



An Analysis of Stock Market Anomalies: Evidence from the Nigerian Stock Exchange

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Abstract

The study examines stock market anomalies in the Nigerian Stock Market (NSE) by investigating month-of-the-year calendar anomalies, size and value fundamental anomalies and momentum effect within asset pricing models. The study also tests for the statistical significance of profit opportunities in anomalies. The sample size is 139 stocks listed on the NSE for the period 2008 to 2015. The time series pooled multiple regression analysis was employed in the study using calendar dummy, the three-factor model and the four-factor model. In addition, ten portfolios based on market capitalization, price-to-book and price gainers-to-losers' criteria were constructed. The study found that there was no January effect but there was strong evidence of July and August effect on most portfolios formed. The July and August monthly calendar anomalies did not exert a significant influence on all portfolios' excess returns after controlling for size, value and momentum factors. The findings also revealed that momentum effect was statistically significant in influencing the portfolio excess returns of big and small price winners' and losers' portfolios. In the NSE most portfolios constructed had no profit opportunities that are of statistical significance for the period under study. It was recommended that investors and equity portfolio managers should consider buying for their portfolio construction around July and August due to the existence of statistically significant negative returns around those periods. Also, investment fund managers should consider size and value factor as well as momentum factor in the pricing of asset to minimize loss and maximize return.

Keywords: Calendar anomalies, Size and Value effect, Momentum effect, fundamental anomalies, Stock market anomalies

Introduction

Stock markets and analysis of stock markets have become key issues in most economies of the world because stock market is one of the most sensitive segments of any economy. It is through this segment that the country's long-term economic growth and developmental goals are achieved and its exposure to the global economy is most readily felt. The Nigerian Stock Exchange (NSE) was established in 1960 for this purpose and has experienced phenomenal growth and development. The developmental efforts and increased trading activities of the stock exchange are directed towards achieving market efficiency. Market efficiency implies the situation where financial asset's prices incorporate all available information. It defines the relationship between information and asset prices in the market. Essentially, "the phrase 'prices fully reflect all available information' is a statement about two separate aspects of prices, namely: the information content and the price formation mechanism". It therefore means that any test of this hypothesis "must concern the kind of information reflected in prices, and *how* this information comes to be reflected in prices" (Lo, 2007:10). However, with frequent and constant releases and dissemination of information in the environment and within firms, efficient markets now seem hard to achieve and even more difficult to maintain. Fama (1991) study reveals various problems with market efficiency such as "deciding what are reasonable information, trading costs and the joint-hypothesis problem" (p.1575). To Mackey (1841), there is a feeling of something shockingly wrong with the concept of market efficiency. This led to the concept of 'anomalies' in stock market and hence 'anomalies of efficient market hypothesis'. The term 'anomaly' can be traced to Field (1934), where stock market seasonality in the form of weekend or holiday effect was first documented.

Stock market anomalies refer to a situation when a security or market performs contrary to the notion of EMH. It can be described as a situation where "market returns are not consistent with the traditional asset pricing behaviour" (Bundoo, 2011:5) and where, as put further by Shiller (2001), the principle of rational behaviour by investors is not entirely correct. There are many stock market anomalies, some occur once or twice and disappear, while others are continuous (Archana, Safer & Kevin, 2014). Stock market anomalies could be related to calendar anomalies Field (1934), size effect and value effect (Keim, 1983) which are called fundamental anomalies; announcement anomalies and technical trading rules anomalies in form of momentum effect. Anomalies can affect the market as well as influence investors' decisions and behaviour in the market. Investors are always conscious of their returns and will usually want to predict returns in the market as a reward for their investment. If stock markets are efficient, investors in stock cannot expect to realize superior profits from market anomalies.

