnormal returns values, using the meltdown as the event window, exhibit the characteristics of semi-strong form efficiency. Signifying that in the pre and post meltdown, the Nigerian stock market is inefficient in the weak form but is efficient in the semi-strong form.

Objective two examines the risk-return relationship of stock prices on the Nigerian Stock Exchange, was achieved using the GARCH-in-mean model. There is statistically significant negative relationship between risk and return of stock prices on the Nigerian Stock Exchange at 5% significant level for the sample period (Jan. 2001 till Dec. 2016), the pre meltdown and post

meltdown period. Suggesting that investor is faced with higher risk on return on their stock quoted the Nigerian Stock Exchange in the pre and post meltdown.

Objective three inspects the magnitude of volatility persistence using the mean reverting and the half-life form of GARCH model on All Share Index return on the Nigerian Stock Exchange. Volatility is found to be highly persistent for the sample period (Jan. 2001 till Dec. 2016) and after the meltdown while volatility is low during the pre-meltdown period. Volatility is persistence for an average of 10 and 8 week for the whole sample (Jan. 2001 till Dec. 2016) and after the meltdown. On the other hand, volatility persists for an average of 1 week before the meltdown. Suggesting that investor on the Nigerian Stock Exchange is confronted with low volatility persistence before the meltdown and higher volatility persistence after the meltdown.

Objective four investigates the impact of good (positive) or bad (negative) news on stock return volatility on the Nigerian Stock Exchange using three (3) GARCH model variants (TGARCH, EGARCH and PGARCH). Results indicate that stock return volatility on the Nigerian Stock Exchange responds more to positive (good) news than it does to negative (bad) news of equal magnitude during for the sample period (Jan. 2001 till Dec. 2016) and pre-meltdown period. Stock return volatility responds more to negative (bad) news than it respond to positive (good) news of the same magnitude on the Nigerian Stock Exchange after the meltdown. Signifying stock return volatility on the Nigerian Stock Exchange responds more to positive (good) news in the pre-meltdown period while stock return volatility responds more to negative news in the post meltdown period.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter summarises the major findings and presents the conclusion and recommendations based on the findings of this research. The study's contributions to knowledge and the suggestions for future research in the scope of this study are also discussed in the chapter.

5.1 Summary of Findings

The study evaluates the Nigerian capital market efficiency in the post financial meltdown. The results of the findings revealed that the financial meltdown of 2008-2009 affected the All Share Index movement on the Nigerian Stock Exchange from March 2008 till April 2009. Thus the period before the meltdown is Jan 2001 and March 2008 while the post meltdown is April 2009 till Dec. 2016. The All Share index return was found to be stationary at level for all periods (whole, pre and post meltdown), non-symmetric and not normally distributed around the mean. The residuals of the mean equation of the All Share Index return also exhibit the presence of ARCH effect and volatility clustering which are all requirement for employing any GARCH modeling.

Summary of major findings on the objectives of the study are:

- i. The results of the GARCH model used for objective one indicates that investor can predict current week stock return by studying past weeks stock return movement on the Nigerian Stock Exchange and achieve a performance better than the market All Share Index return for the whole period, before and after the meltdown. This shows that returns on the Nigerian Stock

Exchange do not reflect all past information for the periods showing that the market is not efficient in the weak form.

In the same vein, to test for the semi-strong form, the market model indicates that the cumulative abnormal return on the Nigerian Stock Exchange increased from zero (before the meltdown) to positive but during the meltdown return reduced and started increasing for few weeks after the meltdown and fluctuates afterwards. This characteristic is a sign that the Nigerian Stock Exchange is efficient in the semi-strong form.

The findings show that information is not immediately and costlessly available to all investors on the Nigerian stock market but the market act as if it were. The findings rejected the null hypothesis which stated that the Nigerian Stock Exchange is not significantly efficient in any form after the meltdown.

ii. The results of GARCH-in-mean model used for objective two shows that σ (standard deviation) as a measure of risk, has significant negative relationship with the All Share Index return on the Nigerian Stock Exchange for the whole period but insignificant negative relationship before the meltdown under the student's t and generalised error distributions. The risk return relationship is insignificantly negative after the meltdown period. The findings did not reject the null hypothesis which stated that there is no significant risk-return relationship on the Nigerian Stock Exchange after the meltdown. The implication of this is that investors on the Nigerian Stock Exchange underweight stock return because it is not certain compared to returns that can be obtained with certainty. This certainty effect contributes to the risk averse position of the investors in choosing sure return against risky investment choices involving losses.

iii. The results of mean reverting and half-life form of GARCH model used for objective three shows that All Share Index return volatility is significantly highly persistent and dying

slowly for the whole sample period and after the meltdown while volatility is significantly low persistent and dying very fast before the meltdown. The return is mean reverting for the whole period, before and after meltdown and do not follow random walk. The average number of week for the volatility to revert to its long run level is 10 weeks for the whole period, 1 week before the meltdown and 7 weeks after the meltdown. The findings rejected the null hypothesis which stated that there is no significant magnitude of volatility persistence in the Nigerian Stock Exchange after the financial meltdown. The implication of this result is that investors on the Nigerian Stock Exchange exhibit herding behavior as a result of their sensitivity and reaction to unexpected news which subsequently led to over and under-pricing of stocks. Thus, stock prices on the Nigerian stock market revolve around the mean price for 1 week in the pre meltdown period before increasing or reducing. However, stock prices revolve around the mean price for 8-10 weeks during the whole sample period and post meltdown period after which the price will move up or down.

iv. The results of the three (3) GARCH model variants (TGARCH, EGARCH and PGARCH) used for objective four indicates that All Share Index return volatility responds more to positive (good) news than it does to negative (bad) news of equal magnitude on the Nigerian Stock Exchange for the whole period and before the meltdown while volatility responds more to negative (bad) news than it respond to positive (good) news of the same magnitude on the Nigerian Stock Exchange after the meltdown but not significant. The result also indicates that the PGARCH model estimates is the best for the whole period, before and after the meltdown, student's t distributional assumption is the best for estimation for the whole period and before the meltdown while the generalized error distribution provide the best estimate for period after the meltdown. The findings rejected the null hypothesis which stated that there is no significant

impact of good or bad news on return volatility in the Nigerian Stock Exchange after the financial meltdown.

All the fitted models were tested for appropriateness (diagnostic test) to ascertain their desirability for policy consideration and implementation. The residual of the models were all found to have no ARCH effect and no serial correlation which are both desirables of a good fitted model. This means that the findings of this study are appropriate for policy consideration.

5.2 Conclusion

The study evaluates the informational efficiency of the Nigerian stock market in the post financial meltdown of 2008-2009 using the efficient market hypothesis. The informational efficiency of the stock market is important in measuring and guiding the behavior of investors. The study reveals the interaction between theories and practice (actual behavior of investors) as it relates to Nigerian stock market efficiency especially in the pre and post meltdown of 2008-2009. The study therefore concluded that;

First, the Nigerian stock market is inefficient in the weak form during the pre and post financial meltdown of 2008-2009. However, using the meltdown as the event window, the Nigerian stock market is shown to be efficient in the semi-strong form after the financial meltdown. Second, the risk-return relationship of stock on the Nigerian stock exchange indicates negative relationship for pre and post financial meltdown of 2008-2009. Third, the volatility persistence is mean reverting but of low magnitude before the meltdown of 2008-2009 while it is of high magnitude after the meltdown of 2008-2009. Fourth, return volatility on the Nigerian stock exchange responds more to good news before the meltdown of 2008-2009 while return volatility responds more to bad news after the meltdown.

Thus, information is irregular, not made open, unavailable, not accessible and unbalance due to late publication and falsification. This has led to information asymmetry between investors and has made the information environment of the Nigerian stock market not conducive and unattractive for shrewd investors. In the same vein, investors are not stimulated as their rights are not protected due to the absence of information transparency and discipline. Therefore, it is the function and performance of institutions (SEC and NSE) to ensure quick and accurate reflection of information in stock returns on the Nigerian stock market.

5.3 Recommendations

Based on the findings and conclusions drawn from this study and the need to strengthen and improve the Nigerian stock market efficiency, the recommendations were:

- i. The regulators of the Nigerian Stock Exchange should provide on-line real time access to share price movement for investors and also minimise operational (dealing) bottleneck. This will not only improve the liquidity level and enhance free flow of relevant securities information on the Nigerian Stock Exchange but will also improve investor's confidence and discourage information imbalance in the market;
- ii. In view of the above point, publication and release of important and relevant financial information by quoted firms on the Nigerian Stock Exchange should be on-line real time and be made mandatory by the regulator of the market (Securities and Exchange Commission) in order to discourage rumour and speculative activities. The regulatory authority should not only spell out punishments that await violators but should be strict and firm about it. Penalty such as specific days of defaulter-suspension and subsequent delisting from the market in the event of failure to make public financial statement should be implemented. This will promote transparency, attract highly sophisticated and informed investors, improve the risk-return

relationship and boost chances of cross-border listing for quoted companies on the Nigerian Stock Exchange;

iii. Also in line with the earlier recommendation (ii), the development, supply and making available an informational dissemination software application for investors should be prioritised by SEC and NSE. This will not only improve the Nigerian Stock Exchange efficiency but will increase trading/dealing activities in the Nigerian Stock Exchange. As sophisticated and informed investors are attracted, the high return volatility magnitude and mean reversion of return will be eliminated and the market will be able to exhibit random walk and earning abnormal return will be reduced to its barest minimum;

iv. The newly introduced short selling activities (started in 2012) on the Nigerian stock market needs to be strictly monitored, restricted and regulated to discourage desperately optimistic noise (rumour) traders (investors) in the market, shorting to make money. Short selling should be restricted from officers, directors, and large shareholders of quoted companies, and should only involve stocks that are inventoried by institutional investors, including pension funds, insurance companies and index funds (all of whom have long-term plans that are not expected to be negatively affected by liquidity constraints). Only large capitalised stocks should be offered for short selling (they likely to be easy and cheap to borrow) while small capitalised stocks with slight institutional ownership may be difficult and expensive. This will prevent increase in the price of already overvalued stocks, which can extend the length and degree of bubbles. The personal risk to the arbitrageur (as agent) will also be reduced as the importance of agency cost is to correct market price to relative efficiency.

v. There is the need to strictly discourage insider trading on the Nigerian Stock Exchange because return volatility is found to be affected by positive news more than negative news and

are affected insignificantly by negative news after the meltdown. This implies that investors position themselves to benefit from positive news which follows the assertion of prospect theory. Thus, there is the need for the market to improve its enlightenment activities on the operations, mechanisms, purpose and benefit of the market to the current and prospective investors and to the government. That the health of the nation measured through its ability to attract investment is known through the performance of the Stock Exchange.

5.4 Contribution to Knowledge

The study revealed the importance of market efficiency theory and the influence of prospect theory explanation of behavioural attitude of investors on the Nigerian Stock Exchange, especially during Jan. 2001 till Dec. 2016 which was divided into pre and post financial meltdown of 2008-2009. The study is a pointer to regulatory authorities of the Nigerian Stock Exchange on the relevance of informational efficiency of the stock market and the understanding of the behavioural attitude of investors towards risk-return relationship on the Nigerian Stock Exchange. Also, the study used and selected GARCH model suitable for investment analysis on the Nigerian Stock Exchange and simplify the analysis and measurement of returns by using and selecting the appropriate model. Furthermore, the study employed three distributional assumptions, unlike most of the previous studies where one or two distributional assumptions were employed.

5.5. Suggestions / Direction for Further Research

Although, this study made significant contributions to knowledge on stock market efficiency, there are some areas not covered by the scope of this study that needs more investigation. These include;

- i. There is the strong form of efficiency of stock exchange which has to do with the effect of insider information possess by institutional investors to measure efficiency of Stock Exchange. Therefore, further research should focus on testing the strong form efficiency of the Nigerian stock market to ascertain if there is monopolistic access and use of information by institutional investors like mutual fund managers, pension fund manager, market makers etc.
- ii. This research should be replicated on daily All Share Index returns, on individual quoted share returns, sectoral index returns such as ASEM Index, NSE-Lotus Islamic Index and NSE Oil/Gas Index, and the NSE-30 index returns as this will aid investment analysis order to know the combination of securities to hold by specific investor according to risk preference and investment purpose.
- iii. Further studies on stock market efficiency hypothesis and the information of event studies such as insurgent attacks, flood/famine and plant pest attack on share prices of related shares will improve investment analysis on share prices movement relative to the event.
- iv. Despite using variants of GARCH models in this study, there are still other variants that are not used, it is suggested that similar studies in the future can explore the other GARCH variants such as Integrated GARCH (IGARCH), Fractionally Integrated GARCH (FIGARCH), Nonlinear GARCH (NGARCH), Quadratic GARCH (QGARCH), Continuous-time-Generalisation GARCH (COGARCH), Hyperbolic GARCH (HYGARCH) among others.

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Appendix I
WEEKLY ALL SHARE INDEX JAN. 2001 – DEC. 2016

1/1/2001	8285.42		11169.1		13005.05		13613.46
	9011.73		11182.98	8/5/2002	12723.91		13902.56
	9057.16		11092.5		12561.34		14086.25
	8930.22	11/5/2001	11090.68		12745.85	6/2/2003	14152.89
	8696.7		10958.55		12327.91		14357.28
2/5/2001	8727.09		11136.61	9/2/2002	12202.39		14470.95
	9025.04		11169.57		12072.97		14528.73
	9040.72	12/3/2001	10884.45		12134		14544.36
	9394.72		10832.52		11930.53	7/7/2003	14575.55
3/5/2001	9486.66		10897.37		12000.42		14349.35
	9332.58		10902.76	10/7/2002	11953.54		14029.71
	9145.95		10939.19		11898.63		14007.56
	9159.83	1/7/2002	10913.82		11394.25	8/4/2003	14366.28
4/2/2001	9345.08		11020.32		11480.37		14680.09
	9363.87		10765.6	11/4/2002	11628.19		15647.36
	9562.96		10644.75		11457.37		15426.02
	9478.18	2/4/2002	10471.1		11536.08	9/1/2003	15821.35
	9728.57		10198.55		11622.74		15821.17
5/7/2001	10000.82		10235.37	12/2/2002	11606.54		15825.96
	10059.51		10796.58		11644.12		16246.93
	10098.11	3/4/2002	11427.62		11643.61		16517.22
	10125.05		11186.81		11843.69	10/6/2003	18175.02
6/4/2001	10138.56		11460.37		12213.87		18535.33
	10475.16		11214.38	1/6/2003	12681.85		18803.77
	10825.08	4/1/2002	11133.63		13338.34		18743.49
	10937.26		11084.07		13140.34	11/3/2003	19912.56
7/2/2001	10726.79		11645.47		13298.75		20409.04
	10447.2		11509.03	2/3/2003	13702.62		20782.48
	10733.41		11419.38		14259.36		19319.33
	10508.27	5/6/2002	11579.87		13910.08	12/1/2003	19058.25
	10474.11		11657.11		13668.81		19827.53
8/6/2001	10237.61		11398.56	3/3/2003	13737.15		19194.59
	10213.47		11486.7		13664.43		19786.66
	10450.45	6/3/2002	11738.69		13529.45		20128.94
	10328.95		12618.82		13605.26	1/5/2004	20257.44
9/3/2001	10266.1		12089.68		13528.06		21054.16
	10229.55		12440.65	4/7/2003	13640.52		21801
	10409.62	7/1/2002	12441.88		13517.6		22687.06
	10274.16		12719.63		13291.55	2/2/2004	22712.88
10/1/2001	10446.65		12390.42		13476.68		23161.67
	11175.89		12690.19	5/5/2003	13628.65		25360.38

	23848.43		23056.06		24888.4		31720.9
3/1/2004	24797.43		22993.57		26221.9		35068.84
	23487.36	1/3/2005	23844.45		25831.47		30925.24
	23660.63		23834.01	11/7/2005	26136.79	9/4/2006	32337.15
	22688.84		23629.76		25525.46		33121.26
	22965.89		23722.89		25657.33		33334.36
4/5/2004	23280.07		23060.02		25213.03		33212.41
	24854.95	2/7/2005	22426.6	12/5/2005	24086.26	10/2/2006	32554.6
	26103.04		23024.07		24388.54		32662.95
	26170.23		22762.39		23733.02		33505.49
5/3/2004	25792.97		22067.26		23739.52		32856.94
	25779.96	3/7/2005	21158.96	1/2/2006	24085.76		32652.07
	27340.31		21429.83		24105.85	11/6/2006	33526.55
	27505.64		21013.59		24141.28		33384.06
	27282.59		20737.13		23814.59		32557.16
6/7/2004	27838.19	4/4/2005	20710.84		23831.1		31356.69
	28797.03		20987.74	2/6/2006	23653.19	12/4/2006	31632.46
	30703.46		21213.84		23953.57		32290.59
	28586.66		22371.02		24093.55		32777.97
7/5/2004	28049.17	5/2/2005	21961.7		23953.64		33322.47
	27681.87		22003.71	3/6/2006	23841.91	1/1/2007	33189.3
	27276.62		21814.96		23540.07		33601.51
	26808.51		21619.41		23405.75		34372.27
8/2/2004	27062.13		21392.91		23404.77		35580.92
	27202.69	6/6/2005	21454.01	4/3/2006	23336.6		35896.31
	26593.4		21621.75		23339.25	2/5/2007	38462.26
	23339.29		21903.83		23221.46		39168.94
	24795.58		21831.41		23276.46		41254.25
9/6/2004	23473.67	7/4/2005	21626.44	5/1/2006	23301.22		40693.13
	23126.4		21459.15		23958.66	3/5/2007	40332.19
	22713.88		21605.72		24280.85		41103.81
	22586.39		21521.65		24440.08		41289.88
10/4/2004	22739.68	8/1/2005	21911		24622.89		41992.13
	22846.13		22085.89	6/5/2006	24612.38	4/2/2007	43456.14
	22858.37		21735.68		24906.54		44643.4
	23208.14		21983.95		24751.82		45910.05
11/1/2004	23354.84		22230.47		25668.69		47093.27
	23844.29	9/5/2005	24061.89	7/3/2006	26161.15		47124.14
	24355.87		23566.61		26701.97	5/7/2007	47422.51
	23764.17		23993.33		27139.57		47059.63
	23707.82		24490.46		27476.35		47279.91
12/6/2004	23109.88	10/3/2005	24635.91		27672.3		48328.26
	22717.04		24604.53	8/7/2006	28918.67	6/4/2007	50773.8

7/2/2007	51342.49	4/7/2008	62224.86	2/2/2009	21813.76	12/7/2009	21217.77
	51702.66		63736.14		23817.83		21374.41
	51512.22		61418.96		23635.92		20659.09
	51330.46		60399.68		22711.91		20722.64
8/6/2007	51470.07	5/5/2008	59124.87	3/2/2009	23377.14	1/4/2010	20438.93
	51514.06		62518.07		21893.04		20827.17
	51084.75		62415.06		21003.42		21658.69
	51894.04		60570.3		20370.06		22060.36
9/3/2007	53752.63	6/2/2008	58929.02	4/6/2009	19836.48	2/1/2010	22030.18
	53818.72		56234.02		19954.15		22594.9
	52388.19		60191.83		19913.86		23226.28
	50295.08		54382.21		19983.09		22967.26
10/1/2007	50291.09	7/7/2008	54905.36	5/4/2009	21455.92	3/1/2010	23168.64
	52452.49		55456.58		21491.11		22985
	52264.11		54662.06		23516.26		22923.91
	50946.53		52286.88		24796.42		24141.72
11/5/2007	50229.01	8/4/2008	50422.78	6/1/2009	26989.04	4/5/2010	24517.88
	50915.25		52641.55		29700.24		25322.87
	51218.89		49703.56		29088.61		26219.74
	51316.89		47517.87		28713.67		27700.11
12/3/2007	50734.79	9/1/2008	44357.08	7/6/2009	28910	5/3/2010	27988.71
	50482.94		47789.2		25813.55		27400.21
	51596.62		49615.55		27086.56		26453.2
	53291.68		48738.14		26100.64		27503.36
1/7/2008	55215.5	10/6/2008	47317.94	8/3/2009	23656.42	6/7/2010	27753.13
	54189.92		46216.13		23924.1		26784.9
	54590.94		45712.41		25286.61		26183.21
	54456.27		44380.96		25382.5		26153.47
2/4/2008	54678.83	11/3/2008	42957.36	9/7/2009	24237.85	7/5/2010	25422.79
	56863.41		41884.1		21973.96		25861.93
	58850.58		36325.86		23327.04		25154.26
	58130.74		34351.81		21866.12		25223.7
3/3/2008	58211.69	12/1/2008	37876.06	10/5/2009	21483.02	8/2/2010	24609.3
	57845.5		34660.65		21870.12		24846.64
	59125.58		33025.75		22332.15		25269.36
	62516.07		30653.65		22497.27		25844.18
2/4/2008	63584.68	1/5/2009	28677.44	11/2/2009	23271.69	9/6/2010	25738.79
	64128.69		29551.84		22293.53		24984.8
	65652.38		30728.91		22653.17		25106.86
	66121.93		31357.24		21804.69		24274.51
3/3/2008	65005.48	1/5/2009	28866.8	11/2/2009	21517.29	9/6/2010	24241.84
	63986.5		27108.54		21349.18		23802.79
	63147.04		24000.09		21635.36		22993.77

	22689.09		23925.72		22381.11		32950.08
10/4/2010	23050.59	8/1/2011	23826.99		22232.36		33506.88
	23772.4		23397.44	6/4/2012	21963.87	4/1/2013	33536.25
	25077.73		22775.55		20902.95		34301.37
	24978.7		22724.02		21184.58		33514.14
11/1/2010	25042.16		21976.87		21394.77		32993.97
	24800.47	9/5/2011	21598.98	7/2/2012	21599.57		33159.08
	25367.83		21104.1		22110.91	5/6/2013	35109.33
	24959.95		21106.67		22741.06		36010.28
	24611.56		20202.5		23095.31		36907.81
12/6/2010	24807.04	10/3/2011	20373		23292.8		37350.53
	24445.06		20225.02	8/6/2012	23523.16	6/3/2013	37794.75
	24444.28		19869.85		23239.03		39564.79
	24689.16		20257.47		23141.08		37249.93
1/3/2011	24770.52		20903.16		23399.58		36464.39
	26169.86	11/7/2011	20532.41	9/3/2012	23750.82	7/1/2013	36164.31
	27267.17		20416.1		24838.7		36926.29
	27684.4		20311.51		25337.18		37382.49
	27356.59		20122.14		25873.71		38328.29
2/7/2011	26763.84	12/5/2011	19963.37	10/1/2012	26011.64		37145.65
	26684.49		19785.03		26442.67	8/5/2013	38424.34
	26639.35		20025.94		27287.85		38038.79
	26181.18		20763.26		27296.35		36986.94
3/7/2011	25357.84	1/2/2012	20730.63		26876.07		36577.28
	25585.24		20725.3	11/5/2012	26559.55	9/2/2013	36248.53
	24378.72		20840.97		26718.3		36403.95
	24863.38		20820.32		26400.94		36098.07
4/4/2011	24752.05		20892.66		26322.18		36188.72
	24733.38	2/6/2012	20877.64	12/3/2012	26494.44		36436.98
	25036.75		20623.63		26671.72	10/7/2013	36925.82
	25020.08		20411.17		27685.54		36991.62
5/2/2011	25041.68		20495.92		27402.06		37342.73
	25300.46	3/5/2012	20592.02		27866.51		37461.94
	25813.71		20950.02	1/7/2013	28538.06	11/4/2013	37765.82
	25790.64		20824.25		29202.01		37870.87
	25829.75		21191.22		30927.18		37883.53
6/6/2011	25963.5	4/2/2012	20652.47		31583.49		39246.05
	25696.46		20941.93	2/4/2013	32411.86	12/2/2013	38920.85
	25309.17		20743.16		33313.49		38738.15
	25271.61		21756.5		33258.45		38831.59
7/4/2011	24696.81		22109.44		33895.08		39562.75
	24310.03	5/7/2012	22665.99	3/4/2013	33183.2		40231.68
	23832.14		22622.44		32849.11	1/6/2014	41450.48