Numerous studies on stock market anomalies have been conducted and reported for developed and some emerging stock markets. For developed markets in US, Canada, UK, Japan, Australia and Hong Kong; anomalies such as calendar anomalies (in form of turn-of-the-year effect, month-of-the-year effect, day-of-the-week effect); size and value fundamental anomalies have been continuously observed (Banz, 1981; Keim, 1983; Jaffe & Westerfield, 1985). This is also the case for some emerging markets such as Indian Stock Exchange (Dash, Dutta & Sabaharwal, 2011); the Stock Exchange of Mauritius (Bundoo, 2011); Ghana Stock Exchange (Alagidede & Panagiotidis, 2012). Despite the numerous research works on stock market anomalies globally, the analysis of stock market anomalies in the Nigerian Stock Exchange is limited and yet to be established. These few studies (Chukwuogor-Ndu, 2007; Idolor, Ogieva & Osamwonyi, 2014) have examined either a single or a few market anomalies in the Nigerian Stock Exchange. As a result, this study fills the gap in empirical literature by examining three stock market anomalies using common stocks listed in the NSE as it is one of the fastest growing emerging markets in Africa. Significantly, the present study examines stock market anomalies within an asset pricing

model framework by employing Fama and French (1993) three-factor model and the four-factor model by Carhart (1997) in an emerging market context, why previous studies have either used the market model, GARCH or ARCH approach or the traditional asset pricing model (like CAPM) in analysing market anomalies. The study is therefore timely given the scarcity of research with these models in the Nigerian Stock Market.

Therefore, the objectives of this study are to 1. examine whether month-of-the-year calendar anomalies are present in the Nigerian Stock Market, particularly when controlling for systematic risk; 2. examine whether size effect and value effect fundamental anomalies are present in the Nigerian Stock Market; 3. investigate if momentum effect are present in the Nigerian Stock Market after controlling for size and value; and 4. investigate if month-of-the-year calendar anomalies persist when the size, value and momentum factors are controlled for.

Review of Related Literature

Returns represent the reward or income or capital gain derived for undertaking investment. It is the primary motivating factor that drives investment in the capital market. For returns, investors need to almost invariably bear some risk. Importantly, the differences in the distribution of returns for each stock with respect to month-of-the-year, firm's size and value will enable investors to invest in stocks and adjust their portfolios when necessary. When investors notice a pattern in the distribution of returns, they see an opportunity to earn profit by trading on the information. This leads to abnormal return. Abnormal return is the anomalous or irregular profit earned by trading on information in the market. Abnormal equity returns are associated with stock market anomalies. According to Jacobs & Levy (1988) these returns are not unique to one historical period, nor can they be explained by consideration of risk or value.

From financial literature, there are significant deviations from efficient market hypothesis otherwise known as anomalies (Fama, 1991). Lo (2007) refers to anomalies as perhaps the most common challenge to Efficient market hypotheses (EMH). Stock market anomalies have been one of the interesting areas of financial market research in the last four decades as the presence of these phenomena has been evident in developed capital markets. Keim (2007) explains it as a "regular pattern in an asset's returns" which is regular, reliable and widely known. Also, he explains that "the fact that the pattern is regular and reliable implies a degree of predictability, and the fact that the regularity is widely known implies that many investors can take advantage of it" (Keim, 2007: 7-8). It can also be described "as empirical results or market returns that are not consistent with the traditional or maintained theories of asset pricing behaviour" (Bundoo, 2011:5). It therefore means that stock market anomalies will show either stock market inefficiency (that is, profit opportunities) or "inadequacies in the underlying asset-pricing model" (Schwert, 2003:947). To this end, there are two aspects of stock market anomalies: The first aspect says that stock market anomalies can be as a result of opportunities to earn abnormal profits from the trading activities of an investor. And the second aspect says that stock market anomalies can arise because the underlying asset-pricing model is faulty. Stock market anomalies could be in the form of calendar effects, fundamental effect, and technical trading rules. To Keim (2007), they could be cross-sectional with cross-sectional return pattern or time series with time-series return pattern in nature.

Calendar Anomalies Calendar anomalies are anomalies or market inefficiencies that are linked to a particular time. It can also be described as stock prices anomalies or stock return changes that are attributable to calendar. The existence of this anomaly is a denial of the weak-form of EMH which states that stock prices reflect all past information. It also depicts that returns are invariant, meaning that there exist short term seasonal pattern in stock returns (Mishra, 2012). This implies seasonality in stock market. Nonetheless, evidence overtime suggests that stock

returns do not remain constant and that the market can be outperformed by means of calendar or seasonal dummies. The months-of-the-year effect or January calendar effect according to Fama (1991:1586-1587) is "the most mystifying seasonal". Stock returns, especially returns on small stocks, are on average higher in January than in other months". January returns are usually positive and significantly higher than other months of the year. A look at several studies in seasonality of return show that the end of the year's effect most commonly referred to as January effect is the most prominent of all monthly calendar anomalies (Mills & Counts, 1995; Ali & Akbar, 2008). It describes the propensity for stock prices to rise during the trading period beginning with the last trading day in December and ending on the last trading day in January. The work of Wachtel (1942) is the first study to discover January effect on stock markets. The January effect seems robust to sampled period, and it is difficult to reconcile with the EMH because of its persistence, regularity and publicity (Lo, 2007). Li (2013) reports five common explanations for the January effect to be: (1) the tax loss hypothesis (tax-loss selling at year end); (2) the inter-generational transfer hypothesis (Gamble, 1993); (3) information release during this period; (4) the Capital Asset Pricing Model (CAPM) mis-specification; and (5) institutional investors' behaviour. Other possible reasons are trade and settlement date delay; shift in the information processing hypothesis (Miller, 1988); as well as risk-based theory.

Many research studies have been carried out to explore and empirically test the presence of calendar anomalies in the developed markets and some emerging markets but very few exist on the Nigerian Stock Exchange. Although these studies reported mix results but most works support the fact that January returns tend to be higher than other months returns. Evidence generated from studies of Jaffe and Westerfield (1985), Anderson, Gerlach and Di Traglia (2003) and Schwert (2003) on the US markets show the presence of January effect - that on the average, stock returns in January are usually higher than other months of the year. An elaborate study by Hansen and Lunde (2003) on 10 countries stock markets (including US) shows that month-of-the-year effects were significantly present in almost all the markets. However, the work of Li (2013) on Canada finance industry found a weak January effect and thus concluded that there are no abnormal returns to take advantage of the January anomaly. Considering studies on emerging markets, Bundoo (2011) studied the Stock Exchange of Mauritius and reports a very minimal January effect both at the market and company level. Further investigation reveals that the market has a strong September effect. Similarly, Alagidede and Panagiotidis (2012) on the Ghanaian capital market discover April effect contrary to the January effect pattern in most markets. Likewise, Stoica and Diaconasu (2012) work on emerging Central and Eastern European stock markets for the period 2000 to 2010, report the existence of January effect in Czech Republic, Croatia, Macedonia, Romania, Slovenia and Hungary. Kuria and Riro (2013) studied the Nairobi Securities Exchange and found the presence of seasonal effects in the market. On the other hand, studies by Maghayereh (2003) on the Amman Stock Exchange in Jordan and Silva (2010) on the Portuguese Stock Exchange document no evidence of month-of-the-year or January effect in these emerging markets. Also, Singh (2014) did an elaborate study on emerging BRIC markets (Brazil, Russia, India and China market) and the results obtained demonstrate a non significant month-of-the-year calendar effect in the Brazil, Russia and India markets. For African and Nigerian markets, the work of Ayadi (1998) on low-income African emerging markets reported the presence of seasonality (January effect) in stock returns on the Nigerian, Ghanaian and Zimbabwean stock markets. Correspondingly Idolor *et al* (2014), in their study on the Nigerian Stock Market using monthly market index from 2005 to 2010 show that the months of February, March, April, May and December were consistently associated with negative market returns. While the months of January, August, September, October and November were associated with positive returns.

Fundamental (Value and Size) Effect: Under the fundamental anomalies, this study pays attention to the size and value effect. Size effect is one of the most enduring anomaly in the market – “it is the apparent excess expected returns that accrue to stocks of small-capitalization companies in excess of their risks” (Lo.2007:8). Size effect can be described as the anomaly where small firms (those with small market capitalizations) outperform large firms (those with large market capitalizations) (Hodnett & Hsieh, 2012). In other words, the size effect is the empirical regularity that firms with small market capitalization exhibit returns that on the average significantly exceed those of large firms.