	41480.62		33225.75	9/7/2015	29511.08	7/4/2016	29305.4
	41751.55		35381.02		29689.08		28854.98
	41917.55		33926.18		30332.68		28805.45
2/3/2014	40571.62	12/1/2014	34543.05		30543.17		27659.44
	40773.5		33228.29	10/5/2015	30588.41	8/1/2016	28009.93
	38767.29		30763.38		30165.22		27425.86
	38295.74		30306.51		29834.21		27246.88
3/3/2014	39558.89		34428.82		30011.89		27650.32
	38952.47	1/5/2015	34684.32	11/2/2015	29177.72		27450.91
	38171.32		30144.7		29175.35	9/5/2016	27756.67
	37790.12		29034.89		28841.67		27577.52
	38331.78		29812.05		28131.28		27858.48
4/7/2014	38712.76	2/2/2015	29562.07		27617.45		28247.07
	39083.66		29985.08	12/7/2015	27631.05	10/3/2016	28335.4
	39325.98		27585.26		27269.71		27835.22
	38898.14		29383.93		26537.36		27861.03
5/5/2014	38578.78	3/2/2015	30103.81		26871.24		27596.82
	38554.19		31049.37	1/4/2016	28642.25		27294.21
	39022.1		30719.36		27028.39	11/7/2016	26981.6
	39831.83		29334.23		23514.04		26170.88
6/2/2014	41474.4		30562.93		23826.5		25537.54
	41529.11	4/6/2015	35728.12	2/1/2016	23916.15		25333.39
	41517.1		34930.02		23501.87	12/5/2016	25740.83
	41129.27		35005.05		24689.69		25817.69
	42187.62		34485.72		24432.51		26707.1
7/7/2014	43031.81	5/4/2015	34708.11		24228.79		26486.02
	42832.82		34388.12	3/7/2016	25820.1		26874.62
	42891.82		34439.52		25988.4		
	42285.85		34272.09		25694.79		
8/4/2014	41934.4	6/1/2015	34310.37		25899.91		
	42598.46		33664.91	4/4/2016	25507.09		
	41380.05		33621.75		25328.07		
	41564.19		33257.9		24719.27		
9/1/2014	41532.31		32853.49		24850.11		
	41160.62	7/6/2015	32538.34	5/2/2016	25062.41		
	40672.94		31729.26		25701.6		
	41049.27		31047.99		26441.03		
	40819.72		31091.69		27116.45		
10/6/2014	41103.94	8/3/2015	30180.27		28902.25		
	40444.39		31441.71	6/6/2016	27634.42		
	38197.73		30705.62		27232.62		
	39087.1		29878.33		29247.27		
11/3/2014	37550.24		28814.62		30649.66		

Appendix II
WEEKLY ALL SHARE INDEX RETURN JAN. 2001 – DEC 2016

1/1/2001	0.00000		-0.00061		0.024811	-0.00111
	0.087661		0.001243	8/5/2002	-0.02162	0.021236
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	-0.01402	11/5/2001	-0.00016		0.014689	6/2/2003 0.004731
	-0.02615		-0.01191		-0.03279	0.014442
2/5/2001	0.003494		0.016249	9/2/2002	-0.01018	0.007917
	0.034141		0.00296		-0.01061	0.003993
	0.001737	12/3/2001	-0.02553		0.005055	0.001076
	0.039156		-0.00477		-0.01677	7/7/2003 0.002144
3/5/2001	0.009786		0.005987		0.005858	-0.01552
	-0.01624		0.000495	10/7/2002	-0.00391	-0.02228
	-0.02		0.003341		-0.00459	-0.00158
	0.001518	1/7/2002	-0.00232		-0.04239	8/4/2003 0.025609
4/2/2001	0.020224		0.009758		0.007558	0.021844
	0.002011		-0.02311	11/4/2002	0.012876	0.06589
	0.021262		-0.01123		-0.01469	-0.01415
	-0.00887	2/4/2002	-0.01631		0.00687	9/1/2003 0.025627
	0.026418		-0.02603		0.007512	-1.1E-05
5/7/2001	0.027985		0.00361	12/2/2002	-0.00139	0.000303
	0.005869		0.05483		0.003238	0.0266
	0.003837	3/4/2002	0.058448		-4.4E-05	0.016636
	0.002668		-0.02107		0.017184	10/6/2003 0.100368
6/4/2001	0.001334		0.024454		0.031255	0.019824
	0.0332		-0.02146	1/6/2003	0.038315	0.014483
	0.033405	4/1/2002	-0.0072		0.051766	-0.00321
	0.010363		-0.00445		-0.01484	11/3/2003 0.062372
7/2/2001	-0.01924		0.050649		0.012055	0.024933
	-0.02606		-0.01172	2/3/2003	0.030369	0.018298
	0.027396		-0.00779		0.04063	-0.0704
	-0.02098	5/6/2002	0.014054		-0.02449	12/1/2003 -0.01351
	-0.00325		0.00667		-0.01734	0.040365
8/6/2001	-0.02258		-0.02218	3/3/2003	0.005	-0.03192
	-0.00236		0.007733		-0.00529	0.030846
	0.023203	6/3/2002	0.021938		-0.00988	0.017299
	-0.01163		0.074977		0.005603	1/5/2004 0.006384
9/3/2001	-0.00608		-0.04193		-0.00567	0.03933
	-0.00356		0.029031	4/7/2003	0.008313	0.035472
	0.017603	7/1/2002	9.89E-05		-0.00901	0.040643
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10/1/2001	0.016789		-0.02588		0.013928	0.019759
	0.069806		0.024194	5/5/2003	0.011277	0.094929

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3/1/2004	0.039793		-0.00271		0.053579		0.105544
	-0.05283	1/3/2005	0.037005		-0.01489		-0.11816
	0.007377		-0.00044	11/7/2005	0.01182	9/4/2006	0.045656
	-0.04107		-0.00857		-0.02339		0.024248
	0.012211		0.003941		0.005166		0.006434
4/5/2004	0.01368		-0.02794		-0.01732		-0.00366
	0.067649	2/7/2005	-0.02747	12/5/2005	-0.04469	10/2/2006	-0.01981
	0.050215		0.026641		0.01255		0.003328
	0.002574		-0.01137		-0.02688		0.025795
5/3/2004	-0.01442		-0.03054		0.000274		-0.01936
	-0.0005	3/7/2005	-0.04116	1/2/2006	0.014585		-0.00624
	0.060526		0.012802		0.000834	11/6/2006	0.026782
	0.006047		-0.01942		0.00147		-0.00425
	-0.00811		-0.01316		-0.01353		-0.02477
6/7/2004	0.020365	4/4/2005	-0.00127		0.000693		-0.03687
	0.034443		0.01337	2/6/2006	-0.00747	12/4/2006	0.008795
	0.066202		0.010773		0.012699		0.020806
	-0.06894		0.054548		0.005844		0.015094
7/5/2004	-0.0188	5/2/2005	-0.0183		-0.00581		0.016612
	-0.01309		0.001913	3/6/2006	-0.00466	1/1/2007	-0.004
	-0.01464		-0.00858		-0.01266		0.01242
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8/2/2004	0.00946		-0.01048		-4.2E-05		0.035164
	0.005194	6/6/2005	0.002856	4/3/2006	-0.00291		0.008864
	-0.0224		0.007819		0.000114	2/5/2007	0.071482
	-0.12237		0.013046		-0.00505		0.018373
	0.062396		-0.00331		0.002368		0.053239
9/6/2004	-0.05331	7/4/2005	-0.00939	5/1/2006	0.001064		-0.0136
	-0.01479		-0.00774		0.028215	3/5/2007	-0.00887
	-0.01784		0.00683		0.013448		0.019132
	-0.00561		-0.00389		0.006558		0.004527
10/4/2004	0.006787	8/1/2005	0.018091		0.00748		0.017008
	0.004681		0.007982	6/5/2006	-0.00043	4/2/2007	0.034864
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11/1/2004	0.006321		0.011214		0.037043		0.025773
	0.020957	9/5/2005	0.082383	7/3/2006	0.019185		0.000656
	0.021455		-0.02058		0.020673	5/7/2007	0.006332
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	-0.00237		0.02072		0.012409		0.004681
12/6/2004	-0.02522	10/3/2005	0.005939		0.007132		0.022173
	-0.017		-0.00127	8/7/2006	0.04504	6/4/2007	0.050603

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	0.007015		0.024287		0.091872	12/7/2009	0.007382
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7/2/2007	-0.00353		-0.0166		-0.03909		0.003076
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8/6/2007	0.035815	6/2/2008	-0.0271		-0.02619		-0.00137
	0.00123		-0.04573	4/6/2009	0.005932	2/1/2010	0.025634
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9/3/2007	-7.9E-05		0.00962		0.073704		0.008768
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	-0.02521		-0.04345		0.054437		0.053124
10/1/2007	-0.01408		-0.03565		0.088425		0.015581
	0.013662	8/4/2008	0.044003	6/1/2009	0.100456		0.032833
	0.005964		-0.05581		-0.02059	4/5/2010	0.035417
	0.001913		-0.04397		-0.01289		0.05646
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11/5/2007	-0.00496	9/1/2008	0.077375		-0.10711		-0.02103
	0.022061		0.038217	7/6/2009	0.049316	5/3/2010	-0.03456
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12/3/2007	-0.01857		-0.02329		0.011315		-0.03489
	0.0074	10/6/2008	-0.0109	8/3/2009	0.056951		-0.02246
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	0.039953		-0.02498		-0.0934		0.017273
1/7/2008	0.034946	11/3/2008	-0.13271		0.061577		-0.02736
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	-0.00629		-0.08489		0.018019		0.009644
2/4/2008	0.022129	12/1/2008	-0.04717		0.021126		0.017013
	0.057344		-0.07183	10/5/2009	0.007394	8/2/2010	0.022748
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3/3/2008	0.02376		0.039831		0.016132		0.004885
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	-0.00965	9/5/2011	-0.01719	7/2/2012	0.009572		0.005004
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12/6/2010	0.007943	10/3/2011	0.00844		0.008551		0.011995
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1/3/2011	0.003295		0.031874		0.011171		-0.02109
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	0.015302		-0.00512		0.020069		0.012354
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2/7/2011	-0.02167	12/5/2011	-0.00789	10/1/2012	0.005331		-0.03086
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3/7/2011	-0.03145	1/2/2012	-0.00157		-0.0154		-0.01108
	0.008968		-0.00026	11/5/2012	-0.01178	9/2/2013	-0.00899
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	0.001516		0.017622		0.059077		0.000334
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2/3/2014	-0.03211	12/1/2014	0.018183		0.006939		-0.03978
	0.004976		-0.03806	10/5/2015	0.001481	8/1/2016	0.012672
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	-0.01088		0.065204		-0.02686		0.000927
5/5/2014	-0.00821	3/2/2015	0.024499		0.012582		-0.00948
	-0.00064		0.03141	1/4/2016	0.065907		-0.01097
	0.012136		-0.01063		-0.05635	11/7/2016	-0.01145
	0.020751		-0.04509		-0.13002		-0.03005
6/2/2014	0.041238		0.041886		0.013288		-0.0242
	0.001319	4/6/2015	0.169002	2/1/2016	0.003763		-0.00799
	-0.00029		-0.02234		-0.01732	12/5/2016	0.016083
	-0.00934		0.002148		0.050542		0.002986
	0.025732		-0.01484		-0.01042		0.03445
7/7/2014	0.02001	5/4/2015	0.006449		-0.00834		-0.00828
	-0.00462		-0.00922	3/7/2016	0.065678		0.014672
	0.001377		0.001495		0.006518		
	-0.01413		-0.00486		-0.0113		
8/4/2014	-0.00831	6/1/2015	0.001117		0.007983		
	0.015836		-0.01881	4/4/2016	-0.01517		
	-0.0286		-0.00128		-0.00702		
	0.00445		-0.01082		-0.02404		
9/1/2014	-0.00077		-0.01216		0.005293		
	-0.00895	7/6/2015	-0.00959	5/2/2016	0.008543		
	-0.01185		-0.02487		0.025504		
	0.009253		-0.02147		0.02877		
	-0.00559		0.001407		0.025544		
10/6/2014	0.006963	8/3/2015	-0.02931		0.065857		
	-0.01605		0.041797	6/6/2016	-0.04387		
	-0.05555		-0.02341		-0.01454		
	0.023283		-0.02694		0.073979		
11/3/2014	-0.03932		-0.0356		0.047949		

Appendix III
Cumulative Abnormal Return Estimates (Normal Distribution)

Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret	Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret
Jan/2001	0.087661217	0.01544	0.072222	0.072222		-0.00060756	0.002452	-0.00306	0.16129
	0.005041207	0.003283	0.001758	0.07398		0.001242714	0.002724	-0.00148	0.159809
	-0.01401543	0.000479	-0.01449	0.059486		-0.00809087	0.00135	-0.00944	0.150367
	-0.02614941	-0.00131	-0.02484	0.034643	Nov/2001	-0.00016408	0.002517	-0.00268	0.147686
Feb/2001	0.003494429	0.003055	0.000439	0.035082		-0.01191361	0.000788	-0.0127	0.134985
	0.034140819	0.007565	0.026576	0.061659		0.0162485	0.004932	0.011317	0.146301
	0.001737388	0.002797	-0.00106	0.060599		0.002959608	0.002976	-1.7E-05	0.146284
	0.039156173	0.008303	0.030854	0.091453	Dec/2001	-0.0255265	-0.00122	-0.02431	0.121973
Mar/2001	0.009786348	0.003981	0.005805	0.097258		-0.00477103	0.001839	-0.00661	0.115363
	-0.01624175	0.000151	-0.01639	0.080865		0.005986603	0.003422	0.002565	0.117928
	-0.01999769	-0.0004	-0.0196	0.061269		0.000494615	0.002614	-0.00212	0.115809
	0.001517612	0.002764	-0.00125	0.060023		0.003341356	0.003033	0.000309	0.116117
Apr/2001	0.020224174	0.005517	0.014707	0.07473	Jan/2002	-0.00231919	0.0022	-0.00452	0.111598
	0.002010684	0.002837	-0.00083	0.073904		0.00975827	0.003977	0.005781	0.11738
	0.021261508	0.005669	0.015592	0.089496		-0.02311367	-0.00086	-0.02225	0.095126
	-0.00886546	0.001237	-0.0101	0.079394		-0.01122557	0.000889	-0.01211	0.083011
	0.026417519	0.006428	0.019989	0.099383	Feb/2002	-0.01631321	0.000141	-0.01645	0.066557
May/2001	0.027984586	0.006659	0.021326	0.120709		-0.02602878	-0.00129	-0.02474	0.041818
	0.005868519	0.003405	0.002464	0.123173		0.003610317	0.003072	0.000538	0.042356
	0.003837165	0.003106	0.000732	0.123905		0.054830456	0.010609	0.044222	0.086577
	0.002667826	0.002934	-0.00027	0.123639	Mar/2002	0.058448138	0.011141	0.047307	0.133884
Jun/2001	0.001334314	0.002737	-0.0014	0.122236		-0.02107263	-0.00056	-0.02051	0.113371
	0.033199981	0.007426	0.025774	0.14801		0.024453799	0.006139	0.018315	0.131686
	0.03340474	0.007456	0.025948	0.173958		-0.0214644	-0.00062	-0.02085	0.110839
	0.010362972	0.004066	0.006297	0.180255	Apr/2002	-0.00720058	0.001481	-0.00868	0.102157
Jul/2001	-0.01924339	-0.00029	-0.01895	0.161303		-0.00445138	0.001886	-0.00634	0.095819
	-0.02606465	-0.00129	-0.02477	0.136532		0.050649265	0.009994	0.040656	0.136475
	0.027395857	0.006572	0.020824	0.157356		-0.01171614	0.000817	-0.01253	0.123942
	-0.02097563	-0.00055	-0.02043	0.136926		-0.00778954	0.001395	-0.00918	0.114757
	-0.00325077	0.002063	-0.00531	0.131612	May/2002	0.014054178	0.004609	0.009445	0.124203
Aug/2001	-0.02257948	-0.00078	-0.0218	0.109814		0.006670196	0.003522	0.003148	0.12735
	-0.00235797	0.002194	-0.00455	0.105262		-0.0221796	-0.00072	-0.02146	0.105893
	0.023202692	0.005955	0.017248	0.12251		0.007732556	0.003679	0.004054	0.109947
	-0.01162629	0.00083	-0.01246	0.110053	Jun/2002	0.021937545	0.005769	0.016169	0.126116
Sep/2001	-0.00608484	0.001646	-0.00773	0.102323		0.07497685	0.013573	0.061404	0.187519
	-0.00356026	0.002017	-0.00558	0.096745		-0.04193261	-0.00363	-0.0383	0.149216
	0.017602925	0.005131	0.012472	0.109217		0.029030545	0.006813	0.022218	0.171434
	-0.01301296	0.000626	-0.01364	0.095578	Jul/2002	9.89E-05	0.002556	-0.00246	0.168977
Oct/2001	0.01678872	0.005011	0.011777	0.107355		0.022323797	0.005826	0.016498	0.185475
	0.06980611	0.012812	0.056994	0.164349		-0.02588204	-0.00127	-0.02461	0.16086

Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret	Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret
Aug/2002	0.024193692	0.006101	0.018093	0.178953	May/2003	0.011276516	0.0042	0.007076	0.142267
	0.024811291	0.006192	0.01862	0.197573		-0.00111456	0.002377	-0.00349	0.138776
	-0.02161776	-0.00064	-0.02098	0.176595		0.021236335	0.005666	0.015571	0.154346
	-0.01277673	0.000661	-0.01344	0.163157		0.013212675	0.004485	0.008728	0.163074
Sep/2002	0.01468872	0.004702	0.009986	0.173143	Jun/2003	0.004730855	0.003237	0.001494	0.164567
	-0.03279028	-0.00228	-0.03051	0.142637		0.014441573	0.004666	0.009776	0.174343
	-0.01018178	0.001043	-0.01122	0.131412		0.007917238	0.003706	0.004211	0.178554
	-0.01060612	0.00098	-0.01159	0.119826		0.003992827	0.003129	0.000864	0.179419
Oct/2002	0.005055094	0.003285	0.00177	0.121596	Jul/2003	0.001075799	0.002699	-0.00162	0.177795
	-0.01676858	7.36E-05	-0.01684	0.104754		0.002144474	0.002857	-0.00071	0.177083
	0.00585808	0.003403	0.002455	0.107209		-0.01551914	0.000257	-0.01578	0.161306
	-0.00390653	0.001966	-0.00587	0.101336		-0.02227557	-0.00074	-0.02154	0.139768
Nov/2002	-0.00459362	0.001865	-0.00646	0.094878	Aug/2003	-0.00157879	0.002309	-0.00389	0.13588
	-0.04238975	-0.0037	-0.03869	0.056184		0.025609028	0.006309	0.0193	0.15518
	0.007558198	0.003653	0.003905	0.060089		0.021843511	0.005755	0.016088	0.171268
	0.012875892	0.004436	0.00844	0.068529		0.065889923	0.012236	0.053654	0.224922
Dec/2002	-0.01469016	0.000379	-0.01507	0.05346	Sep/2003	-0.01414552	0.00046	-0.01461	0.210317
	0.006869814	0.003552	0.003318	0.056778		0.025627479	0.006312	0.019316	0.229633
	0.007512084	0.003646	0.003866	0.060644		-1.14E-05	0.002539	-0.00255	0.227082
	-0.00139382	0.002336	-0.00373	0.056914		0.000302759	0.002586	-0.00228	0.224799
Jan/2003	0.00323783	0.003017	0.00022	0.057134	Oct/2003	0.026599966	0.006455	0.020145	0.244944
	-4.38E-05	0.002535	-0.00258	0.054556		0.016636374	0.004989	0.011647	0.256592
	0.017183674	0.005069	0.012114	0.06667		0.10036798	0.017309	0.083059	0.33965
	0.031255462	0.00714	0.024115	0.090786		0.019824462	0.005458	0.014366	0.354017
Feb/2003	0.038315456	0.008179	0.030137	0.120922	Nov/2003	0.014482612	0.004672	0.009811	0.363827
	0.051766107	0.010158	0.041608	0.16253		-0.00320574	0.002069	-0.00528	0.358552
	-0.01484443	0.000357	-0.0152	0.147329		0.062372056	0.011719	0.050654	0.409206
	0.012055244	0.004315	0.00774	0.15507		0.024933007	0.00621	0.018723	0.427929
Mar/2003	0.03036902	0.00701	0.023359	0.178429	Dec/2003	0.018297774	0.005233	0.013064	0.440993
	0.040630186	0.008519	0.032111	0.21054		-0.07040305	-0.00782	-0.06258	0.378409
	-0.02449479	-0.00106	-0.02343	0.187108		-0.01351393	0.000553	-0.01407	0.364342
	-0.01734498	-1.1E-05	-0.01733	0.169774		0.040364671	0.00848	0.031884	0.396226
Apr/2003	0.004999704	0.003277	0.001723	0.171497	Jan/2004	-0.03192228	-0.00216	-0.02977	0.36646
	-0.00529367	0.001762	-0.00706	0.164442		0.030845671	0.00708	0.023766	0.390226
	-0.0098782	0.001088	-0.01097	0.153476		0.017298523	0.005086	0.012212	0.402438
	0.005603332	0.003365	0.002238	0.155714		0.006383843	0.00348	0.002904	0.405342
May/2003	-0.00567428	0.001706	-0.00738	0.148334	Feb/2004	0.039329747	0.008328	0.031002	0.436344
	0.008313091	0.003764	0.004549	0.152882		0.035472325	0.00776	0.027712	0.464056
	-0.00901139	0.001215	-0.01023	0.142656		0.04064309	0.008521	0.032122	0.496177
	-0.01672264	8.04E-05	-0.0168	0.125853		0.001138094	0.002708	-0.00157	0.494607
	0.013928398	0.00459	0.009338	0.135191		0.019759273	0.005448	0.014311	0.508918

Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret	Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret
Mar/2004	0.09492882	0.016509	0.07842	0.587338	Dec/2004	-0.00237122	0.002192	-0.00456	0.450743
	-0.05961859	-0.00623	-0.05339	0.53395		-0.02522121	-0.00117	-0.02405	0.426692
	0.039792976	0.008396	0.031397	0.565347		-0.01699879	3.98E-05	-0.01704	0.409654
	-0.05283088	-0.00523	-0.0476	0.517749		0.014923599	0.004737	0.010187	0.41984
Apr/2004	0.007377159	0.003626	0.003751	0.5215	Jan/2005	-0.00271035	0.002142	-0.00485	0.414988
	-0.04107203	-0.0035	-0.03757	0.48393		0.037005128	0.007986	0.029019	0.444007
	0.012210849	0.004338	0.007873	0.491803		-0.00043784	0.002477	-0.00291	0.441092
	0.013680288	0.004554	0.009126	0.500929		-0.00856969	0.00128	-0.00985	0.431243
May/2004	0.067649281	0.012495	0.055154	0.556084	Feb/2005	0.003941216	0.003121	0.00082	0.432063
	0.050214947	0.00993	0.040285	0.596369		-0.02794221	-0.00157	-0.02637	0.405691
	0.00257403	0.00292	-0.00035	0.596023		-0.02746832	-0.0015	-0.02597	0.379724
	-0.01441562	0.00042	-0.01484	0.581188		0.026641132	0.006461	0.02018	0.399904
Jun/2004	-0.0005044	0.002467	-0.00297	0.578217	Mar/2005	-0.0113655	0.000869	-0.01223	0.38767
	0.060525695	0.011447	0.049079	0.627295		-0.03053853	-0.00195	-0.02859	0.359084
	0.006047115	0.003431	0.002616	0.629912		-0.04116053	-0.00352	-0.03765	0.321439
	-0.00810925	0.001348	-0.00946	0.620455		0.012801669	0.004425	0.008377	0.329816
Jul/2004	0.020364635	0.005537	0.014827	0.635282	Apr/2005	-0.01942339	-0.00032	-0.01911	0.310709
	0.034443331	0.007609	0.026834	0.662116		-0.01315625	0.000605	-0.01376	0.296948
	0.066202313	0.012282	0.05392	0.716036		-0.00126777	0.002354	-0.00362	0.293326
	-0.06894337	-0.0076	-0.06134	0.654696		0.01336981	0.004508	0.008862	0.302187
Aug/2004	-0.01880213	-0.00023	-0.01858	0.63612	May/2005	0.010772956	0.004126	0.006647	0.308834
	-0.01309486	0.000614	-0.01371	0.622411		0.054548351	0.010567	0.043981	0.352815
	-0.01463955	0.000387	-0.01503	0.607384		-0.01829689	-0.00015	-0.01815	0.334669
	-0.01716158	1.58E-05	-0.01718	0.590207		0.001912876	0.002822	-0.00091	0.33376
Sep/2004	0.009460429	0.003933	0.005527	0.595734	Jun/2005	-0.0085781	0.001279	-0.00986	0.323903
	0.005193974	0.003305	0.001889	0.597623		-0.00896403	0.001222	-0.01019	0.313717
	-0.02239815	-0.00075	-0.02164	0.57598		-0.0104767	0.000999	-0.01148	0.302241
	-0.12236532	-0.01546	-0.1069	0.469078		0.002856086	0.002961	-0.00011	0.302135
Oct/2004	0.0623965	0.011722	0.050674	0.519753	Jul/2005	0.007818585	0.003691	0.004127	0.306263
	-0.05331232	-0.0053	-0.04801	0.471744		0.013046123	0.004461	0.008585	0.314848
	-0.01479402	0.000364	-0.01516	0.456586		-0.00330627	0.002055	-0.00536	0.309487
	-0.01783762	-8.4E-05	-0.01775	0.438832		-0.00938877	0.00116	-0.01055	0.298939
Nov/2004	-0.00561287	0.001715	-0.00733	0.431504	Aug/2005	-0.00773544	0.001403	-0.00914	0.289801
	0.00678683	0.00354	0.003247	0.434751		0.006830187	0.003546	0.003284	0.293085
	0.004681244	0.00323	0.001451	0.436202		-0.0038911	0.001968	-0.00586	0.287225
	0.000535758	0.00262	-0.00208	0.434118		0.018091085	0.005203	0.012888	0.300114
Dec/2004	0.015301616	0.004793	0.010509	0.444627	Sep/2005	0.007981836	0.003715	0.004266	0.30438
	0.006321058	0.003471	0.00285	0.447477		-0.01585673	0.000208	-0.01606	0.288315
	0.020957112	0.005625	0.015332	0.46281		0.011422233	0.004222	0.007201	0.295516
	0.021455032	0.005698	0.015757	0.478567		0.011213635	0.004191	0.007023	0.302539
	-0.02429394	-0.00103	-0.02326	0.455307		0.082383323	0.014663	0.06772	0.370259

Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret	Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret
	-0.02058359	-0.00049	-0.0201	0.350163		0.037042529	0.007992	0.029051	0.323715
	0.018106974	0.005205	0.012902	0.363065	Jul/2006	0.019185241	0.005364	0.013821	0.337536
	0.020719508	0.00559	0.01513	0.378194		0.020672639	0.005583	0.01509	0.352626
Oct/2005	0.005939047	0.003415	0.002524	0.380719		0.016388304	0.004952	0.011436	0.364062
	-0.00127375	0.002354	-0.00363	0.377091		0.012409187	0.004367	0.008042	0.372104
	0.011537306	0.004239	0.007299	0.38439		0.007131588	0.00359	0.003541	0.375645
	0.053579177	0.010425	0.043154	0.427544	Aug/2006	0.045040347	0.009168	0.035872	0.411517
	-0.01488946	0.00035	-0.01524	0.412305		0.096900376	0.016799	0.080101	0.491619
Nov/2005	0.011819691	0.00428	0.00754	0.419844		0.105543664	0.018071	0.087473	0.579091
	-0.02338964	-0.0009	-0.02249	0.397355		-0.11815618	-0.01484	-0.10331	0.47578
	0.005166214	0.003301	0.001865	0.39922	Sep/2006	0.045655587	0.009259	0.036397	0.512177
	-0.01731669	-7E-06	-0.01731	0.381911		0.024247962	0.006109	0.018139	0.530316
Dec/2005	-0.04468999	-0.00403	-0.04066	0.341255		0.006433934	0.003488	0.002946	0.533262
	0.012549894	0.004388	0.008162	0.349418		-0.00365839	0.002003	-0.00566	0.527601
	-0.0268782	-0.00141	-0.02546	0.323953	Oct/2006	-0.01980615	-0.00037	-0.01943	0.508168
	0.00027388	0.002581	-0.00231	0.321646		0.003328255	0.003031	0.000298	0.508466
Jan/2006	0.014584962	0.004687	0.009898	0.331544		0.025794976	0.006337	0.019458	0.527924
	0.000834103	0.002664	-0.00183	0.329714		-0.01935653	-0.00031	-0.01905	0.508875
	0.001469768	0.002757	-0.00129	0.328427		-0.00623521	0.001624	-0.00786	0.501016
	-0.01353242	0.00055	-0.01408	0.314345	Nov/2006	0.026781763	0.006482	0.0203	0.521316
	0.000693272	0.002643	-0.00195	0.312395		-0.00425007	0.001916	-0.00617	0.51515
Feb/2006	-0.00746546	0.001443	-0.00891	0.303487		-0.02476931	-0.0011	-0.02367	0.491485
	0.012699344	0.00441	0.00829	0.311777		-0.03687269	-0.00288	-0.03399	0.457496
	0.005843805	0.003401	0.002443	0.314219	Dec/2006	0.008794614	0.003835	0.00496	0.462456
	-0.00580695	0.001687	-0.00749	0.306726		0.020805527	0.005602	0.015203	0.477659
Mar/2006	-0.00466443	0.001855	-0.00652	0.300207		0.015093561	0.004762	0.010332	0.487991
	-0.01266006	0.000678	-0.01334	0.286869		0.016611767	0.004985	0.011626	0.499617
	-0.00570602	0.001701	-0.00741	0.279461	Jan/2007	-0.0039964	0.001953	-0.00595	0.493668
	-4.19E-05	0.002535	-0.00258	0.276885		0.012419967	0.004368	0.008051	0.501719
Apr/2006	-0.00291265	0.002112	-0.00503	0.271859		0.022938255	0.005916	0.017022	0.518741
	0.000113556	0.002558	-0.00244	0.269415		0.03516352	0.007715	0.027448	0.54619
	-0.00504686	0.001798	-0.00685	0.26257		0.00886402	0.003845	0.005019	0.551209
	0.002368499	0.00289	-0.00052	0.262049	Feb/2007	0.071482278	0.013059	0.058423	0.609632
May/2006	0.001063736	0.002698	-0.00163	0.260415		0.018373335	0.005244	0.013129	0.622761
	0.028214832	0.006693	0.021522	0.281937		0.053238867	0.010375	0.042864	0.665625
	0.013447747	0.00452	0.008928	0.290865		-0.01360151	0.00054	-0.01414	0.651484
	0.006557843	0.003506	0.003052	0.293917	Mar/2007	-0.0088698	0.001236	-0.01011	0.641378
	0.007479926	0.003642	0.003838	0.297756		0.019131617	0.005356	0.013776	0.655154
Jun/2006	-0.00042684	0.002478	-0.00291	0.294851		0.004526831	0.003207	0.00132	0.656473
	0.011951709	0.0043	0.007652	0.302503		0.017007799	0.005044	0.011964	0.668438
	-0.00621202	0.001627	-0.00784	0.294664	Apr/2007	0.034863914	0.007671	0.027193	0.695631

Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret	Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret
May/2007	0.02732088	0.006561	0.02076	0.71639	Feb/2008	0.001392551	0.002746	-0.00135	0.846146
	0.028372615	0.006716	0.021657	0.738047		-0.00629066	0.001615	-0.00791	0.83824
	0.02577257	0.006333	0.019439	0.757487		0.022129293	0.005797	0.016332	0.854573
	0.000655508	0.002637	-0.00198	0.755505		0.057343877	0.010979	0.046365	0.900938
	0.006331574	0.003473	0.002859	0.758364		0.017093365	0.005056	0.012037	0.912975
Jun/2007	-0.00765206	0.001415	-0.00907	0.749296	Mar/2008	0.008555677	0.0038	0.004756	0.917731
	0.00468087	0.00323	0.001451	0.750748		0.02375988	0.006037	0.017723	0.935454
	0.022173266	0.005804	0.01637	0.767117		0.007152064	0.003593	0.003559	0.939012
	0.050602691	0.009987	0.040616	0.807733		-0.01688472	5.65E-05	-0.01694	0.922071
	0.011200462	0.004189	0.007011	0.814745		-0.01567529	0.000235	-0.01591	0.906161
Jul/2007	0.007015047	0.003573	0.003442	0.818186	Apr/2008	-0.01311933	0.000611	-0.01373	0.892431
	-0.00368337	0.001999	-0.00568	0.812504		-0.01460369	0.000392	-0.015	0.877435
	-0.00352848	0.002022	-0.00555	0.806954		0.024287399	0.006115	0.018173	0.895608
	0.002719828	0.002941	-0.00022	0.806732		-0.03635583	-0.00281	-0.03355	0.862061
	0.000854671	0.002667	-0.00181	0.80492		-0.01659553	9.91E-05	-0.01669	0.845366
Aug/2007	-0.00833384	0.001315	-0.00965	0.795272	May/2008	-0.02110624	-0.00056	-0.02054	0.824824
	0.015842106	0.004872	0.01097	0.806242		0.057390401	0.010986	0.046405	0.871229
	0.035815096	0.007811	0.028004	0.834246		-0.00164768	0.002299	-0.00395	0.867283
	0.001229521	0.002722	-0.00149	0.832754		-0.02955633	-0.00181	-0.02775	0.839535
	-0.02658053	-0.00137	-0.02521	0.807543		-0.02709711	-0.00145	-0.02565	0.813884
Sep/2007	-0.03995385	-0.00334	-0.03662	0.770927	Jun/2008	-0.04573298	-0.00419	-0.04154	0.772339
	-7.93E-05	0.002529	-0.00261	0.768318		0.070381061	0.012897	0.057484	0.829823
	0.042977792	0.008865	0.034113	0.802431		-0.09651842	-0.01166	-0.08486	0.744966
	-0.00359144	0.002013	-0.0056	0.796827		0.009619874	0.003956	0.005663	0.750629
	-0.02521003	-0.00117	-0.02404	0.772786		0.010039457	0.004018	0.006021	0.75665
Oct/2007	-0.01408379	0.000469	-0.01455	0.758233	Jul/2008	-0.01432688	0.000433	-0.01476	0.74189
	0.013662224	0.004551	0.009111	0.767344		-0.04345208	-0.00385	-0.0396	0.702291
	0.005963636	0.003419	0.002545	0.769889		-0.03565139	-0.0027	-0.03295	0.669344
	0.001913357	0.002823	-0.00091	0.76898		0.044003325	0.009016	0.034988	0.704332
	-0.01134324	0.000872	-0.01222	0.756765		-0.05581124	-0.00567	-0.05014	0.654192
Nov/2007	-0.00496405	0.001811	-0.00677	0.74999	Aug/2008	-0.04397452	-0.00393	-0.04005	0.614147
	0.022060522	0.005787	0.016273	0.766264		-0.06651792	-0.00725	-0.05927	0.554875
	0.032852152	0.007375	0.025477	0.791741		0.077374796	0.013926	0.063449	0.618324
	0.036099819	0.007853	0.028247	0.819988		0.038216794	0.008164	0.030052	0.648377
	-0.01857413	-0.00019	-0.01838	0.801606		-0.01768417	-6.1E-05	-0.01762	0.630754
Dec/2007	0.007400269	0.00363	0.00377	0.805376	Sep/2008	-0.0291394	-0.00175	-0.02739	0.603361
	-0.00246689	0.002178	-0.00464	0.800732		-0.02328525	-0.00089	-0.0224	0.580961
	0.004086949	0.003142	0.000945	0.801676		-0.01089923	0.000937	-0.01184	0.569124
	0.03995294	0.00842	0.031533	0.833209		-0.02912666	-0.00174	-0.02738	0.541742
	0.034946374	0.007683	0.027263	0.860473		-0.03207682	-0.00218	-0.0299	0.511844
Jan/2008	-0.01223166	0.000741	-0.01297	0.8475		-0.02498431	-0.00114	-0.02385	0.487995

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Nov/2008	-0.13270525	-0.01699	-0.11572	0.372276		-0.04509603	-0.00409	-0.041	-0.01224
	-0.05434283	-0.00546	-0.04889	0.323388		-0.09340309	-0.0112	-0.0822	-0.09445
	0.102592847	0.017637	0.084956	0.408344		0.061576521	0.011601	0.049975	-0.04447
	-0.08489294	-0.00995	-0.07494	0.333401	Sep/2009	-0.06262775	-0.00667	-0.05595	-0.10042
Dec/2008	-0.04716876	-0.0044	-0.04277	0.290632		-0.01752026	-3.7E-05	-0.01748	-0.11791
	-0.07182577	-0.00803	-0.0638	0.226834		0.018018882	0.005192	0.012827	-0.10508
	-0.064469	-0.00695	-0.05752	0.16931		0.021126084	0.00565	0.015477	-0.0896
	0.030490867	0.007027	0.023463	0.192773	Oct/2009	0.007393825	0.003629	0.003765	-0.08584
	0.039830684	0.008402	0.031429	0.224202		0.034422843	0.007606	0.026817	-0.05902
Jan/2009	0.02044752	0.00555	0.014898	0.2391		-0.04203219	-0.00364	-0.03839	-0.09741
	-0.07942153	-0.00915	-0.07028	0.168824		0.016132035	0.004915	0.011217	-0.08619
	-0.06090942	-0.00642	-0.05449	0.114336	Nov/2009	-0.03745524	-0.00297	-0.03449	-0.12068
	-0.11466682	-0.01433	-0.10034	0.014		-0.01318065	0.000602	-0.01378	-0.13446
Feb/2009	-0.09109674	-0.01086	-0.08023	-0.06623		-0.00781279	0.001391	-0.0092	-0.14367
	0.091871828	0.016059	0.075813	0.009579		0.01340473	0.004513	0.008891	-0.13477
	-0.00763756	0.001417	-0.00905	0.000525		-0.01930127	-0.0003	-0.019	-0.15378
	-0.03909347	-0.00321	-0.03588	-0.03536	Dec/2009	0.007382491	0.003627	0.003755	-0.15002
Mar/2009	0.029289919	0.006851	0.022439	-0.01292		-0.03346619	-0.00238	-0.03108	-0.1811
	-0.0634851	-0.0068	-0.05668	-0.0696		0.003076128	0.002994	8.25E-05	-0.18102
	-0.04063483	-0.00344	-0.0372	-0.1068		-0.01369082	0.000527	-0.01422	-0.19524
	-0.03015509	-0.0019	-0.02826	-0.13506	Jan/2010	0.018995124	0.005336	0.013659	-0.18158
	-0.02619433	-0.00131	-0.02488	-0.15994		0.039924771	0.008416	0.031509	-0.15007
Apr/2009	0.005932	0.003414	0.002518	-0.15742		0.018545443	0.00527	0.013276	-0.13679
	-0.00201913	0.002244	-0.00426	-0.16168		-0.00136807	0.00234	-0.00371	-0.1405
	0.003476473	0.003053	0.000424	-0.16126	Feb/2010	0.025633926	0.006313	0.019321	-0.12118
	0.073703817	0.013386	0.060318	-0.10094		0.027943474	0.006653	0.021291	-0.09989
May/2009	0.001640107	0.002782	-0.00114	-0.10209		-0.01115202	0.0009	-0.01205	-0.11194
	0.094231987	0.016406	0.077826	-0.02426		0.008768133	0.003831	0.004937	-0.10701
	0.054437228	0.010551	0.043886	0.019627	Mar/2010	-0.00792623	0.001375	-0.0093	-0.11631
	0.088424861	0.015552	0.072873	0.092499		-0.00265782	0.00215	-0.00481	-0.12111
Jun/2009	0.100455592	0.017322	0.083133	0.175633		0.053124009	0.010358	0.042766	-0.07835
	-0.02059344	-0.00049	-0.0201	0.155528		0.015581326	0.004834	0.010748	-0.0676
	-0.01288958	0.000644	-0.01353	0.141994		0.032832773	0.007372	0.025461	-0.04214
	0.00683751	0.003547	0.00329	0.145285	Apr/2010	0.035417391	0.007752	0.027665	-0.01447
	-0.10710654	-0.01322	-0.09389	0.051397		0.056460133	0.010849	0.045611	0.031137
Jul/2009	0.049315573	0.009797	0.039518	0.090915		0.010418731	0.004074	0.006345	0.037481
	-0.03639886	-0.00281	-0.03358	0.057331		-0.02102634	-0.00055	-0.02047	0.017008
	-0.09364598	-0.01124	-0.08241	-0.02508	May/2010	-0.03456214	-0.00254	-0.03202	-0.01501
	0.011315322	0.004206	0.007109	-0.01797		0.039698789	0.008382	0.031316	0.016307
Aug/2009	0.056951359	0.010921	0.04603	0.028063		0.009081436	0.003877	0.005204	0.021511
	0.003792126	0.003099	0.000693	0.028757		-0.03488724	-0.00259	-0.03229	-0.01078

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Jun/2010	-0.02246378	-0.00076	-0.0217	-0.03248	Apr/2011	0.008967641	0.003861	0.005107	-0.14796
	-0.00113584	0.002374	-0.00351	-0.03599		-0.04715688	-0.0044	-0.04276	-0.19072
	-0.02793817	-0.00157	-0.02637	-0.06236		0.019880453	0.005466	0.014414	-0.1763
Jul/2010	0.017273478	0.005083	0.012191	-0.05017	May/2011	-0.00447767	0.001882	-0.00636	-0.18266
	-0.02736339	-0.00149	-0.02588	-0.07605		-0.00075428	0.00243	-0.00318	-0.18585
	0.002760566	0.002947	-0.00019	-0.07624		0.01226561	0.004346	0.00792	-0.17793
Aug/2010	-0.02435804	-0.00104	-0.02331	-0.09955	Jun/2011	-0.00066582	0.002443	-0.00311	-0.18104
	0.009644321	0.00396	0.005684	-0.09387		0.000863307	0.002668	-0.0018	-0.18284
	0.017013166	0.005044	0.011969	-0.0819		0.010333971	0.004062	0.006272	-0.17657
Sep/2010	0.022747707	0.005888	0.01686	-0.06504	Jul/2011	0.020286192	0.005526	0.01476	-0.16181
	-0.0040779	0.001941	-0.00602	-0.07106		-0.00089371	0.002409	-0.0033	-0.16511
	-0.02929392	-0.00177	-0.02752	-0.09858		0.001516442	0.002764	-0.00125	-0.16636
Oct/2010	0.00488537	0.00326	0.001626	-0.09696	Aug/2011	0.005178138	0.003303	0.001875	-0.16448
	-0.03315229	-0.00234	-0.03082	-0.12777		-0.01028521	0.001028	-0.01131	-0.1758
	-0.00134586	0.002343	-0.00369	-0.13146		-0.01507173	0.000323	-0.0154	-0.19119
Nov/2010	-0.01811125	-0.00012	-0.01799	-0.14945	Sep/2011	-0.00148405	0.002323	-0.00381	-0.195
	-0.03398845	-0.00246	-0.03153	-0.18098		-0.02274489	-0.00081	-0.02194	-0.21694
	-0.01325055	0.000591	-0.01384	-0.19482		-0.01566113	0.000237	-0.0159	-0.23283
Dec/2010	0.015932768	0.004885	0.011047	-0.18377	Oct/2011	-0.01965814	-0.00035	-0.01931	-0.25214
	0.031314166	0.007149	0.024166	-0.1596		0.00392663	0.003119	0.000808	-0.25133
	0.054909475	0.01062	0.044289	-0.11532		-0.00412652	0.001934	-0.00606	-0.25739
Jan/2011	-0.00394892	0.00196	-0.00591	-0.12122	Nov/2011	-0.01802788	-0.00011	-0.01792	-0.27531
	0.002540565	0.002915	-0.00037	-0.1216		-0.0265794	-0.00137	-0.02521	-0.30052
	-0.00965132	0.001121	-0.01077	-0.13237		-0.00226251	0.002208	-0.00447	-0.30499
Feb/2011	0.022876986	0.005907	0.01697	-0.1154	Dec/2011	-0.03287931	-0.0023	-0.03058	-0.33557
	-0.01607863	0.000175	-0.01625	-0.13165		-0.0171949	1.09E-05	-0.01721	-0.35278
	-0.01395796	0.000487	-0.01445	-0.1461		-0.02291219	-0.00083	-0.02208	-0.37486
Mar/2011	0.007942609	0.00371	0.004233	-0.14187	Jan/2012	0.000121777	0.002559	-0.00244	-0.3773
	-0.01459183	0.000394	-0.01499	-0.15685		-0.04283812	-0.00376	-0.03908	-0.41637
	-3.19E-05	0.002536	-0.00257	-0.15942		0.00843955	0.003783	0.004657	-0.41172
Apr/2011	0.010017886	0.004015	0.006003	-0.15342	Feb/2012	-0.00726354	0.001472	-0.00874	-0.42045
	0.003295373	0.003026	0.000269	-0.15315		-0.01756092	-4.3E-05	-0.01752	-0.43797
	0.056492153	0.010853	0.045639	-0.10751		0.019507948	0.005411	0.014097	-0.42387
May/2011	0.041930297	0.008711	0.03322	-0.07429	Mar/2012	0.031874168	0.007231	0.024643	-0.39923
	0.015301551	0.004793	0.010509	-0.06378		-0.01773655	-6.9E-05	-0.01767	-0.4169
	-0.01184097	0.000799	-0.01264	-0.07642		-0.0056647	0.001707	-0.00737	-0.42427
Jun/2011	-0.02166754	-0.00065	-0.02102	-0.09744	Apr/2012	-0.00512292	0.001787	-0.00691	-0.43118
	-0.00296482	0.002105	-0.00507	-0.10251		-0.00932329	0.001169	-0.01049	-0.44167
	-0.00169162	0.002292	-0.00398	-0.10649		-0.00789031	0.00138	-0.00927	-0.45094
Jul/2011	-0.01719899	1.03E-05	-0.01721	-0.1237	May/2012	-0.00893336	0.001227	-0.01016	-0.4611
	-0.03144778	-0.00209	-0.02936	-0.15306		0.012176378	0.004333	0.007844	-0.45326