The value effect can be described as the positive relation between security returns of value securities to the market price of securities (Keim, 2007). It also means that positive abnormal risk-adjusted returns accrue to value stocks, which are stocks possessing high ratios of fundamental values relative to their share prices. Many research studies reveal that positive abnormal returns seem to accrue to portfolio of stocks with low price-to-book value, high book-to-market value (B/M), high earnings-to-price (E/P) ratios or high dividend yields (Basu, 1983; Schwert, 2003). The low price-to-book (otherwise high book-to-market) value firms are underpriced by the market and have high book value. They are then a good buy and hold targets as their prices will possibly rise with time. These fundamental anomalies undermine the semi-strong form of market efficiency. Possible explanations have been suggested for the size and value effect. According to Ball (1978), these explanations are likely to indicate inadequacy in the underlying asset pricing model rather than market inefficiency. They are (1) Small firm’s stocks are more illiquid with higher transaction costs; (2) there are some unique risks associated with small size firms [e.g lower operating efficiency, higher leverage]; (3) there are limited information available about small firms; (4) small firm’s stocks trade less regularly than large firm’s stocks, hence their beta estimates might be less dependable; (5) the value premium (BE/ME) anomaly is not an anomaly parse but a premium or compensation for risk; (6) the value premium is also due to investors’ overreaction to firm performance; and (7) the value premium is due to the value characteristic and not risk.

The size and value effects have been investigated and reproduced by numerous researchers for different sampled periods for most developed and few developing securities markets around the world. Some studies on the US stock market have reported the size and value effect. Rozeff and Kinney (1976) and Banz (1981) in their respective studies, document that small capitalization stocks tend to outperform large capitalization stocks by a wide margin. Keim (1983) work reports that the relation between daily abnormal returns and size is negative and more in January than other months of the year. Similarly, in the work of Fama and French (1995) specifically discovered a negative relation between cross section of average returns and firm size, and a positive relation between cross section of average returns and firm’s book-to-value equity ratios. Equally, empirical works in emerging markets have documented the size and value effect. Drew and Veeraraghavan (2002) document evidence of the size and value effect for the Kuala Lumpur Stock Exchange. Bundoo (2011), studied the Stock Exchange of Mauritius and the findings indicate that the size and value premium subsumed most of the day-of-the-week effects. Li (2013) study on Canada finance industry found a weak January effect in small-cap firms.

Technical Trading Rules (Momentum Effect): It has been observed that security with “prices on an upward or downward trajectory over a period of 3 to 12 months have a higher than expected probability of continuing on that upward or downward trajectory over the subsequent 3 to 12 months”. The display of this temporal pattern in prices of securities is known as momentum (Keim, 2007:5). Momentum effect is the “effect that over intermediate horizons, winners stocks continue to perform well and losers stocks continue to perform poorly” (Glaser

& Weber, 2003:108). It occurs when past equity returns are used as explanatory variables in the cross-section of stock returns. Likely acceptable explanations provided for momentum effects are: (1) data Snooping Bias; (2) reward for risk; (3) Trading behaviour of investors; and (4) Cross-sectional difference in expected returns.

There have been persistent momentum effects (profits) as verified from developed capital markets. Hong, Lim and Stein (2000), Jegadeesh (1990), Jegadeesh and Titman (1993, 2001) studied the US markets and Nijman, Swinkels and Verbeek (2004) studied the European stock market. In their individual research work, they examined momentum returns to firm size and value and found that momentum effect is more in small cap stocks in the respective markets studied. Jegadeesh (1990) reports that stocks that have performed well over the past few months tend to make high returns over the next months. In a follow-up study, Jegadeesh and Titman (1993) show that a strategy that simultaneously buys past winners and sells past losers produces significant abnormal returns over holdings periods of 3 to 12 months that is independent of market, size or value factors. In another study by Jegadeesh and Titman (2001), the findings show that momentum effect is more pronounced for small cap stocks. This again confirms the results of their earlier study. Carhart (1997) investigated momentum for a sample of mutual funds companies. The results indicate that the momentum factor was statistically significant along with the size and value factors. Chan, Hameed and Tong (2000) in their study on international equity market, found the momentum effect to be significant with a *t* value of 2.35. Subsequently, Hong et al (2000), investigated return momentum effect on the basis of size and found that portfolio of stocks with the highest market value has non-existent of momentum effect. Nijman *et al* (2004) in their study of the European stock market, investigated momentum effect on the basis of size and value and the results indicate that momentum effect is more for small growth stocks. Furthermore, They reported momentum profits for China market only. Israel and Moskowitz (2013) examined the last century in US stock markets and the last four decades in the international stock markets. They documented that momentum profits are present in every size group across the markets studied.

Theoretical Framework: In general, the modern capital market theories that provide explanations to stock market anomalies can be classified into two: risk-based or rational theories and the non-risk-based or behaviour theories. Drawing from the rational theories, the study adopts the three-factor model and the four-factor model. The three-factor model is a multifactor model developed by Fama and French in 1992, which is a microeconomic based risk factor. The model helps to overcome the inability of the CAPM in explaining size effect, value effect and other obvious anomalies. Before the Fama and French three-factor model, several research studies [such as Keim (1983, Cook and Rozeff (1984)] have documented evidence of firm characteristics (firm size, earnings-to-price ratio, book-to-equity ratio (BE/ME), price-to-book value (P/B) and past sales growth) explaining on the average stock returns that cannot be explained by the CAPM. Similarly, Carhart (1997) developed the four-factor model, which included an additional factor called the momentum factor to the Fama and French three-factor model. The four-factor model is consistent with a model of market equilibrium with four risk factors. This additional momentum factor was motivated by the inability of the three-factor model to explain cross-sectional variables in returns in portfolio sorted by momentum.

From the literature review especially empirical literature, it is obvious that most of the studies on stock market anomalies have been predominantly carried out in developed markets (US, Australian) and some emerging markets (Asian, Kenya, South Africa). However, investigating stock market anomalies with the application of Fama and French three factor model and Carhart's four-factor model have not be fully and predominantly done in the Nigerian market. Hence, the need to study month-of-the-year anomalies on portfolio's bases, size and value effect

and momentum effect with the application of the three-factor model and the four-factor model techniques on cross-section of stock returns in the Nigerian Stock Market. This study therefore takes the position of portfolio theory and the rational theory, which is considered to provide a good background for the issues raised. Again, of all the techniques associated with determining anomalies, the three-factor and four-factor model have been found relevant for this study. The selection is based on the fact that its construction and analysis agrees with the position of the portfolio theory, the rational theory and partly the behavioural theory. In addition, the technique provides an interface for the interpolation of all the risk and return factors in stock anomalies. This to a large extent helps in achieving the major objectives of this study.

Methodology

Data: The population of interest consists of all firms whose stocks were quoted on the Nigerian Stock Exchange (NSE) between 2008 and 2015. A sample size of one-hundred and thirty-nine (139) stocks was used in the study made up of firms (stocks) with continuous trading on the NSE for the period of study. These are firms with needed data for the study for the period under review. However, the sample size was not the same for each year studied as some firms were delisted and other new firms listed during the period. The study employs secondary sources of data consisting of monthly data for the period for all variables. Data on share prices, All share index, firm capitalization, market capitalization, and price-to-book value were obtained from the NSE official website, while data on Treasury bill rates were collected from the official website of the Central Bank of Nigeria (CBN). This was used as a proxy for risk-free rate of return. The paper used monthly data from January 2009 to December 2015 consisting of eighty-four (84) observations for all the variables of concern.

Model Specification: Studies on stock market anomalies within asset pricing framework have used market model with dummy variables, the three-factor model by Fama and French (1992) and the four-factor model by Cahart (1997).

To test for the month-of-the-year calendar anomalies, the study employed the market model with calendar effect. This study follows the usual econometric procedure in tests of seasonality by adding a dummy variable to the regression which takes the value of “one” in the month and a “zero” on the remaining months. The model is stated as:

$$R_{p,t} - R_{ft} = JAN + FEB + MAR + APR + MAY + JUN + JUL + AUG + SEP + OCT + NOV + DEC + \mu_{pt} \dots \dots \dots (1)$$