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	0.036818247	0.007959	0.02886	-0.4244		0.016570658	0.004979	0.011591	-0.31654
Jan/2012	-0.00157153	0.00231	-0.00388	-0.42828		0.031962733	0.007244	0.024719	-0.29182
	-0.00025711	0.002503	-0.00276	-0.43104		0.000311494	0.002587	-0.00228	-0.2941
	0.005581101	0.003362	0.002219	-0.42882		-0.01539693	0.000275	-0.01567	-0.30977
	-0.00099084	0.002395	-0.00339	-0.43221	Nov/2012	-0.01177702	0.000808	-0.01259	-0.32236
	0.00347449	0.003052	0.000422	-0.43179		0.005977134	0.00342	0.002557	-0.3198
Feb/2012	-0.00071891	0.002435	-0.00315	-0.43494		-0.011878	0.000793	-0.01267	-0.33247
	-0.01216661	0.000751	-0.01292	-0.44786		-0.00298323	0.002102	-0.00509	-0.33755
	-0.01030178	0.001025	-0.01133	-0.45918	Dec/2012	0.006544291	0.003504	0.00304	-0.33451
	0.004152138	0.003152	0.001	-0.45818		0.006691215	0.003526	0.003166	-0.33135
Mar/2012	0.004688738	0.003231	0.001458	-0.45673		0.038011047	0.008134	0.029877	-0.30147
	0.017385375	0.005099	0.012286	-0.44444		-0.01023928	0.001034	-0.01127	-0.31275
	-0.00600334	0.001658	-0.00766	-0.4521		0.016949456	0.005035	0.011914	-0.30083
	0.017622243	0.005134	0.012488	-0.43961	Jan/2013	0.02409882	0.006087	0.018012	-0.28282
Apr/2012	-0.02542327	-0.0012	-0.02422	-0.46384		0.023265422	0.005964	0.017301	-0.26552
	0.014015757	0.004603	0.009412	-0.45442		0.059077098	0.011234	0.047843	-0.21767
	-0.00949148	0.001144	-0.01064	-0.46506		0.021221139	0.005664	0.015558	-0.20212
	0.048851766	0.009729	0.039123	-0.42594	Feb/2013	0.026227944	0.0064	0.019828	-0.18229
	0.016222278	0.004928	0.011294	-0.41464		0.027817904	0.006634	0.021184	-0.16111
May/2012	0.025172505	0.006245	0.018928	-0.39572		-0.00165218	0.002298	-0.00395	-0.16506
	-0.00192138	0.002258	-0.00418	-0.3999		0.019141902	0.005358	0.013784	-0.15127
	-0.01066773	0.000971	-0.01164	-0.41153	Mar/2013	-0.02100246	-0.00055	-0.02045	-0.17172
	-0.00664623	0.001563	-0.00821	-0.41974		-0.01006805	0.00106	-0.01113	-0.18285
Jun/2012	-0.01207654	0.000764	-0.01284	-0.43258		0.003073751	0.002993	8.05E-05	-0.18277
	-0.04830296	-0.00457	-0.04374	-0.47632		0.01689829	0.005027	0.011871	-0.1709
	0.013473218	0.004523	0.00895	-0.46737	Apr/2013	0.000876536	0.00267	-0.00179	-0.17269
	0.009921839	0.004001	0.005921	-0.46145		0.022814715	0.005898	0.016917	-0.15578
Jul/2012	0.009572433	0.00395	0.005623	-0.45583		-0.0229504	-0.00084	-0.02211	-0.17789
	0.023673619	0.006024	0.017649	-0.43818		-0.01552091	0.000257	-0.01578	-0.19367
	0.028499505	0.006734	0.021765	-0.41641		0.005004248	0.003277	0.001727	-0.19194
	0.01557755	0.004833	0.010744	-0.40567	May/2013	0.058814961	0.011195	0.04762	-0.14432
	0.008551087	0.003799	0.004752	-0.40092		0.02566127	0.006317	0.019344	-0.12498
Aug/2012	0.009889751	0.003996	0.005894	-0.39502		0.024924272	0.006208	0.018716	-0.10626
	-0.01207873	0.000764	-0.01284	-0.40787		0.011995293	0.004306	0.007689	-0.09857
	-0.00421489	0.001921	-0.00614	-0.414	Jun/2013	0.011893272	0.004291	0.007602	-0.09097
	0.011170611	0.004185	0.006986	-0.40702		0.04683296	0.009432	0.037401	-0.05357
Sep/2012	0.015010526	0.00475	0.010261	-0.39675		-0.05850808	-0.00607	-0.05244	-0.10601
	0.045803892	0.009281	0.036523	-0.36023		-0.02108836	-0.00056	-0.02053	-0.12654
	0.020068683	0.005494	0.014575	-0.34566	Jul/2013	-0.0082294	0.00133	-0.00956	-0.1361
	0.0211756	0.005657	0.015519	-0.33014		0.021069944	0.005641	0.015429	-0.12067
Oct/2012	0.005330894	0.003325	0.002005	-0.32813		0.012354342	0.004359	0.007995	-0.11267

Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret	Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret
Aug/2013	0.025300615	0.006264	0.019037	-0.09364	May/2014	-0.00821016	0.001333	-0.00954	-0.18679
	-0.03085554	-0.002	-0.02886	-0.12249		-0.0006374	0.002447	-0.00308	-0.18988
	0.034423681	0.007606	0.026818	-0.09567	Jun/2014	0.012136424	0.004327	0.00781	-0.18207
	-0.010034	0.001065	-0.0111	-0.10677		0.020750549	0.005594	0.015156	-0.16691
Sep/2013	-0.02765204	-0.00153	-0.02612	-0.1329		0.041237623	0.008609	0.032629	-0.13428
	-0.0110758	0.000911	-0.01199	-0.14488		0.001319127	0.002735	-0.00142	-0.1357
	-0.00898782	0.001219	-0.01021	-0.15509		-0.0002892	0.002498	-0.00279	-0.13849
	0.004287622	0.003172	0.001116	-0.15398	Jul/2014	-0.00934145	0.001166	-0.01051	-0.14899
Oct/2013	-0.00840239	0.001305	-0.00971	-0.16368		0.025732283	0.006327	0.019405	-0.12959
	0.002511215	0.002911	-0.0004	-0.16408		0.020010373	0.005485	0.014525	-0.11506
	0.006860149	0.00355	0.00331	-0.16077		-0.00462425	0.001861	-0.00648	-0.12155
Nov/2013	0.013416041	0.004515	0.008901	-0.15187	Aug/2014	0.001377448	0.002744	-0.00137	-0.12292
	0.001781951	0.002803	-0.00102	-0.15289		-0.01412787	0.000462	-0.01459	-0.13751
	0.009491609	0.003938	0.005554	-0.14734		-0.00831129	0.001318	-0.00963	-0.14713
	0.003192322	0.003011	0.000182	-0.14716		0.015835686	0.004871	0.010965	-0.13617
Dec/2013	0.0081117	0.003735	0.004377	-0.14278	Sep/2014	-0.02860221	-0.00167	-0.02693	-0.1631
	0.002781616	0.00295	-0.00017	-0.14295		0.00444997	0.003196	0.001254	-0.16185
	0.000334294	0.00259	-0.00226	-0.1452		-0.00076701	0.002428	-0.0032	-0.16505
	0.035966025	0.007833	0.028133	-0.11707		-0.00894942	0.001224	-0.01017	-0.17522
Jan/2014	-0.00828618	0.001322	-0.00961	-0.12668	Oct/2014	-0.01184822	0.000798	-0.01265	-0.18787
	-0.00469414	0.00185	-0.00654	-0.13322		0.009252589	0.003902	0.00535	-0.18251
	0.002412092	0.002896	-0.00048	-0.13371		-0.00559206	0.001718	-0.00731	-0.18983
	0.018829	0.005312	0.013517	-0.12019		0.006962811	0.003566	0.003397	-0.18643
Feb/2014	0.016908076	0.005029	0.011879	-0.10831	Nov/2014	-0.01604591	0.00018	-0.01623	-0.20265
	0.030294534	0.006999	0.023296	-0.08501		-0.05554936	-0.00563	-0.04992	-0.25257
	0.000727133	0.002648	-0.00192	-0.08694		0.023283321	0.005967	0.017316	-0.23525
	0.006531484	0.003502	0.003029	-0.08391		-0.03931886	-0.00324	-0.03607	-0.27133
Mar/2014	0.0039759	0.003126	0.00085	-0.08306	Dec/2014	-0.11516544	-0.0144	-0.10076	-0.37209
	-0.03210899	-0.00218	-0.02993	-0.11298		0.06486746	0.012086	0.052782	-0.31931
	0.004975892	0.003273	0.001703	-0.11128		-0.04111922	-0.00351	-0.03761	-0.35692
	-0.04920377	-0.0047	-0.0445	-0.15578		0.018182713	0.005216	0.012966	-0.34395
Apr/2014	-0.01216361	0.000751	-0.01291	-0.1687	Jan/2015	-0.03806149	-0.00306	-0.035	-0.37895
	0.032984086	0.007394	0.02559	-0.14311		-0.07418107	-0.00837	-0.06581	-0.44476
	-0.01532955	0.000285	-0.01561	-0.15872		-0.0148511	0.000356	-0.01521	-0.45997
	-0.02005393	-0.00041	-0.01964	-0.17837		0.136020611	0.022555	0.113465	-0.3465
May/2014	-0.00998656	0.001072	-0.01106	-0.18943	Feb/2015	0.007421108	0.003633	0.003788	-0.34271
	0.014333376	0.00465	0.009683	-0.17974		0.13088	0.021799	0.109081	-0.23363
	0.009939011	0.004003	0.005936	-0.17381		-0.90368161	-0.13043	-0.77325	-1.00689
	0.00958082	0.003951	0.00563	-0.16818		0.026766418	0.006479	0.020287	-0.9866
Jun/2014	0.006200033	0.003453	0.002747	-0.16543	Jul/2014	-0.0083852	0.001307	-0.00969	-0.99629
	-0.01087932	0.00094	-0.01182	-0.17725		0.014309214	0.004646	0.009663	-0.98663

Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret	Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret
Mar/2015	-0.0800338	-0.00924	-0.0708	-1.05743	Dec/2015	-0.01826543	-0.00015	-0.01812	-1.14079
	0.065204026	0.012135	0.053069	-1.00436		0.000492442	0.002613	-0.00212	-1.14292
	0.024499105	0.006146	0.018353	-0.986		-0.01307732	0.000617	-0.01369	-1.15661
	0.031409978	0.007163	0.024247	-0.96176		-0.0268558	-0.00141	-0.02545	-1.18205
Apr/2015	-0.01062856	0.000977	-0.01161	-0.97336	Jan/2016	0.012581508	0.004392	0.008189	-1.17387
	-0.04508981	-0.00409	-0.041	-1.01436		0.065907267	0.012239	0.053669	-1.1202
	0.04188622	0.008704	0.033182	-0.98118		-0.05634543	-0.00575	-0.0506	-1.17079
	0.169001794	0.027408	0.141594	-0.83958		-0.13002439	-0.01659	-0.11343	-1.28423
May/2015	-0.02233815	-0.00075	-0.02159	-0.86118	Feb/2016	0.013288231	0.004496	0.008792	-1.27543
	0.002148009	0.002857	-0.00071	-0.86189		0.003762617	0.003095	0.000668	-1.27477
	-0.01483586	0.000358	-0.01519	-0.87708		-0.01732219	-7.8E-06	-0.01731	-1.29208
	0.006448756	0.00349	0.002959	-0.87412		0.05054151	0.009978	0.040564	-1.25152
Jun/2015	-0.00921946	0.001184	-0.0104	-0.88452	Mar/2016	-0.01041649	0.001008	-0.01142	-1.26294
	0.001494702	0.002761	-0.00127	-0.88579		-0.00833807	0.001314	-0.00965	-1.27259
	-0.00486157	0.001826	-0.00669	-0.89248		0.065678476	0.012205	0.053473	-1.21912
	0.001116944	0.002705	-0.00159	-0.89407		0.006518178	0.0035	0.003018	-1.2161
Jul/2015	-0.01881239	-0.00023	-0.01859	-0.91265	Apr/2016	-0.01129773	0.000879	-0.01218	-1.22828
	-0.00128205	0.002352	-0.00363	-0.91629		0.007982941	0.003716	0.004267	-1.22401
	-0.01082186	0.000949	-0.01177	-0.92806		-0.01516685	0.000309	-0.01548	-1.23949
	-0.01215982	0.000752	-0.01291	-0.94097		-0.00701844	0.001508	-0.00853	-1.24801
Aug/2015	-0.00959259	0.00113	-0.01072	-0.95169	May/2016	-0.02403657	-0.001	-0.02304	-1.27105
	-0.02486544	-0.00112	-0.02375	-0.97544		0.005293037	0.00332	0.001973	-1.26908
	-0.02147135	-0.00062	-0.02085	-0.99629		0.008543222	0.003798	0.004745	-1.26434
	0.001407499	0.002748	-0.00134	-0.99763		0.025503932	0.006294	0.01921	-1.24513
Sep/2015	-0.02931394	-0.00177	-0.02754	-1.02517	Jun/2016	0.028769804	0.006774	0.021996	-1.22313
	0.041796843	0.008691	0.033106	-0.99207		0.025544391	0.0063	0.019245	-1.20389
	-0.02341126	-0.0009	-0.02251	-1.01457		0.065856703	0.012231	0.053625	-1.15026
	-0.02694263	-0.00142	-0.02552	-1.04009		-0.04386614	-0.00391	-0.03995	-1.19021
Oct/2015	-0.03560139	-0.0027	-0.0329	-1.073	Jul/2016	-0.01453984	0.000402	-0.01494	-1.20515
	0.024170369	0.006097	0.018073	-1.05492		0.073979294	0.013426	0.060553	-1.1446
	0.006031633	0.003429	0.002603	-1.05232		0.047949433	0.009596	0.038353	-1.10625
	0.021678004	0.005731	0.015947	-1.03637		-0.04385889	-0.00391	-0.03995	-1.14619
Nov/2015	0.00693938	0.003562	0.003377	-1.033	Aug/2016	-0.01536986	0.000279	-0.01565	-1.16184
	0.001481182	0.002759	-0.00128	-1.03427		-0.00171652	0.002288	-0.004	-1.16585
	-0.01383498	0.000505	-0.01434	-1.04862		-0.03978449	-0.00331	-0.03647	-1.20232
	-0.01097323	0.000926	-0.0119	-1.06051		0.012671623	0.004406	0.008266	-1.19405
Dec/2015	0.005955579	0.003417	0.002538	-1.05798	Sep/2016	-0.02085225	-0.00053	-0.02033	-1.21438
	-0.02779465	-0.00155	-0.02625	-1.08422		-0.00652596	0.001581	-0.00811	-1.22249
	-8.12E-05	0.002529	-0.00261	-1.08683		0.014806833	0.00472	0.010087	-1.2124
	-0.01143705	0.000858	-0.0123	-1.09913		-0.00721185	0.00148	-0.00869	-1.22109
	-0.02463068	-0.00108	-0.02355	-1.12268		0.011138429	0.00418	0.006958	-1.21413

Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret
Oct/2016	-0.0064543	0.001591	-0.00805	-1.22218
	0.010188008	0.00404	0.006148	-1.21603
	0.013948715	0.004593	0.009355	-1.20667
	0.00312705	0.003001	0.000126	-1.20655
	-0.01765212	-5.6E-05	-0.0176	-1.22414
	0.000927243	0.002677	-0.00175	-1.22589
Nov/2016	-0.00948314	0.001146	-0.01063	-1.23652
	-0.01096539	0.000928	-0.01189	-1.24842
	-0.01145335	0.000856	-0.01231	-1.26073
	-0.03004714	-0.00188	-0.02817	-1.28889
	-0.02420018	-0.00102	-0.02318	-1.31207
Dec/2016	-0.00799411	0.001365	-0.00936	-1.32143
	0.016083122	0.004908	0.011176	-1.31026
	0.002985918	0.00298	5.56E-06	-1.31025
	0.034449635	0.00761	0.02684	-1.28341
	-0.00827795	0.001323	-0.0096	-1.29301
	0.014672	0.0047	0.009972	-1.28304

Appendix IV
Cumulative Abnormal Return Estimates (Student's t Distribution)

Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret	Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret
1/1/2001	0.087661217	0.012116	0.075545	0.075545		0.06980611	0.009955	0.059851	0.213853
	0.005041207	0.002117	0.002924	0.078469		-0.00060756	0.001433	-0.00204	0.211812
	-0.01401543	-0.00019	-0.01383	0.064643		0.001242714	0.001657	-0.00041	0.211398
	-0.02614941	-0.00166	-0.02449	0.040151		-0.00809087	0.000528	-0.00862	0.202779
2/1/2001	0.003494429	0.00193	0.001565	0.041716	11/5/2001	-0.00016408	0.001487	-0.00165	0.201128
	0.034140819	0.005639	0.028502	0.070217		-0.01191361	6.51E-05	-0.01198	0.189149
	0.001737388	0.001717	2.01E-05	0.070238		0.0162485	0.003474	0.012775	0.201924
	0.039156173	0.006246	0.03291	0.103148		0.002959608	0.001865	0.001094	0.203018
3/1/2001	0.009786348	0.002691	0.007095	0.110243	12/3/2001	-0.0255265	-0.00158	-0.02394	0.179074
	-0.01624175	-0.00046	-0.01578	0.09446		-0.00477103	0.00093	-0.0057	0.173374
	-0.01999769	-0.00091	-0.01908	0.075375		0.005986603	0.002232	0.003755	0.177129
	0.001517612	0.001691	-0.00017	0.075202		0.000494615	0.001567	-0.00107	0.176057
4/2/2001	0.020224174	0.003955	0.016269	0.091472		0.003341356	0.001911	0.00143	0.177487
	0.002010684	0.00175	0.00026	0.091732	1/7/2002	-0.00231919	0.001226	-0.00355	0.173941
	0.021261508	0.00408	0.017181	0.108913		0.00975827	0.002688	0.00707	0.181011
	-0.00886546	0.000434	-0.0093	0.099614		-0.02311367	-0.00129	-0.02182	0.159188
	0.026417519	0.004704	0.021713	0.121327		-0.01122557	0.000148	-0.01137	0.147814
5/7/2001	0.027984586	0.004894	0.023091	0.144418	2/4/2002	-0.01631321	-0.00047	-0.01585	0.131968
	0.005868519	0.002217	0.003651	0.148069		-0.02602878	-0.00164	-0.02439	0.107583
	0.003837165	0.001971	0.001866	0.149935		0.003610317	0.001944	0.001666	0.109249
	0.002667826	0.00183	0.000838	0.150773		0.054830456	0.008143	0.046687	0.155936
6/4/2001	0.001334314	0.001668	-0.00033	0.150438	3/4/2002	0.058448138	0.008581	0.049867	0.205804
	0.033199981	0.005525	0.027675	0.178113		-0.02107263	-0.00104	-0.02003	0.185774
	0.03340474	0.00555	0.027855	0.205968		0.024453799	0.004467	0.019987	0.205762
	0.010362972	0.002761	0.007602	0.21357		-0.0214644	-0.00109	-0.02037	0.185388
7/2/2001	-0.01924339	-0.00082	-0.01842	0.195148	4/1/2002	-0.00720058	0.000636	-0.00784	0.177552
	-0.02606465	-0.00165	-0.02442	0.170731		-0.00445138	0.000968	-0.00542	0.172132
	0.027395857	0.004823	0.022573	0.193305		0.050649265	0.007637	0.043012	0.215145
	-0.02097563	-0.00103	-0.01994	0.173361		-0.01171614	8.9E-05	-0.01181	0.203339
	-0.00325077	0.001114	-0.00436	0.168996		-0.00778954	0.000564	-0.00835	0.194986
8/6/2001	-0.02257948	-0.00123	-0.02135	0.147642	5/6/2002	0.014054178	0.003208	0.010846	0.205832
	-0.00235797	0.001222	-0.00358	0.144063		0.006670196	0.002314	0.004356	0.210188
	0.023202692	0.004315	0.018888	0.16295		-0.0221796	-0.00118	-0.021	0.189186
	-0.01162629	9.99E-05	-0.01173	0.151224		0.007732556	0.002443	0.00529	0.194475
9/3/2001	-0.00608484	0.000771	-0.00686	0.144369	6/3/2002	0.021937545	0.004162	0.017775	0.212251
	-0.00356026	0.001076	-0.00464	0.139732		0.07497685	0.010581	0.064396	0.276646
	0.017602925	0.003637	0.013965	0.153698		-0.04193261	-0.00357	-0.03836	0.238282
	-0.01301296	-6.8E-05	-0.01295	0.140753		0.029030545	0.005021	0.02401	0.262292
10/1/2001	0.01678872	0.003539	0.01325	0.154003	7/1/2002	9.89E-05	0.001519	-0.00142	0.260872

Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret	Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret
	0.022323797	0.004209	0.018115	0.278987		-0.01672264	-0.00052	-0.01621	0.263123
	-0.02588204	-0.00163	-0.02426	0.25473		0.013928398	0.003193	0.010736	0.273859
	0.024193692	0.004435	0.019759	0.274489	5/5/2003	0.011276516	0.002872	0.008405	0.282263
	0.024811291	0.00451	0.020301	0.29479		-0.00111456	0.001372	-0.00249	0.279777
8/5/2002	-0.02161776	-0.00111	-0.02051	0.274282		0.021236335	0.004077	0.017159	0.296936
	-0.01277673	-3.9E-05	-0.01274	0.261544		0.013212675	0.003106	0.010107	0.307042
	0.01468872	0.003285	0.011404	0.272948	6/2/2003	0.004730855	0.00208	0.002651	0.309694
	-0.03279028	-0.00246	-0.03033	0.242619		0.014441573	0.003255	0.011187	0.32088
9/2/2002	-0.01018178	0.000275	-0.01046	0.232163		0.007917238	0.002465	0.005452	0.326332
	-0.01060612	0.000223	-0.01083	0.221334		0.003992827	0.00199	0.002003	0.328335
	0.005055094	0.002119	0.002936	0.22427		0.001075799	0.001637	-0.00056	0.327774
	-0.01676858	-0.00052	-0.01625	0.208024	7/7/2003	0.002144474	0.001767	0.000378	0.328152
	0.00585808	0.002216	0.003642	0.211666		-0.01551914	-0.00037	-0.01515	0.313004
10/7/2002	-0.00390653	0.001034	-0.00494	0.206725		-0.02227557	-0.00119	-0.02109	0.291917
	-0.00459362	0.000951	-0.00554	0.20118		-0.00157879	0.001316	-0.00289	0.289022
	-0.04238975	-0.00362	-0.03877	0.162414	8/4/2003	0.025609028	0.004606	0.021003	0.310025
	0.007558198	0.002422	0.005136	0.16755		0.021843511	0.004151	0.017693	0.327718
11/4/2002	0.012875892	0.003065	0.009811	0.177361		0.065889923	0.009482	0.056408	0.384126
	-0.01469016	-0.00027	-0.01442	0.162942		-0.01414552	-0.00021	-0.01394	0.370186
	0.006869814	0.002338	0.004531	0.167473	9/1/2003	0.025627479	0.004609	0.021019	0.391205
	0.007512084	0.002416	0.005096	0.172569		-1.14E-05	0.001506	-0.00152	0.389688
12/2/2002	-0.00139382	0.001338	-0.00273	0.169837		0.000302759	0.001544	-0.00124	0.388447
	0.00323783	0.001899	0.001339	0.171176		0.026599966	0.004726	0.021874	0.41032
	-4.38E-05	0.001502	-0.00155	0.16963		0.016636374	0.00352	0.013116	0.423436
	0.017183674	0.003587	0.013597	0.183227	10/6/2003	0.10036798	0.013654	0.086714	0.51015
	0.031255462	0.00529	0.025966	0.209193		0.019824462	0.003906	0.015918	0.526068
1/6/2003	0.038315456	0.006144	0.032171	0.241364		0.014482612	0.00326	0.011223	0.537291
	0.051766107	0.007772	0.043994	0.285358		-0.00320574	0.001119	-0.00432	0.532966
	-0.01484443	-0.00029	-0.01455	0.270803	11/3/2003	0.062372056	0.009056	0.053316	0.586282
	0.012055244	0.002966	0.009089	0.279893		0.024933007	0.004525	0.020408	0.606691
2/3/2003	0.03036902	0.005183	0.025187	0.305079		0.018297774	0.003722	0.014576	0.621267
	0.040630186	0.006424	0.034206	0.339285		-0.07040305	-0.00701	-0.06339	0.557878
	-0.02449479	-0.00146	-0.02304	0.316248	12/1/2003	-0.01351393	-0.00013	-0.01339	0.544492
	-0.01734498	-0.00059	-0.01675	0.299495		0.040364671	0.006392	0.033972	0.578465
3/3/2003	0.004999704	0.002112	0.002888	0.302382		-0.03192228	-0.00236	-0.02957	0.548899
	-0.00529367	0.000866	-0.00616	0.296222		0.030845671	0.00524	0.025605	0.574504
	-0.0098782	0.000311	-0.01019	0.286033		0.017298523	0.003601	0.013698	0.588202
	0.005603332	0.002185	0.003418	0.289451	1/5/2004	0.006383843	0.00228	0.004104	0.592307
	-0.00567428	0.00082	-0.00649	0.282956		0.039329747	0.006267	0.033063	0.625369
4/7/2003	0.008313091	0.002513	0.0058	0.288756		0.035472325	0.0058	0.029672	0.655041
	-0.00901139	0.000416	-0.00943	0.279329		0.04064309	0.006426	0.034217	0.689259

Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret	Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret
2/2/2004	0.001138094	0.001645	-0.00051	0.688752		0.021455032	0.004104	0.017351	0.717805
	0.019759273	0.003898	0.015861	0.704613		-0.02429394	-0.00143	-0.02286	0.694944
	0.09492882	0.012996	0.081933	0.786546		-0.00237122	0.00122	-0.00359	0.691353
	-0.05961859	-0.00571	-0.05391	0.732636	12/6/2004	-0.02522121	-0.00155	-0.02368	0.667677
3/1/2004	0.039792976	0.006323	0.03347	0.766105		-0.01699879	-0.00055	-0.01645	0.651229
	-0.05283088	-0.00489	-0.04794	0.718162		0.014923599	0.003313	0.01161	0.662839
	0.007377159	0.0024	0.004977	0.723139		-0.00271035	0.001179	-0.00389	0.65895
	-0.04107203	-0.00346	-0.03761	0.685531	1/3/2005	0.037005128	0.005986	0.031019	0.689969
	0.012210849	0.002985	0.009226	0.694757		-0.00043784	0.001454	-0.00189	0.688077
4/5/2004	0.013680288	0.003163	0.010518	0.705274		-0.00856969	0.00047	-0.00904	0.679038
	0.067649281	0.009694	0.057955	0.763229		0.003941216	0.001984	0.001957	0.680995
	0.050214947	0.007584	0.042631	0.80586		-0.02794221	-0.00187	-0.02607	0.654928
	0.00257403	0.001819	0.000756	0.806615	2/7/2005	-0.02746832	-0.00182	-0.02565	0.629277
5/3/2004	-0.01441562	-0.00024	-0.01418	0.792437		0.026641132	0.004731	0.02191	0.651187
	-0.0005044	0.001446	-0.00195	0.790487		-0.0113655	0.000131	-0.0115	0.63969
	0.060525695	0.008832	0.051693	0.84218		-0.03053853	-0.00219	-0.02835	0.61134
	0.006047115	0.002239	0.003808	0.845989	3/7/2005	-0.04116053	-0.00347	-0.03769	0.573654
	-0.00810925	0.000526	-0.00863	0.837354		0.012801669	0.003056	0.009745	0.583399
6/7/2004	0.020364635	0.003972	0.016393	0.853747		-0.01942339	-0.00084	-0.01858	0.56482
	0.034443331	0.005676	0.028768	0.882514		-0.01315625	-8.5E-05	-0.01307	0.551749
	0.066202313	0.009519	0.056683	0.939197	4/4/2005	-0.00126777	0.001354	-0.00262	0.549127
	-0.06894337	-0.00684	-0.06211	0.877091		0.01336981	0.003125	0.010245	0.559372
7/5/2004	-0.01880213	-0.00077	-0.01803	0.859058		0.010772956	0.002811	0.007962	0.567334
	-0.01309486	-7.8E-05	-0.01302	0.846041		0.054548351	0.008109	0.046439	0.613774
	-0.01463955	-0.00026	-0.01437	0.831666	5/2/2005	-0.01829689	-0.00071	-0.01759	0.596184
	-0.01716158	-0.00057	-0.01659	0.815074		0.001912876	0.001739	0.000174	0.596359
8/2/2004	0.009460429	0.002652	0.006808	0.821883		-0.0085781	0.000469	-0.00905	0.587312
	0.005193974	0.002136	0.003058	0.824941		-0.00896403	0.000422	-0.00939	0.577926
	-0.02239815	-0.0012	-0.02119	0.803747		-0.0104767	0.000239	-0.01072	0.56721
	-0.12236532	-0.0133	-0.10906	0.694684	6/6/2005	0.002856086	0.001853	0.001003	0.568213
	0.0623965	0.009059	0.053338	0.748022		0.007818585	0.002453	0.005365	0.573579
9/6/2004	-0.05331232	-0.00495	-0.04837	0.699655		0.013046123	0.003086	0.00996	0.583539
	-0.01479402	-0.00028	-0.01451	0.685144		-0.00330627	0.001107	-0.00441	0.579126
	-0.01783762	-0.00065	-0.01719	0.667958	7/4/2005	-0.00938877	0.000371	-0.00976	0.569366
	-0.00561287	0.000828	-0.00644	0.661518		-0.00773544	0.000571	-0.00831	0.56106
10/4/2004	0.00678683	0.002328	0.004458	0.665976		0.006830187	0.002334	0.004497	0.565557
	0.004681244	0.002074	0.002608	0.668584		-0.0038911	0.001036	-0.00493	0.560629
	0.000535758	0.001572	-0.00104	0.667548	8/1/2005	0.018091085	0.003697	0.014395	0.575024
	0.015301616	0.003359	0.011943	0.679491		0.007981836	0.002473	0.005509	0.580533
11/1/2004	0.006321058	0.002272	0.004049	0.68354		-0.01585673	-0.00041	-0.01544	0.565088
	0.020957112	0.004043	0.016914	0.700453		0.011422233	0.002889	0.008533	0.573621

Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret	Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret
	0.011213635	0.002864	0.008349	0.58197		0.011951709	0.002953	0.008998	0.627518
9/5/2005	0.082383323	0.011478	0.070906	0.652876		-0.00621202	0.000755	-0.00697	0.62055
	-0.02058359	-0.00098	-0.0196	0.633277		0.037042529	0.00599	0.031052	0.651603
	0.018106974	0.003698	0.014409	0.647685	7/3/2006	0.019185241	0.003829	0.015356	0.666959
	0.020719508	0.004015	0.016705	0.66439		0.020672639	0.004009	0.016664	0.683623
10/3/2005	0.005939047	0.002226	0.003713	0.668103		0.016388304	0.00349	0.012898	0.696521
	-0.00127375	0.001353	-0.00263	0.665477		0.012409187	0.003009	0.0094	0.705921
	0.011537306	0.002903	0.008634	0.674111		0.007131588	0.00237	0.004761	0.710682
	0.053579177	0.007992	0.045588	0.719698	8/7/2006	0.045040347	0.006958	0.038082	0.748765
	-0.01488946	-0.0003	-0.01459	0.705104		0.096900376	0.013235	0.083666	0.83243
11/7/2005	0.011819691	0.002938	0.008882	0.713986		0.105543664	0.014281	0.091263	0.923693
	-0.02338964	-0.00132	-0.02207	0.69192		-0.11815618	-0.01279	-0.10536	0.81833
	0.005166214	0.002132	0.003034	0.694954	9/4/2006	0.045655587	0.007033	0.038623	0.856953
	-0.01731669	-0.00059	-0.01673	0.678226		0.024247962	0.004442	0.019806	0.876759
12/5/2005	-0.04468999	-0.0039	-0.04079	0.637438		0.006433934	0.002286	0.004148	0.880908
	0.012549894	0.003026	0.009524	0.646962		-0.00365839	0.001064	-0.00472	0.876185
	-0.0268782	-0.00175	-0.02513	0.62183	10/2/2006	-0.01980615	-0.00089	-0.01892	0.857269
	0.00027388	0.00154	-0.00127	0.620564		0.003328255	0.00191	0.001418	0.858687
1/2/2006	0.014584962	0.003272	0.011313	0.631876		0.025794976	0.004629	0.021166	0.879854
	0.000834103	0.001608	-0.00077	0.631103		-0.01935653	-0.00084	-0.01852	0.861333
	0.001469768	0.001685	-0.00022	0.630887		-0.00623521	0.000752	-0.00699	0.854345
	-0.01353242	-0.00013	-0.0134	0.617486	11/6/2006	0.026781763	0.004748	0.022033	0.876379
	0.000693272	0.001591	-0.0009	0.616588		-0.00425007	0.000993	-0.00524	0.871136
2/6/2006	-0.00746546	0.000603	-0.00807	0.608519		-0.02476931	-0.00149	-0.02328	0.847857
	0.012699344	0.003044	0.009655	0.618175		-0.03687269	-0.00296	-0.03392	0.81394
	0.005843805	0.002214	0.00363	0.621804	12/4/2006	0.008794614	0.002571	0.006223	0.820163
	-0.00580695	0.000804	-0.00661	0.615193		0.020805527	0.004025	0.01678	0.836944
3/6/2006	-0.00466443	0.000942	-0.00561	0.609586		0.015093561	0.003334	0.01176	0.848704
	-0.01266006	-2.5E-05	-0.01263	0.596951		0.016611767	0.003517	0.013094	0.861798
	-0.00570602	0.000816	-0.00652	0.590429	1/1/2007	-0.0039964	0.001023	-0.00502	0.856778
	-4.19E-05	0.001502	-0.00154	0.588885		0.012419967	0.00301	0.00941	0.866188
4/3/2006	-0.00291265	0.001154	-0.00407	0.584818		0.022938255	0.004283	0.018655	0.884843
	0.000113556	0.001521	-0.00141	0.583411		0.03516352	0.005763	0.029401	0.914244
	-0.00504686	0.000896	-0.00594	0.577468		0.00886402	0.00258	0.006284	0.920528
	0.002368499	0.001794	0.000575	0.578042	2/5/2007	0.071482278	0.010158	0.061324	0.981852
5/1/2006	0.001063736	0.001636	-0.00057	0.57747		0.018373335	0.003731	0.014643	0.996495
	0.028214832	0.004922	0.023293	0.600764		0.053238867	0.00795	0.045288	1.041783
	0.013447747	0.003135	0.010313	0.611077		-0.01360151	-0.00014	-0.01346	1.028321
	0.006557843	0.002301	0.004257	0.615334	3/5/2007	-0.0088698	0.000434	-0.0093	1.019018
	0.007479926	0.002412	0.005068	0.620402		0.019131617	0.003822	0.015309	1.034327
6/5/2006	-0.00042684	0.001455	-0.00188	0.618519		0.004526831	0.002055	0.002472	1.036799

Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret	Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret
	0.017007799	0.003565	0.013442	1.050241	1/7/2008	0.034946374	0.005736	0.02921	1.29374
4/2/2007	0.034863914	0.005727	0.029137	1.079378		-0.01223166	2.66E-05	-0.01226	1.281482
	0.02732088	0.004814	0.022507	1.101886		0.001392551	0.001676	-0.00028	1.281199
	0.028372615	0.004941	0.023432	1.125317		-0.00629066	0.000746	-0.00704	1.274162
	0.02577257	0.004626	0.021146	1.146464	2/4/2008	0.022129293	0.004185	0.017944	1.292106
	0.000655508	0.001586	-0.00093	1.145533		0.057343877	0.008447	0.048897	1.341003
5/7/2007	0.006331574	0.002273	0.004058	1.149591		0.017093365	0.003576	0.013518	1.354521
	-0.00765206	0.000581	-0.00823	1.141358		0.008555677	0.002542	0.006013	1.360534
	0.00468087	0.002074	0.002607	1.143966	3/3/2008	0.02375988	0.004383	0.019377	1.379911
	0.022173266	0.004191	0.017983	1.161948		0.007152064	0.002373	0.004779	1.384691
6/4/2007	0.050602691	0.007631	0.042971	1.20492		-0.01688472	-0.00054	-0.01635	1.368342
	0.011200462	0.002863	0.008338	1.213258		-0.01567529	-0.00039	-0.01529	1.353057
	0.007015047	0.002356	0.004659	1.217917		-0.01311933	-8.1E-05	-0.01304	1.340019
	-0.00368337	0.001061	-0.00474	1.213172	4/7/2008	-0.01460369	-0.00026	-0.01434	1.325676
7/2/2007	-0.00352848	0.00108	-0.00461	1.208564		0.024287399	0.004446	0.019841	1.345517
	0.002719828	0.001836	0.000884	1.209447		-0.03635583	-0.00289	-0.03346	1.312054
	0.000854671	0.00161	-0.00076	1.208692		-0.01659553	-0.0005	-0.01609	1.29596
	-0.00833384	0.000498	-0.00883	1.199859	5/5/2008	-0.02110624	-0.00105	-0.02006	1.275901
	0.015842106	0.003424	0.012418	1.212277		0.057390401	0.008453	0.048938	1.324839
8/6/2007	0.035815096	0.005842	0.029973	1.242251		-0.00164768	0.001308	-0.00296	1.321883
	0.001229521	0.001656	-0.00043	1.241824		-0.02955633	-0.00207	-0.02749	1.294397
	-0.02658053	-0.00171	-0.02487	1.216954	6/2/2008	-0.02709711	-0.00177	-0.02532	1.269072
	-0.03995385	-0.00333	-0.03663	1.180328		-0.04573298	-0.00403	-0.04171	1.227367
9/3/2007	-7.93E-05	0.001497	-0.00158	1.178752		0.070381061	0.010025	0.060356	1.287723
	0.042977792	0.006709	0.036269	1.215021		-0.09651842	-0.01017	-0.08634	1.201379
	-0.00359144	0.001072	-0.00466	1.210357		0.009619874	0.002671	0.006949	1.208328
	-0.02521003	-0.00154	-0.02367	1.186691	7/7/2008	0.010039457	0.002722	0.007317	1.215645
10/1/2007	-0.01408379	-0.0002	-0.01389	1.172805		-0.01432688	-0.00023	-0.0141	1.201546
	0.013662224	0.003161	0.010502	1.183307		-0.04345208	-0.00375	-0.0397	1.161845
	0.005963636	0.002229	0.003735	1.187042		-0.03565139	-0.00281	-0.03284	1.129002
	0.001913357	0.001739	0.000175	1.187216	8/4/2008	0.044003325	0.006833	0.037171	1.166172
	-0.01134324	0.000134	-0.01148	1.175739		-0.05581124	-0.00525	-0.05056	1.115609
11/5/2007	-0.00496405	0.000906	-0.00587	1.169869		-0.04397452	-0.00382	-0.04016	1.07545
	0.022060522	0.004177	0.017884	1.187752		-0.06651792	-0.00654	-0.05997	1.015475
	0.032852152	0.005483	0.027369	1.215121	9/1/2008	0.077374796	0.010872	0.066503	1.081978
	0.036099819	0.005876	0.030224	1.245345		0.038216794	0.006132	0.032084	1.114063
12/3/2007	-0.01857413	-0.00074	-0.01783	1.227512		-0.01768417	-0.00063	-0.01705	1.097012
	0.007400269	0.002403	0.004998	1.23251		-0.0291394	-0.00202	-0.02712	1.069892
	-0.00246689	0.001208	-0.00368	1.228834		-0.02328525	-0.00131	-0.02197	1.047918
	0.004086949	0.002002	0.002085	1.23092	10/6/2008	-0.01089923	0.000188	-0.01109	1.036831
	0.03995294	0.006342	0.033611	1.26453		-0.02912666	-0.00202	-0.02711	1.009723

Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret	Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret
11/3/2008	-0.03207682	-0.00238	-0.0297	0.980021	8/3/2009	0.056951359	0.0084	0.048552	0.527011
	-0.02498431	-0.00152	-0.02347	0.956554		0.003792126	0.001966	0.001826	0.528837
	-0.13270525	-0.01455	-0.11815	0.838402		-0.04509603	-0.00395	-0.04115	0.487692
	-0.05434283	-0.00507	-0.04927	0.789129		-0.09340309	-0.0098	-0.08361	0.404086
	0.102592847	0.013924	0.088669	0.877799		0.061576521	0.008959	0.052617	0.456703
12/1/2008	-0.08489294	-0.00877	-0.07613	0.801673	9/7/2009	-0.06262775	-0.00607	-0.05656	0.400148
	-0.04716876	-0.0042	-0.04297	0.758706		-0.01752026	-0.00061	-0.01691	0.383241
	-0.07182577	-0.00719	-0.06464	0.694066		0.018018882	0.003688	0.014331	0.397572
	-0.064469	-0.0063	-0.05817	0.635893		0.021126084	0.004064	0.017062	0.414635
	0.030490867	0.005197	0.025294	0.661187		0.007393825	0.002402	0.004992	0.419627
1/5/2009	0.039830684	0.006328	0.033503	0.69469	10/5/2009	0.034422843	0.005673	0.02875	0.448376
	0.02044752	0.003982	0.016466	0.711155		-0.04203219	-0.00358	-0.03845	0.409924
	-0.07942153	-0.00811	-0.07132	0.639839		0.016132035	0.003459	0.012673	0.422597
	-0.06090942	-0.00586	-0.05504	0.584794		-0.03745524	-0.00303	-0.03443	0.388168
	-0.11466682	-0.01237	-0.1023	0.482498		-0.01318065	-8.8E-05	-0.01309	0.375075
2/2/2009	-0.09109674	-0.00952	-0.08158	0.40092	11/2/2009	-0.00781279	0.000561	-0.00837	0.366701
	0.091871828	0.012626	0.079246	0.480166		0.01340473	0.003129	0.010275	0.376976
	-0.00763756	0.000583	-0.00822	0.471946		-0.01930127	-0.00083	-0.01847	0.358504
	-0.03909347	-0.00322	-0.03587	0.436077		0.007382491	0.0024	0.004982	0.363486
	0.029289919	0.005052	0.024238	0.460315		-0.03346619	-0.00254	-0.03092	0.332563
3/2/2009	-0.0634851	-0.00618	-0.05731	0.403006	12/7/2009	0.003076128	0.001879	0.001197	0.33376
	-0.04063483	-0.00341	-0.03722	0.365782		-0.01369082	-0.00015	-0.01354	0.320219
	-0.03015509	-0.00214	-0.02801	0.33777		0.018995124	0.003806	0.015189	0.335409
	-0.02619433	-0.00166	-0.02453	0.313238		0.039924771	0.006339	0.033586	0.368994
	0.005932	0.002225	0.003707	0.316946		0.018545443	0.003752	0.014794	0.383788
4/6/2009	-0.00201913	0.001263	-0.00328	0.313664	1/4/2010	-0.00136807	0.001341	-0.00271	0.381079
	0.003476473	0.001928	0.001549	0.315212		0.025633926	0.004609	0.021025	0.402103
	0.073703817	0.010427	0.063277	0.378489		0.027943474	0.004889	0.023055	0.425158
	0.001640107	0.001705	-6.5E-05	0.378424		-0.01115202	0.000157	-0.01131	0.413848
	0.094231987	0.012912	0.08132	0.459744		0.008768133	0.002568	0.0062	0.420048
5/4/2009	0.054437228	0.008095	0.046342	0.506086	3/1/2010	-0.00792623	0.000548	-0.00847	0.411574
	0.088424861	0.012209	0.076216	0.582302		-0.00265782	0.001185	-0.00384	0.407731
	0.100455592	0.013665	0.086791	0.669092		0.053124009	0.007936	0.045188	0.452919
	-0.02059344	-0.00099	-0.01961	0.649484		0.015581326	0.003393	0.012189	0.465107
	-0.01288958	-5.3E-05	-0.01284	0.636648		0.032832773	0.005481	0.027352	0.492459
6/1/2009	0.00683751	0.002335	0.004503	0.641151	4/5/2010	0.035417391	0.005793	0.029624	0.522083
	-0.10710654	-0.01146	-0.09565	0.5455		0.056460133	0.00834	0.04812	0.570203
	0.049315573	0.007476	0.04184	0.58734		0.010418731	0.002768	0.007651	0.577854
	-0.03639886	-0.0029	-0.0335	0.55384		-0.02102634	-0.00104	-0.01999	0.557865
	-0.09364598	-0.00983	-0.08382	0.47002		-0.03456214	-0.00268	-0.03189	0.525979
7/6/2009	0.011315322	0.002876	0.008439	0.478459	5/3/2010	0.039698789	0.006312	0.033387	0.559366

Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret	Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret
6/7/2010	0.009081436	0.002606	0.006475	0.565842	3/7/2011	-0.01719899	-0.00057	-0.01662	0.461765
	-0.03488724	-0.00272	-0.03217	0.53367		-0.03144778	-0.0023	-0.02915	0.432616
	-0.02246378	-0.00121	-0.02125	0.512418		0.008967641	0.002592	0.006375	0.438992
	-0.00113584	0.00137	-0.00251	0.509912		-0.04715688	-0.0042	-0.04296	0.396035
	-0.02793817	-0.00187	-0.02606	0.483849		0.019880453	0.003913	0.015967	0.412002
7/5/2010	0.017273478	0.003598	0.013676	0.497524	4/4/2011	-0.00447767	0.000965	-0.00544	0.40656
	-0.02736339	-0.0018	-0.02556	0.471966		-0.00075428	0.001416	-0.00217	0.40439
	0.002760566	0.001841	0.000919	0.472885		0.01226561	0.002991	0.009274	0.413664
	-0.02435804	-0.00144	-0.02292	0.449968		-0.00066582	0.001426	-0.00209	0.411571
	0.009644321	0.002674	0.00697	0.456938		0.000863307	0.001611	-0.00075	0.410823
8/2/2010	0.017013166	0.003566	0.013447	0.470385	5/2/2011	0.010333971	0.002758	0.007576	0.4184
	0.022747707	0.00426	0.018488	0.488873		0.020286192	0.003962	0.016324	0.434724
	-0.0040779	0.001013	-0.00509	0.483782		-0.00089371	0.001399	-0.00229	0.432431
	-0.02929392	-0.00204	-0.02726	0.456526		0.001516442	0.001691	-0.00017	0.432257
	0.00488537	0.002098	0.002787	0.459313		0.005178138	0.002134	0.003044	0.435301
9/6/2010	-0.03315229	-0.00251	-0.03065	0.428666	6/6/2011	-0.01028521	0.000262	-0.01055	0.424754
	-0.00134586	0.001344	-0.00269	0.425976		-0.01507173	-0.00032	-0.01475	0.409999
	-0.01811125	-0.00068	-0.01743	0.40855		-0.00148405	0.001327	-0.00281	0.407188
	-0.03398845	-0.00261	-0.03138	0.377168		-0.02274489	-0.00125	-0.0215	0.385689
	-0.01325055	-9.7E-05	-0.01315	0.364014		-0.01566113	-0.00039	-0.01527	0.370416
10/4/2010	0.015932768	0.003435	0.012497	0.376512	7/4/2011	-0.01965814	-0.00087	-0.01879	0.35163
	0.031314166	0.005297	0.026017	0.402529		0.00392663	0.001982	0.001944	0.353575
	0.054909475	0.008153	0.046757	0.449286		-0.00412652	0.001008	-0.00513	0.34844
	-0.00394892	0.001029	-0.00498	0.444308		-0.01802788	-0.00067	-0.01735	0.331087
	0.002540565	0.001814	0.000726	0.445034		-0.0265794	-0.00171	-0.02487	0.306218
11/1/2010	-0.00965132	0.000339	-0.00999	0.435044	9/5/2011	-0.00226251	0.001233	-0.0035	0.302722
	0.022876986	0.004276	0.018601	0.453645		-0.03287931	-0.00247	-0.03041	0.272315
	-0.01607863	-0.00044	-0.01564	0.438005		-0.0171949	-0.00057	-0.01662	0.255694
	-0.01395796	-0.00018	-0.01378	0.42423		-0.02291219	-0.00127	-0.02165	0.234048
	0.007942609	0.002468	0.005474	0.429704		0.000121777	0.001522	-0.0014	0.232648
12/6/2010	-0.01459183	-0.00026	-0.01433	0.415371	10/3/2011	-0.04283812	-0.00368	-0.03916	0.193488
	-3.19E-05	0.001503	-0.00154	0.413836		0.00843955	0.002528	0.005911	0.199399
	0.010017886	0.002719	0.007298	0.421135		-0.00726354	0.000628	-0.00789	0.191507
	0.003295373	0.001906	0.00139	0.422524		-0.01756092	-0.00062	-0.01694	0.174565
	0.056492153	0.008344	0.048148	0.470672		0.019507948	0.003868	0.01564	0.190205
1/3/2011	0.041930297	0.006582	0.035349	0.506021	11/7/2011	0.031874168	0.005365	0.02651	0.216714
	0.015301551	0.003359	0.011943	0.517963		-0.01773655	-0.00064	-0.0171	0.199617
	-0.01184097	7.39E-05	-0.01191	0.506048		-0.0056647	0.000821	-0.00649	0.193131
	-0.02166754	-0.00112	-0.02055	0.485496		-0.00512292	0.000887	-0.00601	0.187121
	-0.00296482	0.001148	-0.00411	0.481383		-0.00932329	0.000379	-0.0097	0.177419
2/7/2011	-0.00169162	0.001302	-0.00299	0.478389	12/5/2011	-0.00789031	0.000552	-0.00844	0.168977

Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret	Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret
	-0.00893336	0.000426	-0.00936	0.159618		0.0211756	0.00407	0.017106	0.340178
	0.012176378	0.002981	0.009196	0.168814	10/1/2012	0.005330894	0.002152	0.003179	0.343356
	0.036818247	0.005963	0.030855	0.199669		0.016570658	0.003513	0.013058	0.356414
1/2/2012	-0.00157153	0.001317	-0.00289	0.19678		0.031962733	0.005375	0.026587	0.383002
	-0.00025711	0.001476	-0.00173	0.195047		0.000311494	0.001545	-0.00123	0.381769
	0.005581101	0.002182	0.003399	0.198446		-0.01539693	-0.00036	-0.01504	0.366728
	-0.00099084	0.001387	-0.00238	0.196068	11/5/2012	-0.01177702	8.17E-05	-0.01186	0.354869
	0.00347449	0.001928	0.001547	0.197615		0.005977134	0.00223	0.003747	0.358616
2/6/2012	-0.00071891	0.00142	-0.00214	0.195476		-0.011878	6.94E-05	-0.01195	0.346669
	-0.01216661	3.45E-05	-0.0122	0.183275		-0.00298323	0.001146	-0.00413	0.34254
	-0.01030178	0.00026	-0.01056	0.172713	12/3/2012	0.006544291	0.002299	0.004245	0.346785
	0.004152138	0.00201	0.002143	0.174856		0.006691215	0.002317	0.004374	0.351159
3/5/2012	0.004688738	0.002074	0.002614	0.17747		0.038011047	0.006107	0.031904	0.383063
	0.017385375	0.003611	0.013774	0.191244		-0.01023928	0.000268	-0.01051	0.372556
	-0.00600334	0.00078	-0.00678	0.184461		0.016949456	0.003558	0.013391	0.385947
	0.017622243	0.00364	0.013982	0.198443	1/7/2013	0.02409882	0.004424	0.019675	0.405622
4/2/2012	-0.02542327	-0.00157	-0.02385	0.17459		0.023265422	0.004323	0.018943	0.424565
	0.014015757	0.003203	0.010812	0.185402		0.059077098	0.008657	0.05042	0.474985
	-0.00949148	0.000358	-0.00985	0.175552		0.021221139	0.004075	0.017146	0.492131
	0.048851766	0.007419	0.041432	0.216985	2/4/2013	0.026227944	0.004681	0.021547	0.513677
	0.016222278	0.00347	0.012752	0.229737		0.027817904	0.004874	0.022944	0.536621
5/7/2012	0.025172505	0.004554	0.020619	0.250356		-0.00165218	0.001307	-0.00296	0.533662
	-0.00192138	0.001274	-0.0032	0.24716		0.019141902	0.003824	0.015318	0.54898
	-0.01066773	0.000216	-0.01088	0.236276	3/4/2013	-0.02100246	-0.00103	-0.01997	0.529013
	-0.00664623	0.000703	-0.00735	0.228927		-0.01006805	0.000288	-0.01036	0.518656
6/4/2012	-0.01207654	4.54E-05	-0.01212	0.216805		0.003073751	0.001879	0.001195	0.519851
	-0.04830296	-0.00434	-0.04396	0.172841		0.01689829	0.003552	0.013346	0.533197
	0.013473218	0.003138	0.010336	0.183177	4/1/2013	0.000876536	0.001613	-0.00074	0.532461
	0.009921839	0.002708	0.007214	0.190391		0.022814715	0.004268	0.018546	0.551007
7/2/2012	0.009572433	0.002666	0.006907	0.197298		-0.0229504	-0.00127	-0.02168	0.529327
	0.023673619	0.004372	0.019301	0.216599		-0.01552091	-0.00037	-0.01515	0.514178
	0.028499505	0.004956	0.023543	0.240143		0.005004248	0.002113	0.002892	0.517069
	0.01557755	0.003392	0.012185	0.252328	5/6/2013	0.058814961	0.008625	0.05019	0.567259
	0.008551087	0.002542	0.006009	0.258337		0.02566127	0.004613	0.021049	0.588308
8/6/2012	0.009889751	0.002704	0.007186	0.265523		0.024924272	0.004524	0.020401	0.608708
	-0.01207873	4.51E-05	-0.01212	0.253399		0.011995293	0.002959	0.009037	0.617745
	-0.00421489	0.000997	-0.00521	0.248187	6/3/2013	0.011893272	0.002946	0.008947	0.626692
	0.011170611	0.002859	0.008312	0.256499		0.04683296	0.007175	0.039658	0.66635
9/3/2012	0.015010526	0.003324	0.011687	0.268186		-0.05850808	-0.00557	-0.05293	0.613416
	0.045803892	0.007051	0.038753	0.306939		-0.02108836	-0.00105	-0.02004	0.593373
	0.020068683	0.003936	0.016133	0.323072	7/1/2013	-0.0082294	0.000511	-0.00874	0.584632

Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret	Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret
	0.021069944	0.004057	0.017013	0.601645		0.006200033	0.002257	0.003943	0.601096
	0.012354342	0.003002	0.009352	0.610997		-0.01087932	0.00019	-0.01107	0.590027
	0.025300615	0.004569	0.020732	0.631729	5/5/2014	-0.00821016	0.000513	-0.00872	0.581303
	-0.03085554	-0.00223	-0.02863	0.603101		-0.0006374	0.00143	-0.00207	0.579236
8/5/2013	0.034423681	0.005673	0.02875	0.631851		0.012136424	0.002976	0.009161	0.588397
	-0.010034	0.000293	-0.01033	0.621524		0.020750549	0.004018	0.016732	0.605129
	-0.02765204	-0.00184	-0.02581	0.595712	6/2/2014	0.041237623	0.006498	0.03474	0.639868
	-0.0110758	0.000167	-0.01124	0.58447		0.001319127	0.001667	-0.00035	0.639521
9/2/2013	-0.00898782	0.000419	-0.00941	0.575063		-0.0002892	0.001472	-0.00176	0.63776
	0.004287622	0.002026	0.002262	0.577324		-0.00934145	0.000376	-0.00972	0.628042
	-0.00840239	0.00049	-0.00889	0.568432		0.025732283	0.004621	0.021111	0.649153
	0.002511215	0.001811	0.0007	0.569132	7/7/2014	0.020010373	0.003929	0.016082	0.665234
	0.006860149	0.002337	0.004523	0.573655		-0.00462425	0.000947	-0.00557	0.659663
10/7/2013	0.013416041	0.003131	0.010285	0.58394		0.001377448	0.001674	-0.0003	0.659367
	0.001781951	0.001723	5.93E-05	0.584		-0.01412787	-0.0002	-0.01393	0.645442
	0.009491609	0.002656	0.006836	0.590836	8/4/2014	-0.00831129	0.000501	-0.00881	0.636629
	0.003192322	0.001893	0.001299	0.592135		0.015835686	0.003424	0.012412	0.649041
11/4/2013	0.0081117	0.002489	0.005623	0.597758		-0.02860221	-0.00195	-0.02665	0.622394
	0.002781616	0.001844	0.000938	0.598696		0.00444997	0.002046	0.002404	0.624798
	0.000334294	0.001547	-0.00121	0.597482	9/1/2014	-0.00076701	0.001414	-0.00218	0.622617
	0.035966025	0.00586	0.030106	0.627588		-0.00894942	0.000424	-0.00937	0.613244
12/2/2013	-0.00828618	0.000504	-0.00879	0.618798		-0.01184822	7.3E-05	-0.01192	0.601322
	-0.00469414	0.000939	-0.00563	0.613165		0.009252589	0.002627	0.006626	0.607948
	0.002412092	0.001799	0.000613	0.613778		-0.00559206	0.00083	-0.00642	0.601526
	0.018829	0.003786	0.015043	0.628821	10/6/2014	0.006962811	0.00235	0.004613	0.606139
	0.016908076	0.003553	0.013355	0.642176		-0.01604591	-0.00044	-0.01561	0.590528
1/6/2014	0.030294534	0.005173	0.025121	0.667297		-0.05554936	-0.00522	-0.05033	0.540195
	0.000727133	0.001595	-0.00087	0.666429		0.023283321	0.004325	0.018958	0.559153
	0.006531484	0.002297	0.004234	0.670663	11/3/2014	-0.03931886	-0.00325	-0.03607	0.523086
	0.0039759	0.001988	0.001988	0.672651		-0.11516544	-0.01243	-0.10273	0.420352
2/3/2014	-0.03210899	-0.00238	-0.02973	0.642921		0.06486746	0.009358	0.05551	0.475861
	0.004975892	0.002109	0.002867	0.645788		-0.04111922	-0.00347	-0.03765	0.438212
	-0.04920377	-0.00445	-0.04476	0.601032	12/1/2014	0.018182713	0.003708	0.014475	0.452687
	-0.01216361	3.49E-05	-0.0122	0.588834		-0.03806149	-0.0031	-0.03496	0.417725
3/3/2014	0.032984086	0.005499	0.027485	0.616319		-0.07418107	-0.00747	-0.06671	0.351015
	-0.01532955	-0.00035	-0.01498	0.601337		-0.0148511	-0.00029	-0.01456	0.336454
	-0.02005393	-0.00092	-0.01913	0.582204		0.136020611	0.017969	0.118051	0.454505
	-0.00998656	0.000298	-0.01028	0.571919	1/5/2015	0.007421108	0.002405	0.005016	0.459521
	0.014333376	0.003242	0.011092	0.58301		0.13088	0.017347	0.113533	0.573054
4/7/2014	0.009939011	0.00271	0.007229	0.590239		-0.90368161	-0.10786	-0.79582	-0.22276
	0.00958082	0.002667	0.006914	0.597154		0.026766418	0.004746	0.02202	-0.20074

Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret	Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret
2/2/2015	-0.0083852	0.000492	-0.00888	-0.20962		-0.01143705	0.000123	-0.01156	-0.27002
	0.014309214	0.003239	0.01107	-0.19855		-0.02463068	-0.00147	-0.02316	-0.29318
	-0.0800338	-0.00818	-0.07185	-0.27041		-0.01826543	-0.0007	-0.01756	-0.31074
	0.065204026	0.009399	0.055806	-0.2146	12/7/2015	0.000492442	0.001567	-0.00107	-0.31182
3/2/2015	0.024499105	0.004472	0.020027	-0.19457		-0.01307732	-7.6E-05	-0.013	-0.32482
	0.031409978	0.005308	0.026101	-0.16847		-0.0268558	-0.00174	-0.02511	-0.34993
	-0.01062856	0.000221	-0.01085	-0.17932		0.012581508	0.00303	0.009552	-0.34038
	-0.04508981	-0.00395	-0.04114	-0.22046	1/4/2016	0.065907267	0.009484	0.056424	-0.28395
	0.04188622	0.006576	0.03531	-0.18515		-0.05634543	-0.00531	-0.05103	-0.33499
4/6/2015	0.169001794	0.021961	0.147041	-0.03811		-0.13002439	-0.01423	-0.11579	-0.45078
	-0.02233815	-0.0012	-0.02114	-0.05925		0.013288231	0.003115	0.010173	-0.44061
	0.002148009	0.001767	0.000381	-0.05887	2/1/2016	0.003762617	0.001962	0.0018	-0.43881
	-0.01483586	-0.00029	-0.01455	-0.07342		-0.01732219	-0.00059	-0.01673	-0.45554
5/4/2015	0.006448756	0.002287	0.004161	-0.06926		0.05054151	0.007624	0.042918	-0.41262
	-0.00921946	0.000391	-0.00961	-0.07887		-0.01041649	0.000246	-0.01066	-0.42329
	0.001494702	0.001688	-0.00019	-0.07906		-0.00833807	0.000498	-0.00884	-0.43212
	-0.00486157	0.000919	-0.00578	-0.08484	3/7/2016	0.065678476	0.009456	0.056223	-0.3759
6/1/2015	0.001116944	0.001642	-0.00053	-0.08537		0.006518178	0.002296	0.004222	-0.37168
	-0.01881239	-0.00077	-0.01804	-0.10341		-0.01129773	0.00014	-0.01144	-0.38311
	-0.00128205	0.001352	-0.00263	-0.10604		0.007982941	0.002473	0.00551	-0.37761
	-0.01082186	0.000197	-0.01102	-0.11706	4/4/2016	-0.01516685	-0.00033	-0.01484	-0.39244
	-0.01215982	3.53E-05	-0.0122	-0.12926		-0.00701844	0.000658	-0.00768	-0.40012
7/6/2015	-0.00959259	0.000346	-0.00994	-0.13919		-0.02403657	-0.0014	-0.02263	-0.42275
	-0.02486544	-0.0015	-0.02336	-0.16256		0.005293037	0.002148	0.003145	-0.41961
	-0.02147135	-0.00109	-0.02038	-0.18294	5/2/2016	0.008543222	0.002541	0.006002	-0.41361
	0.001407499	0.001677	-0.00027	-0.18321		0.025503932	0.004594	0.02091	-0.3927
8/3/2015	-0.02931394	-0.00204	-0.02727	-0.21048		0.028769804	0.004989	0.023781	-0.36892
	0.041796843	0.006566	0.035231	-0.17525		0.025544391	0.004599	0.020946	-0.34797
	-0.02341126	-0.00133	-0.02208	-0.19733		0.065856703	0.009478	0.056379	-0.29159
	-0.02694263	-0.00175	-0.02519	-0.22252	6/6/2016	-0.04386614	-0.0038	-0.04006	-0.33165
	-0.03560139	-0.0028	-0.0328	-0.25532		-0.01453984	-0.00025	-0.01429	-0.34594
9/7/2015	0.024170369	0.004432	0.019738	-0.23558		0.073979294	0.010461	0.063519	-0.28242
	0.006031633	0.002237	0.003795	-0.23179		0.047949433	0.00731	0.040639	-0.24178
	0.021678004	0.004131	0.017547	-0.21424	7/4/2016	-0.04385889	-0.0038	-0.04006	-0.28184
	0.00693938	0.002347	0.004593	-0.20965		-0.01536986	-0.00035	-0.01502	-0.29686
10/5/2015	0.001481182	0.001686	-0.00021	-0.20985		-0.00171652	0.001299	-0.00302	-0.29987
	-0.01383498	-0.00017	-0.01367	-0.22352		-0.03978449	-0.00331	-0.03648	-0.33635
	-0.01097323	0.000179	-0.01115	-0.23467	8/1/2016	0.012671623	0.003041	0.009631	-0.32672
	0.005955579	0.002228	0.003728	-0.23095		-0.02085225	-0.00102	-0.01984	-0.34655
11/2/2015	-0.02779465	-0.00186	-0.02594	-0.25688		-0.00652596	0.000717	-0.00724	-0.3538
	-8.12E-05	0.001497	-0.00158	-0.25846		0.014806833	0.003299	0.011508	-0.34229

Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret
	-0.00721185	0.000634	-0.00785	-0.35014
9/5/2016	0.011138429	0.002855	0.008283	-0.34185
	-0.0064543	0.000726	-0.00718	-0.34903
	0.010188008	0.00274	0.007448	-0.34158
	0.013948715	0.003195	0.010754	-0.33083
10/3/2016	0.00312705	0.001885	0.001242	-0.32959
	-0.01765212	-0.00063	-0.01702	-0.34661
	0.000927243	0.001619	-0.00069	-0.3473
	-0.00948314	0.000359	-0.00984	-0.35715
	-0.01096539	0.00018	-0.01115	-0.36829
11/7/2016	-0.01145335	0.000121	-0.01157	-0.37987
	-0.03004714	-0.00213	-0.02792	-0.40778
	-0.02420018	-0.00142	-0.02278	-0.43056
	-0.00799411	0.000539	-0.00853	-0.4391
12/5/2016	0.016083122	0.003454	0.01263	-0.42647
	0.002985918	0.001868	0.001118	-0.42535
	0.034449635	0.005676	0.028773	-0.39658
	-0.00827795	0.000505	-0.00878	-0.40536
	0.014672	0.003283	0.011389	-0.39397

Appendix V
Cumulative Abnormal Return Estimates (Generalised Error Distribution)

Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret	Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret
1/1/2001	0.087661217	0.012637	0.075024	0.075024		0.06980611	0.010418	0.059388	0.203329
	0.005041207	0.002371	0.00267	0.077694		-0.00060756	0.00167	-0.00228	0.201052
	-0.01401543	3.61E-06	-0.01402	0.063675		0.001242714	0.001899	-0.00066	0.200395
	-0.02614941	-0.0015	-0.02465	0.03903		-0.00809087	0.00074	-0.00883	0.191565
2/1/2001	0.003494429	0.002179	0.001315	0.040345	11/5/2001	-0.00016408	0.001725	-0.00189	0.189676
	0.034140819	0.005987	0.028154	0.068499		-0.01191361	0.000265	-0.01218	0.177498
	0.001737388	0.001961	-0.00022	0.068276		0.0162485	0.003764	0.012485	0.189982
	0.039156173	0.00661	0.032546	0.100822		0.002959608	0.002113	0.000847	0.190829
3/1/2001	0.009786348	0.002961	0.006825	0.107647	12/3/2001	-0.0255265	-0.00143	-0.0241	0.166729
	-0.01624175	-0.00027	-0.01597	0.091678		-0.00477103	0.001152	-0.00592	0.160806
	-0.01999769	-0.00074	-0.01926	0.07242		0.005986603	0.002489	0.003498	0.164304
	0.001517612	0.001934	-0.00042	0.072004		0.000494615	0.001806	-0.00131	0.162992
4/2/2001	0.020224174	0.004258	0.015966	0.087971		0.003341356	0.00216	0.001181	0.164173
	0.002010684	0.001995	1.59E-05	0.087987	1/7/2002	-0.00231919	0.001457	-0.00378	0.160397
	0.021261508	0.004387	0.016875	0.104861		0.00975827	0.002957	0.006801	0.167198
	-0.00886546	0.000643	-0.00951	0.095352		-0.02311367	-0.00113	-0.02199	0.145211
	0.026417519	0.005027	0.02139	0.116743		-0.01122557	0.00035	-0.01158	0.133635
5/7/2001	0.027984586	0.005222	0.022763	0.139505	2/4/2002	-0.01631321	-0.00028	-0.01603	0.117604
	0.005868519	0.002474	0.003394	0.1429		-0.02602878	-0.00149	-0.02454	0.093064
	0.003837165	0.002222	0.001615	0.144515		0.003610317	0.002194	0.001417	0.094481
	0.002667826	0.002076	0.000591	0.145106		0.054830456	0.008558	0.046273	0.140754
6/4/2001	0.001334314	0.001911	-0.00058	0.14453	3/4/2002	0.058448138	0.009007	0.049441	0.190195
	0.033199981	0.00587	0.02733	0.17186		-0.02107263	-0.00087	-0.0202	0.169996
	0.03340474	0.005895	0.027509	0.199369		0.024453799	0.004783	0.01967	0.189666
	0.010362972	0.003033	0.00733	0.206699		-0.0214644	-0.00092	-0.02054	0.169124
7/2/2001	-0.01924339	-0.00065	-0.0186	0.188102	4/1/2002	-0.00720058	0.00085	-0.00805	0.161073
	-0.02606465	-0.00149	-0.02457	0.163531		-0.00445138	0.001192	-0.00564	0.155429
	0.027395857	0.005149	0.022247	0.185778		0.050649265	0.008038	0.042611	0.198041
	-0.02097563	-0.00086	-0.02011	0.165663		-0.01171614	0.000289	-0.01201	0.186035
	-0.00325077	0.001341	-0.00459	0.161072		-0.00778954	0.000777	-0.00857	0.177468
8/6/2001	-0.02257948	-0.00106	-0.02152	0.139552	5/6/2002	0.014054178	0.003491	0.010563	0.188031
	-0.00235797	0.001452	-0.00381	0.135742		0.006670196	0.002574	0.004096	0.192128
	0.023202692	0.004628	0.018575	0.154317		-0.0221796	-0.00101	-0.02117	0.170959
	-0.01162629	0.0003	-0.01193	0.142391		0.007732556	0.002706	0.005027	0.175986
9/3/2001	-0.00608484	0.000989	-0.00707	0.135317	6/3/2002	0.021937545	0.004471	0.017467	0.193453
	-0.00356026	0.001303	-0.00486	0.130454		0.07497685	0.011061	0.063916	0.257369
	0.017602925	0.003932	0.013671	0.144125		-0.04193261	-0.00347	-0.03847	0.218901
	-0.01301296	0.000128	-0.01314	0.130983		0.029030545	0.005352	0.023679	0.24258
10/1/2001	0.01678872	0.003831	0.012958	0.143941	7/1/2002	9.89E-05	0.001757	-0.00166	0.240921

Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret	Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret
	0.022323797	0.004519	0.017805	0.258726		-0.01672264	-0.00033	-0.01639	0.232937
	-0.02588204	-0.00147	-0.02441	0.234315		0.013928398	0.003476	0.010453	0.243389
	0.024193692	0.004751	0.019443	0.253758	5/5/2003	0.011276516	0.003146	0.00813	0.25152
	0.024811291	0.004828	0.019984	0.273741		-0.00111456	0.001607	-0.00272	0.248799
8/5/2002	-0.02161776	-0.00094	-0.02068	0.253065		0.021236335	0.004384	0.016853	0.265651
	-0.01277673	0.000158	-0.01293	0.24013		0.013212675	0.003387	0.009826	0.275478
	0.01468872	0.00357	0.011119	0.251249	6/2/2003	0.004730855	0.002333	0.002398	0.277876
	-0.03279028	-0.00233	-0.03046	0.220788		0.014441573	0.003539	0.010902	0.288778
9/2/2002	-0.01018178	0.00048	-0.01066	0.210126		0.007917238	0.002729	0.005189	0.293966
	-0.01060612	0.000427	-0.01103	0.199093		0.003992827	0.002241	0.001752	0.295718
	0.005055094	0.002373	0.002682	0.201775		0.001075799	0.001879	-0.0008	0.294915
	-0.01676858	-0.00034	-0.01643	0.185345	7/7/2003	0.002144474	0.002011	0.000133	0.295048
	0.00585808	0.002473	0.003385	0.18873		-0.01551914	-0.00018	-0.01534	0.279712
10/7/2002	-0.00390653	0.00126	-0.00517	0.183564		-0.02227557	-0.00102	-0.02125	0.258459
	-0.00459362	0.001174	-0.00577	0.177796		-0.00157879	0.001549	-0.00313	0.255332
	-0.04238975	-0.00352	-0.03887	0.138928	8/4/2003	0.025609028	0.004927	0.020682	0.276014
	0.007558198	0.002684	0.004874	0.143802		0.021843511	0.004459	0.017384	0.293398
11/4/2002	0.012875892	0.003345	0.009531	0.153333		0.065889923	0.009932	0.055958	0.349357
	-0.01469016	-8E-05	-0.01461	0.138723		-0.01414552	-1.3E-05	-0.01413	0.335224
	0.006869814	0.002599	0.004271	0.142995	9/1/2003	0.025627479	0.004929	0.020698	0.355922
	0.007512084	0.002678	0.004834	0.147828		-1.14E-05	0.001744	-0.00175	0.354167
12/2/2002	-0.00139382	0.001572	-0.00297	0.144863		0.000302759	0.001783	-0.00148	0.352687
	0.00323783	0.002147	0.001091	0.145953		0.026599966	0.00505	0.02155	0.374237
	-4.38E-05	0.00174	-0.00178	0.14417		0.016636374	0.003812	0.012824	0.387062
	0.017183674	0.00388	0.013304	0.157473	10/6/2003	0.10036798	0.014216	0.086152	0.473214
	0.031255462	0.005628	0.025627	0.1831		0.019824462	0.004208	0.015616	0.48883
1/6/2003	0.038315456	0.006506	0.03181	0.21491		0.014482612	0.003544	0.010938	0.499768
	0.051766107	0.008177	0.043589	0.2585		-0.00320574	0.001347	-0.00455	0.495216
	-0.01484443	-9.9E-05	-0.01475	0.243755	11/3/2003	0.062372056	0.009495	0.052877	0.548093
	0.012055244	0.003243	0.008812	0.252567		0.024933007	0.004843	0.02009	0.568184
2/3/2003	0.03036902	0.005518	0.024851	0.277418		0.018297774	0.004018	0.014279	0.582463
	0.040630186	0.006793	0.033837	0.311255		-0.07040305	-0.007	-0.0634	0.519062
	-0.02449479	-0.0013	-0.0232	0.288058	12/1/2003	-0.01351393	6.59E-05	-0.01358	0.505482
	-0.01734498	-0.00041	-0.01693	0.271123		0.040364671	0.00676	0.033604	0.539087
3/3/2003	0.004999704	0.002366	0.002634	0.273757		-0.03192228	-0.00222	-0.0297	0.509386
	-0.00529367	0.001087	-0.00638	0.267376		0.030845671	0.005578	0.025268	0.534654
	-0.0098782	0.000518	-0.0104	0.25698		0.017298523	0.003894	0.013404	0.548058
	0.005603332	0.002441	0.003162	0.260142	1/5/2004	0.006383843	0.002538	0.003846	0.551904
	-0.00567428	0.00104	-0.00671	0.253428		0.039329747	0.006632	0.032698	0.584602
4/7/2003	0.008313091	0.002778	0.005535	0.258963		0.035472325	0.006152	0.02932	0.613922
	-0.00901139	0.000625	-0.00964	0.249326		0.04064309	0.006795	0.033848	0.64777

Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret	Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret
2/2/2004	0.001138094	0.001886	-0.00075	0.647022		0.021455032	0.004411	0.017044	0.665984
	0.019759273	0.0042	0.015559	0.662581		-0.02429394	-0.00127	-0.02302	0.642963
	0.09492882	0.01354	0.081389	0.74397		-0.00237122	0.00145	-0.00382	0.639142
	-0.05961859	-0.00566	-0.05396	0.690014	12/6/2004	-0.02522121	-0.00139	-0.02383	0.615309
3/1/2004	0.039792976	0.006689	0.033104	0.723118		-0.01699879	-0.00037	-0.01663	0.598678
	-0.05283088	-0.00482	-0.04801	0.675106		0.014923599	0.003599	0.011324	0.610002
	0.007377159	0.002662	0.004716	0.679822		-0.00271035	0.001408	-0.00412	0.605883
	-0.04107203	-0.00336	-0.03771	0.642108	1/3/2005	0.037005128	0.006343	0.030662	0.636546
	0.012210849	0.003262	0.008949	0.651057		-0.00043784	0.001691	-0.00213	0.634417
4/5/2004	0.013680288	0.003445	0.010236	0.661292		-0.00856969	0.00068	-0.00925	0.625167
	0.067649281	0.01015	0.057499	0.718791		0.003941216	0.002235	0.001707	0.626874
	0.050214947	0.007984	0.042231	0.761022		-0.02794221	-0.00173	-0.02622	0.600658
	0.00257403	0.002065	0.000509	0.761531	2/7/2005	-0.02746832	-0.00167	-0.0258	0.574858
5/3/2004	-0.01441562	-4.6E-05	-0.01437	0.747162		0.026641132	0.005055	0.021586	0.596444
	-0.0005044	0.001682	-0.00219	0.744975		-0.0113655	0.000333	-0.0117	0.584746
	0.060525695	0.009265	0.05126	0.796235		-0.03053853	-0.00205	-0.02849	0.556256
	0.006047115	0.002496	0.003551	0.799786	3/7/2005	-0.04116053	-0.00337	-0.03779	0.518465
	-0.00810925	0.000737	-0.00885	0.790939		0.012801669	0.003336	0.009466	0.527931
6/7/2004	0.020364635	0.004275	0.016089	0.807029		-0.01942339	-0.00067	-0.01876	0.509176
	0.034443331	0.006025	0.028419	0.835448		-0.01315625	0.00011	-0.01327	0.495909
	0.066202313	0.009971	0.056232	0.891679	4/4/2005	-0.00126777	0.001587	-0.00286	0.493054
	-0.06894337	-0.00682	-0.06212	0.829557		0.01336981	0.003406	0.009964	0.503018
7/5/2004	-0.01880213	-0.00059	-0.01821	0.811346		0.010772956	0.003084	0.007689	0.510707
	-0.01309486	0.000118	-0.01321	0.798133		0.054548351	0.008523	0.046026	0.556733
	-0.01463955	-7.4E-05	-0.01457	0.783568	5/2/2005	-0.01829689	-0.00053	-0.01777	0.538965
	-0.01716158	-0.00039	-0.01677	0.766793		0.001912876	0.001983	-7E-05	0.538895
8/2/2004	0.009460429	0.00292	0.00654	0.773333		-0.0085781	0.000679	-0.00926	0.529638
	0.005193974	0.00239	0.002804	0.776137		-0.00896403	0.000631	-0.0096	0.520042
	-0.02239815	-0.00104	-0.02136	0.754777		-0.0104767	0.000443	-0.01092	0.509122
	-0.12236532	-0.01346	-0.10891	0.64587	6/6/2005	0.002856086	0.0021	0.000756	0.509878
	0.0623965	0.009498	0.052899	0.698769		0.007818585	0.002716	0.005102	0.514981
9/6/2004	-0.05331232	-0.00488	-0.04843	0.650336		0.013046123	0.003366	0.00968	0.524661
	-0.01479402	-9.3E-05	-0.0147	0.635635		-0.00330627	0.001334	-0.00464	0.52002
	-0.01783762	-0.00047	-0.01737	0.618268	7/4/2005	-0.00938877	0.000578	-0.00997	0.510053
	-0.00561287	0.001048	-0.00666	0.611608		-0.00773544	0.000784	-0.00852	0.501534
10/4/2004	0.00678683	0.002588	0.004199	0.615807		0.006830187	0.002594	0.004237	0.50577
	0.004681244	0.002327	0.002355	0.618161		-0.0038911	0.001262	-0.00515	0.500618
	0.000535758	0.001812	-0.00128	0.616885	8/1/2005	0.018091085	0.003993	0.014098	0.514716
	0.015301616	0.003646	0.011655	0.628541		0.007981836	0.002737	0.005245	0.519961
11/1/2004	0.006321058	0.00253	0.003791	0.632331		-0.01585673	-0.00023	-0.01563	0.50433
	0.020957112	0.004349	0.016608	0.64894		0.011422233	0.003164	0.008258	0.512588

Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret	Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret
	0.011213635	0.003138	0.008075	0.520663		0.011951709	0.00323	0.008722	0.556059
9/5/2005	0.082383323	0.011981	0.070402	0.591065		-0.00621202	0.000973	-0.00719	0.548874
	-0.02058359	-0.00081	-0.01977	0.571294		0.037042529	0.006347	0.030695	0.579569
	0.018106974	0.003995	0.014112	0.585406	7/3/2006	0.019185241	0.004129	0.015057	0.594625
	0.020719508	0.004319	0.0164	0.601807		0.020672639	0.004314	0.016359	0.610984
10/3/2005	0.005939047	0.002483	0.003456	0.605263		0.016388304	0.003781	0.012607	0.623591
	-0.00127375	0.001587	-0.00286	0.602402		0.012409187	0.003287	0.009122	0.632714
	0.011537306	0.003178	0.008359	0.610761		0.007131588	0.002631	0.004501	0.637214
	0.053579177	0.008402	0.045177	0.655938	8/7/2006	0.045040347	0.007341	0.037699	0.674913
	-0.01488946	-0.0001	-0.01478	0.641154		0.096900376	0.013785	0.083116	0.758029
11/7/2005	0.011819691	0.003214	0.008606	0.64976		0.105543664	0.014859	0.090685	0.848714
	-0.02338964	-0.00116	-0.02223	0.627531		-0.11815618	-0.01294	-0.10522	0.743494
	0.005166214	0.002387	0.002779	0.630311	9/4/2006	0.045655587	0.007418	0.038238	0.781732
	-0.01731669	-0.00041	-0.01691	0.6134		0.024247962	0.004758	0.01949	0.801222
12/5/2005	-0.04468999	-0.00381	-0.04088	0.572518		0.006433934	0.002544	0.00389	0.805111
	0.012549894	0.003304	0.009246	0.581764		-0.00365839	0.00129	-0.00495	0.800163
	-0.0268782	-0.00159	-0.02528	0.55648	10/2/2006	-0.01980615	-0.00072	-0.01909	0.781072
	0.00027388	0.001779	-0.00151	0.554975		0.003328255	0.002159	0.00117	0.782242
1/2/2006	0.014584962	0.003557	0.011028	0.566003		0.025794976	0.00495	0.020845	0.803087
	0.000834103	0.001849	-0.00101	0.564988		-0.01935653	-0.00066	-0.0187	0.784391
	0.001469768	0.001928	-0.00046	0.56453		-0.00623521	0.00097	-0.00721	0.777185
	-0.01353242	6.36E-05	-0.0136	0.550934	11/6/2006	0.026781763	0.005073	0.021709	0.798894
	0.000693272	0.001831	-0.00114	0.549796		-0.00425007	0.001217	-0.00547	0.793427
2/6/2006	-0.00746546	0.000817	-0.00828	0.541513		-0.02476931	-0.00133	-0.02344	0.76999
	0.012699344	0.003323	0.009376	0.55089		-0.03687269	-0.00284	-0.03404	0.735954
	0.005843805	0.002471	0.003373	0.554263	12/4/2006	0.008794614	0.002838	0.005957	0.741911
	-0.00580695	0.001023	-0.00683	0.547432		0.020805527	0.00433	0.016475	0.758386
3/6/2006	-0.00466443	0.001165	-0.00583	0.541602		0.015093561	0.00362	0.011473	0.76986
	-0.01266006	0.000172	-0.01283	0.52877		0.016611767	0.003809	0.012803	0.782663
	-0.00570602	0.001036	-0.00674	0.522028	1/1/2007	-0.0039964	0.001248	-0.00524	0.777418
	-4.19E-05	0.00174	-0.00178	0.520247		0.012419967	0.003288	0.009132	0.786549
4/3/2006	-0.00291265	0.001383	-0.0043	0.515951		0.022938255	0.004595	0.018343	0.804893
	0.000113556	0.001759	-0.00165	0.514305		0.03516352	0.006114	0.02905	0.833942
	-0.00504686	0.001118	-0.00616	0.50814		0.00886402	0.002846	0.006018	0.83996
	0.002368499	0.002039	0.000329	0.50847	2/5/2007	0.071482278	0.010627	0.060856	0.900816
5/1/2006	0.001063736	0.001877	-0.00081	0.507656		0.018373335	0.004028	0.014345	0.915161
	0.028214832	0.005251	0.022964	0.53062		0.053238867	0.00836	0.044879	0.96004
	0.013447747	0.003416	0.010032	0.540652		-0.01360151	5.5E-05	-0.01366	0.946384
	0.006557843	0.00256	0.003998	0.54465	3/5/2007	-0.0088698	0.000643	-0.00951	0.936871
	0.007479926	0.002674	0.004806	0.549456		0.019131617	0.004122	0.01501	0.95188
6/5/2006	-0.00042684	0.001692	-0.00212	0.547337		0.004526831	0.002307	0.002219	0.9541

Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret	Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret
4/2/2007	0.017007799	0.003858	0.01315	0.967249	1/7/2008	0.034946374	0.006087	0.028859	1.199872
	0.034863914	0.006077	0.028787	0.996037		-0.01223166	0.000225	-0.01246	1.187415
	0.02732088	0.00514	0.022181	1.018218		0.001392551	0.001918	-0.00053	1.18689
	0.028372615	0.00527	0.023102	1.04132		-0.00629066	0.000963	-0.00725	1.179636
5/7/2007	0.02577257	0.004947	0.020825	1.062146	2/4/2008	0.022129293	0.004495	0.017635	1.19727
	0.000655508	0.001826	-0.00117	1.060975		0.057343877	0.00887	0.048474	1.245744
	0.006331574	0.002532	0.0038	1.064775		0.017093365	0.003869	0.013225	1.258969
	-0.00765206	0.000794	-0.00845	1.056328		0.008555677	0.002808	0.005748	1.264717
6/4/2007	0.00468087	0.002327	0.002354	1.058683	3/3/2008	0.02375988	0.004697	0.019063	1.283779
	0.022173266	0.0045	0.017673	1.076356		0.007152064	0.002634	0.004518	1.288298
	0.050602691	0.008032	0.04257	1.118926		-0.01688472	-0.00035	-0.01653	1.271766
	0.011200462	0.003137	0.008064	1.12699		-0.01567529	-0.0002	-0.01547	1.256293
7/2/2007	0.007015047	0.002617	0.004398	1.131389	4/7/2008	-0.01311933	0.000115	-0.01323	1.243059
	-0.00368337	0.001287	-0.00497	1.126418		-0.01460369	-6.9E-05	-0.01453	1.228525
	-0.00352848	0.001307	-0.00484	1.121583		0.024287399	0.004763	0.019525	1.24805
	0.002719828	0.002083	0.000637	1.12222		-0.03635583	-0.00277	-0.03358	1.214466
8/6/2007	0.000854671	0.001851	-0.001	1.121223	5/5/2008	-0.01659553	-0.00032	-0.01628	1.198187
	-0.00833384	0.00071	-0.00904	1.11218		-0.02110624	-0.00088	-0.02023	1.177958
	0.015842106	0.003713	0.012129	1.124308		0.057390401	0.008876	0.048515	1.226473
	0.035815096	0.006195	0.02962	1.153929		-0.00164768	0.00154	-0.00319	1.223285
9/3/2007	0.001229521	0.001898	-0.00067	1.15326	6/2/2008	-0.02955633	-0.00193	-0.02763	1.195656
	-0.02658053	-0.00156	-0.02502	1.128237		-0.02709711	-0.00162	-0.02548	1.170181
	-0.03995385	-0.00322	-0.03673	1.091503		-0.04573298	-0.00394	-0.0418	1.128385
	-7.93E-05	0.001735	-0.00181	1.089688		0.070381061	0.01049	0.059891	1.188276
10/1/2007	0.042977792	0.007085	0.035893	1.125581	7/7/2008	-0.09651842	-0.01025	-0.08627	1.102005
	-0.00359144	0.001299	-0.00489	1.120691		0.009619874	0.00294	0.00668	1.108685
	-0.02521003	-0.00139	-0.02382	1.096868		0.010039457	0.002992	0.007047	1.115732
	-0.01408379	-4.9E-06	-0.01408	1.082789		-0.01432688	-3.5E-05	-0.01429	1.10144
11/5/2007	0.013662224	0.003443	0.01022	1.093009	8/4/2008	-0.04345208	-0.00365	-0.0398	1.061642
	0.005963636	0.002486	0.003478	1.096487		-0.03565139	-0.00268	-0.03297	1.028675
	0.001913357	0.001983	-6.9E-05	1.096417		0.044003325	0.007212	0.036791	1.065466
	-0.01134324	0.000336	-0.01168	1.084738		-0.05581124	-0.00519	-0.05062	1.014844
12/3/2007	-0.00496405	0.001128	-0.00609	1.078646	9/1/2008	-0.04397452	-0.00372	-0.04026	0.974589
	0.022060522	0.004486	0.017575	1.096221		-0.06651792	-0.00652	-0.06	0.91459
	0.032852152	0.005827	0.027025	1.123246		0.077374796	0.011359	0.066016	0.980607
	0.036099819	0.00623	0.029869	1.153116		0.038216794	0.006493	0.031723	1.01233
12/3/2007	-0.01857413	-0.00056	-0.01801	1.135104	10/6/2008	-0.01768417	-0.00045	-0.01723	0.995098
	0.007400269	0.002664	0.004736	1.13984		-0.0291394	-0.00188	-0.02726	0.967834
	-0.00246689	0.001438	-0.00391	1.135935		-0.02328525	-0.00115	-0.02214	0.945697
	0.004086949	0.002253	0.001834	1.137769		-0.01089923	0.000391	-0.01129	0.934407
	0.03995294	0.006709	0.033244	1.171013		-0.02912666	-0.00187	-0.02725	0.907154

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11/3/2008	-0.03207682	-0.00224	-0.02984	0.877318	8/3/2009	0.056951359	0.008821	0.04813	0.415983
	-0.02498431	-0.00136	-0.02363	0.853693		0.003792126	0.002216	0.001576	0.417559
	-0.13270525	-0.01474	-0.11796	0.735731		-0.04509603	-0.00386	-0.04124	0.376321
	-0.05434283	-0.00501	-0.04934	0.686395		-0.09340309	-0.00986	-0.08354	0.292778
	0.102592847	0.014492	0.088101	0.774496		0.061576521	0.009396	0.052181	0.344959
12/1/2008	-0.08489294	-0.0088	-0.07609	0.698406	9/7/2009	-0.06262775	-0.00604	-0.05659	0.288367
	-0.04716876	-0.00412	-0.04305	0.655353		-0.01752026	-0.00043	-0.01709	0.271279
	-0.07182577	-0.00718	-0.06465	0.590706		0.018018882	0.003984	0.014035	0.285314
	-0.064469	-0.00627	-0.0582	0.532502		0.021126084	0.00437	0.016756	0.30207
	0.030490867	0.005533	0.024957	0.55746		0.007393825	0.002664	0.00473	0.3068
1/5/2009	0.039830684	0.006694	0.033137	0.590597	10/5/2009	0.034422843	0.006022	0.028401	0.335201
	0.02044752	0.004286	0.016162	0.606758		-0.04203219	-0.00348	-0.03855	0.296647
	-0.07942153	-0.00812	-0.0713	0.53546		0.016132035	0.003749	0.012383	0.309029
	-0.06090942	-0.00582	-0.05509	0.480373		-0.03745524	-0.00291	-0.03455	0.274483
	-0.11466682	-0.0125	-0.10216	0.378209		-0.01318065	0.000107	-0.01329	0.261195
2/2/2009	-0.09109674	-0.00957	-0.08152	0.296686	11/2/2009	-0.00781279	0.000774	-0.00859	0.252608
	0.091871828	0.01316	0.078712	0.375397		0.01340473	0.003411	0.009994	0.262602
	-0.00763756	0.000796	-0.00843	0.366964		-0.01930127	-0.00065	-0.01865	0.243954
	-0.03909347	-0.00311	-0.03598	0.330983		0.007382491	0.002662	0.00472	0.248674
	0.029289919	0.005384	0.023906	0.354888		-0.03346619	-0.00241	-0.03105	0.217621
3/2/2009	-0.0634851	-0.00614	-0.05734	0.297546	12/7/2009	0.003076128	0.002127	0.000949	0.21857
	-0.04063483	-0.0033	-0.03733	0.260215		-0.01369082	4.39E-05	-0.01373	0.204835
	-0.03015509	-0.002	-0.02815	0.232062		0.018995124	0.004105	0.01489	0.219725
	-0.02619433	-0.00151	-0.02468	0.207377		0.039924771	0.006706	0.033219	0.252944
	0.005932	0.002482	0.00345	0.210827		0.018545443	0.004049	0.014496	0.26744
4/6/2009	-0.00201913	0.001494	-0.00351	0.207314	2/1/2010	-0.00136807	0.001575	-0.00294	0.264497
	0.003476473	0.002177	0.0013	0.208613		0.025633926	0.00493	0.020704	0.285201
	0.073703817	0.010903	0.062801	0.271415		0.027943474	0.005217	0.022727	0.307928
	0.001640107	0.001949	-0.00031	0.271106		-0.01115202	0.000359	-0.01151	0.296416
	0.094231987	0.013453	0.080779	0.351885		0.008768133	0.002834	0.005934	0.30235
5/4/2009	0.054437228	0.008509	0.045929	0.397813	3/1/2010	-0.00792623	0.00076	-0.00869	0.293664
	0.088424861	0.012732	0.075693	0.473506		-0.00265782	0.001415	-0.00407	0.289591
	0.100455592	0.014226	0.086229	0.559736		0.053124009	0.008346	0.044778	0.33437
	-0.02059344	-0.00081	-0.01978	0.539956		0.015581326	0.003681	0.0119	0.34627
	-0.01288958	0.000143	-0.01303	0.526923		0.032832773	0.005824	0.027008	0.373278
6/1/2009	0.00683751	0.002595	0.004243	0.531166	4/5/2010	0.035417391	0.006146	0.029272	0.40255
	-0.10710654	-0.01156	-0.09554	0.435622		0.056460133	0.00876	0.0477	0.45025
	0.049315573	0.007872	0.041443	0.477065		0.010418731	0.00304	0.007379	0.45763
	-0.03639886	-0.00278	-0.03362	0.443444		-0.02102634	-0.00087	-0.02016	0.437471
	-0.09364598	-0.00989	-0.08376	0.359688		-0.03456214	-0.00255	-0.03201	0.405458
7/6/2009	0.011315322	0.003151	0.008164	0.367853	5/3/2010	0.039698789	0.006677	0.033021	0.438479

Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret	Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret
6/7/2010	0.009081436	0.002873	0.006208	0.444687	3/7/2011	-0.01719899	-0.00039	-0.01681	0.331007
	-0.03488724	-0.00259	-0.0323	0.41239		-0.03144778	-0.00216	-0.02929	0.301722
	-0.02246378	-0.00105	-0.02142	0.390972		0.008967641	0.002859	0.006108	0.30783
	-0.00113584	0.001604	-0.00274	0.388232		-0.04715688	-0.00411	-0.04304	0.264788
	-0.02793817	-0.00173	-0.02621	0.36202		0.019880453	0.004215	0.015665	0.280453
7/5/2010	0.017273478	0.003891	0.013382	0.375403	4/4/2011	-0.00447767	0.001189	-0.00567	0.274787
	-0.02736339	-0.00165	-0.02571	0.349694		-0.00075428	0.001651	-0.00241	0.272381
	0.002760566	0.002088	0.000673	0.350367		0.01226561	0.003269	0.008997	0.281378
8/2/2010	-0.02435804	-0.00128	-0.02308	0.32729	5/2/2011	-0.00066582	0.001662	-0.00233	0.27905
	0.009644321	0.002943	0.006701	0.333991		0.000863307	0.001852	-0.00099	0.278061
	0.017013166	0.003859	0.013154	0.347145		0.010333971	0.003029	0.007305	0.285366
	0.022747707	0.004571	0.018176	0.365322		0.020286192	0.004266	0.016021	0.301386
	-0.0040779	0.001238	-0.00532	0.360005		-0.00089371	0.001634	-0.00253	0.298859
9/6/2010	-0.02929392	-0.00189	-0.0274	0.332606	6/6/2011	0.001516442	0.001933	-0.00042	0.298442
	0.00488537	0.002352	0.002533	0.33514		0.005178138	0.002388	0.00279	0.301231
	-0.03315229	-0.00237	-0.03078	0.304361		-0.01028521	0.000467	-0.01075	0.290479
	-0.00134586	0.001578	-0.00292	0.301438		-0.01507173	-0.00013	-0.01494	0.275535
	-0.01811125	-0.00051	-0.01761	0.283832		-0.00148405	0.001561	-0.00304	0.27249
10/4/2010	-0.03398845	-0.00248	-0.03151	0.252321	7/4/2011	-0.02274489	-0.00108	-0.02166	0.250827
	-0.01325055	9.86E-05	-0.01335	0.238972		-0.01566113	-0.0002	-0.01546	0.235366
	0.015932768	0.003725	0.012208	0.25118		-0.01965814	-0.0007	-0.01896	0.216406
	0.031314166	0.005636	0.025678	0.276859		0.00392663	0.002233	0.001694	0.218099
	0.054909475	0.008567	0.046342	0.323201		-0.00412652	0.001232	-0.00536	0.212741
11/1/2010	-0.00394892	0.001254	-0.0052	0.317998	8/1/2011	-0.01802788	-0.00049	-0.01753	0.195208
	0.002540565	0.002061	0.00048	0.318478		-0.0265794	-0.00156	-0.02502	0.170186
	-0.00965132	0.000546	-0.0102	0.30828		-0.00226251	0.001464	-0.00373	0.166459
	0.022876986	0.004587	0.01829	0.32657		-0.03287931	-0.00234	-0.03054	0.13592
	-0.01607863	-0.00025	-0.01583	0.310744		-0.0171949	-0.00039	-0.0168	0.119117
12/6/2010	-0.01395796	1.08E-05	-0.01397	0.296775	9/5/2011	-0.02291219	-0.0011	-0.02181	0.097306
	0.007942609	0.002732	0.005211	0.301986		0.000121777	0.00176	-0.00164	0.095668
	-0.01459183	-6.8E-05	-0.01452	0.287462		-0.04283812	-0.00358	-0.03926	0.056407
	-3.19E-05	0.001741	-0.00177	0.285689		0.00843955	0.002794	0.005646	0.062053
	0.010017886	0.00299	0.007028	0.292717		-0.00726354	0.000843	-0.00811	0.053947
1/3/2011	0.003295373	0.002154	0.001141	0.293858	10/3/2011	-0.01756092	-0.00044	-0.01712	0.036823
	0.056492153	0.008764	0.047728	0.341587		0.019507948	0.004169	0.015339	0.052162
	0.041930297	0.006955	0.034976	0.376562		0.031874168	0.005705	0.026169	0.078331
	0.015301551	0.003646	0.011655	0.388217		-0.01773655	-0.00046	-0.01728	0.061053
	-0.01184097	0.000274	-0.01211	0.376103		-0.0056647	0.001041	-0.00671	0.054348
2/7/2011	-0.02166754	-0.00095	-0.02072	0.355382	11/7/2011	-0.00512292	0.001108	-0.00623	0.048116
	-0.00296482	0.001377	-0.00434	0.351041		-0.00932329	0.000587	-0.00991	0.038206
	-0.00169162	0.001535	-0.00323	0.347814		-0.00789031	0.000765	-0.00865	0.029551
12/5/2011									

Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret	Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret
	-0.00893336	0.000635	-0.00957	0.019983		0.0211756	0.004376	0.0168	0.189897
	0.012176378	0.003258	0.008918	0.028901	10/1/2012	0.005330894	0.002407	0.002924	0.19282
	0.036818247	0.00632	0.030499	0.0594		0.016570658	0.003804	0.012767	0.205587
1/2/2012	-0.00157153	0.00155	-0.00312	0.056279		0.031962733	0.005716	0.026246	0.231833
	-0.00025711	0.001713	-0.00197	0.054309		0.000311494	0.001784	-0.00147	0.230361
	0.005581101	0.002438	0.003143	0.057451		-0.01539693	-0.00017	-0.01523	0.215132
	-0.00099084	0.001622	-0.00261	0.054838	11/5/2012	-0.01177702	0.000282	-0.01206	0.203074
	0.00347449	0.002177	0.001298	0.056136		0.005977134	0.002488	0.003489	0.206563
2/6/2012	-0.00071891	0.001656	-0.00237	0.053762		-0.011878	0.000269	-0.01215	0.194416
	-0.01216661	0.000233	-0.0124	0.041362		-0.00298323	0.001374	-0.00436	0.190058
	-0.01030178	0.000465	-0.01077	0.030595	12/3/2012	0.006544291	0.002558	0.003986	0.194045
	0.004152138	0.002261	0.001891	0.032486		0.006691215	0.002576	0.004115	0.198159
3/5/2012	0.004688738	0.002328	0.002361	0.034847		0.038011047	0.006468	0.031543	0.229703
	0.017385375	0.003905	0.01348	0.048328		-0.01023928	0.000473	-0.01071	0.218991
	-0.00600334	0.000999	-0.007	0.041325		0.016949456	0.003851	0.013099	0.232089
	0.017622243	0.003935	0.013688	0.055013	1/7/2013	0.02409882	0.004739	0.01936	0.251449
4/2/2012	-0.02542327	-0.00141	-0.02401	0.031003		0.023265422	0.004636	0.01863	0.270078
	0.014015757	0.003486	0.010529	0.041533		0.059077098	0.009085	0.049992	0.32007
	-0.00949148	0.000566	-0.01006	0.031476		0.021221139	0.004382	0.016839	0.33691
	0.048851766	0.007815	0.041037	0.072513	2/4/2013	0.026227944	0.005004	0.021224	0.358134
	0.016222278	0.003761	0.012462	0.084974		0.027817904	0.005201	0.022617	0.38075
5/7/2012	0.025172505	0.004873	0.0203	0.105274		-0.00165218	0.00154	-0.00319	0.377559
	-0.00192138	0.001506	-0.00343	0.101847		0.019141902	0.004123	0.015019	0.392577
	-0.01066773	0.00042	-0.01109	0.090759	3/4/2013	-0.02100246	-0.00086	-0.02014	0.372439
	-0.00664623	0.000919	-0.00757	0.083194		-0.01006805	0.000494	-0.01056	0.361877
6/4/2012	-0.01207654	0.000245	-0.01232	0.070873		0.003073751	0.002127	0.000947	0.362824
	-0.04830296	-0.00426	-0.04405	0.026826		0.01689829	0.003845	0.013054	0.375878
	0.013473218	0.003419	0.010054	0.036881	4/1/2013	0.000876536	0.001854	-0.00098	0.3749
	0.009921839	0.002978	0.006944	0.043825		0.022814715	0.00458	0.018235	0.393135
7/2/2012	0.009572433	0.002934	0.006638	0.050463		-0.0229504	-0.00111	-0.02184	0.371291
	0.023673619	0.004686	0.018987	0.06945		-0.01552091	-0.00018	-0.01534	0.355954
	0.028499505	0.005286	0.023213	0.092663		0.005004248	0.002367	0.002637	0.358591
	0.01557755	0.00368	0.011897	0.10456	5/6/2013	0.058814961	0.009053	0.049762	0.408354
	0.008551087	0.002807	0.005744	0.110304		0.02566127	0.004933	0.020728	0.429082
8/6/2012	0.009889751	0.002974	0.006916	0.11722		0.024924272	0.004842	0.020082	0.449164
	-0.01207873	0.000244	-0.01232	0.104897		0.011995293	0.003235	0.00876	0.457924
	-0.00421489	0.001221	-0.00544	0.099461	6/3/2013	0.011893272	0.003223	0.008671	0.466595
	0.011170611	0.003133	0.008038	0.107499		0.04683296	0.007564	0.039269	0.505864
9/3/2012	0.015010526	0.00361	0.0114	0.118899		-0.05850808	-0.00552	-0.05298	0.45288
	0.045803892	0.007436	0.038368	0.157267		-0.02108836	-0.00088	-0.02021	0.432667
	0.020068683	0.004238	0.01583	0.173097	7/1/2013	-0.0082294	0.000723	-0.00895	0.423715

Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret	Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret
	0.021069944	0.004363	0.016707	0.440422		0.006200033	0.002515	0.003685	0.429891
	0.012354342	0.00328	0.009074	0.449496		-0.01087932	0.000393	-0.01127	0.418618
	0.025300615	0.004889	0.020412	0.469908	5/5/2014	-0.00821016	0.000725	-0.00894	0.409683
	-0.03085554	-0.00209	-0.02877	0.441142		-0.0006374	0.001666	-0.0023	0.40738
8/5/2013	0.034423681	0.006022	0.028402	0.469543		0.012136424	0.003253	0.008883	0.416264
	-0.010034	0.000498	-0.01053	0.459011		0.020750549	0.004323	0.016427	0.432691
	-0.02765204	-0.00169	-0.02596	0.433305	6/2/2014	0.041237623	0.006869	0.034369	0.46706
	-0.0110758	0.000369	-0.01144	0.421605		0.001319127	0.001909	-0.00059	0.46647
9/2/2013	-0.00898782	0.000628	-0.00962	0.411989		-0.0002892	0.001709	-0.002	0.464472
	0.004287622	0.002278	0.00201	0.413999		-0.00934145	0.000584	-0.00993	0.454546
	-0.00840239	0.000701	-0.0091	0.404895		0.025732283	0.004942	0.02079	0.475336
	0.002511215	0.002057	0.000454	0.40535	7/7/2014	0.020010373	0.004231	0.015779	0.491115
	0.006860149	0.002597	0.004263	0.409612		-0.00462425	0.00117	-0.00579	0.485321
10/7/2013	0.013416041	0.003412	0.010004	0.419617		0.001377448	0.001916	-0.00054	0.484782
	0.001781951	0.001966	-0.00018	0.419432		-0.01412787	-1E-05	-0.01412	0.470664
	0.009491609	0.002924	0.006567	0.425999	8/4/2014	-0.00831129	0.000712	-0.00902	0.461641
	0.003192322	0.002142	0.001051	0.42705		0.015835686	0.003713	0.012123	0.473764
11/4/2013	0.0081117	0.002753	0.005359	0.432409		-0.02860221	-0.00181	-0.02679	0.44697
	0.002781616	0.002091	0.000691	0.4331		0.00444997	0.002298	0.002152	0.449123
	0.000334294	0.001787	-0.00145	0.431648	9/1/2014	-0.00076701	0.00165	-0.00242	0.446706
	0.035966025	0.006214	0.029752	0.4614		-0.00894942	0.000633	-0.00958	0.437123
12/2/2013	-0.00828618	0.000715	-0.009	0.452398		-0.01184822	0.000273	-0.01212	0.425002
	-0.00469414	0.001162	-0.00586	0.446542		0.009252589	0.002895	0.006358	0.43136
	0.002412092	0.002045	0.000367	0.44691		-0.00559206	0.00105	-0.00664	0.424718
	0.018829	0.004084	0.014745	0.461654	10/6/2014	0.006962811	0.00261	0.004353	0.429071
	0.016908076	0.003846	0.013062	0.474717		-0.01604591	-0.00025	-0.0158	0.413273
1/6/2014	0.030294534	0.005509	0.024785	0.499502		-0.05554936	-0.00516	-0.05039	0.362881
	0.000727133	0.001835	-0.00111	0.498394		0.023283321	0.004638	0.018645	0.381526
	0.006531484	0.002557	0.003975	0.502369	11/3/2014	-0.03931886	-0.00314	-0.03618	0.345348
	0.0039759	0.002239	0.001737	0.504106		-0.11516544	-0.01256	-0.1026	0.242746
2/3/2014	-0.03210899	-0.00224	-0.02986	0.474241		0.06486746	0.009805	0.055063	0.297809
	0.004975892	0.002363	0.002613	0.476854		-0.04111922	-0.00336	-0.03776	0.260054
	-0.04920377	-0.00437	-0.04484	0.432019	12/1/2014	0.018182713	0.004004	0.014179	0.274233
	-0.01216361	0.000234	-0.0124	0.419621		-0.03806149	-0.00298	-0.03508	0.239155
3/3/2014	0.032984086	0.005843	0.027141	0.446762		-0.07418107	-0.00747	-0.06671	0.172446
	-0.01532955	-0.00016	-0.01517	0.431592		-0.0148511	-0.0001	-0.01475	0.157695
	-0.02005393	-0.00075	-0.01931	0.412285		0.136020611	0.018645	0.117375	0.27507
	-0.00998656	0.000504	-0.01049	0.401794	1/5/2015	0.007421108	0.002667	0.004754	0.279824
	0.014333376	0.003526	0.010807	0.412602		0.13088	0.018007	0.112873	0.392698
4/7/2014	0.009939011	0.00298	0.006959	0.419561		-0.90368161	-0.11054	-0.79315	-0.40045
	0.00958082	0.002935	0.006645	0.426206		0.026766418	0.005071	0.021696	-0.37875

Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret	Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret
2/2/2015	-0.0083852	0.000703	-0.00909	-0.38784		-0.01143705	0.000324	-0.01176	-0.45801
	0.014309214	0.003523	0.010786	-0.37705		-0.02463068	-0.00132	-0.02332	-0.48132
	-0.0800338	-0.0082	-0.07183	-0.44889		-0.01826543	-0.00052	-0.01774	-0.49906
	0.065204026	0.009846	0.055358	-0.39353	12/7/2015	0.000492442	0.001806	-0.00131	-0.50038
3/2/2015	0.024499105	0.004789	0.01971	-0.37382		-0.01307732	0.00012	-0.0132	-0.51357
	0.031409978	0.005648	0.025762	-0.34806		-0.0268558	-0.00159	-0.02526	-0.53884
	-0.01062856	0.000424	-0.01105	-0.35911		0.012581508	0.003308	0.009273	-0.52956
	-0.04508981	-0.00386	-0.04123	-0.40034	1/4/2016	0.065907267	0.009934	0.055973	-0.47359
	0.04188622	0.006949	0.034937	-0.36541		-0.05634543	-0.00526	-0.05109	-0.52468
4/6/2015	0.169001794	0.022743	0.146259	-0.21915		-0.13002439	-0.01441	-0.11561	-0.64029
	-0.02233815	-0.00103	-0.02131	-0.24046		0.013288231	0.003396	0.009892	-0.6304
	0.002148009	0.002012	0.000136	-0.24032	2/1/2016	0.003762617	0.002212	0.00155	-0.62885
	-0.01483586	-9.8E-05	-0.01474	-0.25506		-0.01732219	-0.00041	-0.01691	-0.64577
5/4/2015	0.006448756	0.002546	0.003903	-0.25116		0.05054151	0.008025	0.042517	-0.60325
	-0.00921946	0.0006	-0.00982	-0.26097		-0.01041649	0.000451	-0.01087	-0.61412
	0.001494702	0.001931	-0.00044	-0.26141		-0.00833807	0.000709	-0.00905	-0.62316
	-0.00486157	0.001141	-0.006	-0.26741	3/7/2016	0.065678476	0.009905	0.055773	-0.56739
6/1/2015	0.001116944	0.001884	-0.00077	-0.26818		0.006518178	0.002555	0.003963	-0.56343
	-0.01881239	-0.00059	-0.01822	-0.2864		-0.01129773	0.000341	-0.01164	-0.57507
	-0.00128205	0.001586	-0.00287	-0.28927		0.007982941	0.002737	0.005246	-0.56982
	-0.01082186	0.0004	-0.01122	-0.30049	4/4/2016	-0.01516685	-0.00014	-0.01503	-0.58485
	-0.01215982	0.000234	-0.01239	-0.31288		-0.00701844	0.000873	-0.00789	-0.59274
7/6/2015	-0.00959259	0.000553	-0.01015	-0.32303		-0.02403657	-0.00124	-0.0228	-0.61553
	-0.02486544	-0.00134	-0.02352	-0.34655		0.005293037	0.002403	0.00289	-0.61264
	-0.02147135	-0.00092	-0.02055	-0.3671	5/2/2016	0.008543222	0.002806	0.005737	-0.60691
	0.001407499	0.00192	-0.00051	-0.36761		0.025503932	0.004914	0.02059	-0.58632
8/3/2015	-0.02931394	-0.0019	-0.02742	-0.39503		0.028769804	0.00532	0.02345	-0.56287
	0.041796843	0.006938	0.034859	-0.36017		0.025544391	0.004919	0.020626	-0.54224
	-0.02341126	-0.00116	-0.02225	-0.38242		0.065856703	0.009928	0.055929	-0.48631
	-0.02694263	-0.0016	-0.02534	-0.40776	6/6/2016	-0.04386614	-0.00371	-0.04016	-0.52647
	-0.03560139	-0.00268	-0.03292	-0.44068		-0.01453984	-6.2E-05	-0.01448	-0.54095
9/7/2015	0.024170369	0.004748	0.019422	-0.42126		0.073979294	0.010937	0.063043	-0.47791
	0.006031633	0.002494	0.003537	-0.41772		0.047949433	0.007703	0.040247	-0.43766
	0.021678004	0.004438	0.01724	-0.40048	7/4/2016	-0.04385889	-0.0037	-0.04015	-0.47782
	0.00693938	0.002607	0.004332	-0.39615		-0.01536986	-0.00016	-0.01521	-0.49302
10/5/2015	0.001481182	0.001929	-0.00045	-0.3966		-0.00171652	0.001532	-0.00325	-0.49627
	-0.01383498	2.6E-05	-0.01386	-0.41046		-0.03978449	-0.0032	-0.03659	-0.53286
	-0.01097323	0.000382	-0.01135	-0.42181	8/1/2016	0.012671623	0.003319	0.009352	-0.5235
	0.005955579	0.002485	0.003471	-0.41834		-0.02085225	-0.00085	-0.02001	-0.54351
11/2/2015	-0.02779465	-0.00171	-0.02609	-0.44443		-0.00652596	0.000934	-0.00746	-0.55097
	-8.12E-05	0.001735	-0.00182	-0.44624		0.014806833	0.003585	0.011222	-0.53975

Date	Act. Ret	Exp. Ret	Abn. Ret	Cum. Abn. Ret
9/5/2016	-0.00721185	0.000849	-0.00806	-0.54781
	0.011138429	0.003129	0.00801	-0.5398
	-0.0064543	0.000943	-0.0074	-0.5472
	0.010188008	0.003011	0.007177	-0.54002
10/3/2016	0.013948715	0.003478	0.010471	-0.52955
	0.00312705	0.002134	0.000994	-0.52856
	-0.01765212	-0.00045	-0.0172	-0.54576
	0.000927243	0.00186	-0.00093	-0.54669
11/7/2016	-0.00948314	0.000567	-0.01005	-0.55674
	-0.01096539	0.000383	-0.01135	-0.56809
	-0.01145335	0.000322	-0.01178	-0.57987
	-0.03004714	-0.00199	-0.02806	-0.60793
12/5/2016	-0.02420018	-0.00126	-0.02294	-0.63086
	-0.00799411	0.000752	-0.00875	-0.63961
	0.016083122	0.003743	0.01234	-0.62727
	0.002985918	0.002116	0.00087	-0.6264
	0.034449635	0.006025	0.028424	-0.59798
	-0.00827795	0.000716	-0.00899	-0.60697
	0.014672	0.003568	0.011104	-0.59587