To test for the fundamental anomalies (the size and value effect), the three-factor model by Fama and French (1992, 1993) was employed. The Fama and French (1993) three factor model comprise excess market return (Rm – Rf), a size factor (SMB) and book-to-market equity (HML). The model is expressed in the following form:

$$R_{p,t} - R_{ft} = \alpha_{pt} + \beta_p [R_{m,t} - R_{ft}] + s_p(SMB) + h_p(HML) + \mu_{pt} \dots \dots \dots (2)$$

To determine the momentum effect, the four-factor model by Carhart’s (1997) was used. The four-factor model consists of excess market return (Rm – Rf), a size factor (SMB), price-to-book (HML) and the momentum factor (WML). It is express as:

$$R_{p,t} - R_{ft} = \alpha_{pt} + \beta_p [R_{m,t} - R_{ft}] + s_pSMB_t + h_pHML_t + m_pWML_t + \mu_{p,t} \dots \dots (3)$$

To investigate if the month-of-the-year calendar anomalies persist after constrolling for size, value and momentum, we employed the Carhart’s model with calendar effect(the statistically significant month-of-the-year calendar effect). It is express as:

$$R_{p,t} - R_{ft} = \alpha_{pt} + \beta_p [R_{m,t} - R_{ft}] + s_p(SMB) + h_p(HML) + m_p WML_t + c_{1p}JUL_t + c_{2p}AUG_t + \mu_{pt} \dots \dots \dots (4)$$

Where:

- $R_{p,t}$ = Average monthly return of portfolio p in time t
- R_{ft} = Monthly risk free rate
- $R_{m,t}$ = Expected monthly market return
- α_{pt} = Intercept of regression
- β_p, s_p, h_p, m_p = Factor sensitivities (slope coefficient in regression)
- c_{1p} to c_{12p} = are coefficients
- SMB = Small minus big (proxy for size premium)
- HML = High minus low (proxy for value premium)
- WML_t = Winners minus Losers returns (Portfolio Momentum Factor)
- μ_{pt} = error term
- JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEPT, OCT, NOV and DEC are dummy variables

Note 1: the α sign (interval) is not included in equation (1) to avoid the dummy variable trap.

Note 2: The risk-free rate is proxy by the monthly Treasury bill rate. For the monthly analysis, the 90-day Treasury bill rates are divided by 3 to allow equal interval between the variables.

The a priori expectations of parameters are expected to assume the following signs:

- $\alpha_{pt} < 0$ $\beta_p > 0$ $\mu_p > 0$
- $s_p < 0$ for big firms portfolio and > 0 for small firms portfolio
- $h_p < 0$ for value firm (high $\frac{BE}{ME}$ or low P/B) and > 0 for growth firm (low $\frac{BE}{ME}$ or high P/B)
- $m_p < 0$ for loser firms portfolio and > 0 for winner firms portfolio

Measurements of Variables: The monthly returns for the quoted companies as well as market returns were computed as follows:

$$R_i = \ln \left(\frac{P_t}{P_0} \right) \times 100; \quad R_m = \ln \left(\frac{ASI}{ASI_{t-1}} \right) \times 100 \dots \dots \dots (5)$$

- Where, R_i = monthly stock return
- R_m = market return
- P_i = stock prices at the end of the present month
- P_0 = stock prices at the end of the pervious month
- ASI = All share index of the NSE at the end of the present month
- ASI_{t-1} = All share index of the NSE at the end of the pervious month
- ln = Natural logarithm

- *HML (High minus Low):* HML for each month represents the difference between each month's average returns of high P/B group and low P/B group. It is expressed as:

$$HML = \frac{1}{2} (BH + SH) - \frac{1}{2} (BL + SL) \dots \dots \dots (8)$$

- *WML (Winners minus Losers):* WML for each month represents the difference between each month average stock returns of price winners group and price losers group.

$$WML = \frac{1}{2}(BW + SW) - \frac{1}{2}(BL + SL) \dots \dots \dots (9)$$

The StataC 13 statistical and econometric software was used as an aid for the analysis. This enables the regression results from the six portfolios to be obtained in one output for each model.

Results and Discussion

Model 1 on the Test for month-of-the-year Calendar anomalies results are reported in table 1 below. The summarized results show that there is no significant January effect for all the portfolios and the January effect factor coefficient is positive for three portfolios. The February effect, April effect, May effect, June effect, September effect and October effect factor coefficients are not significant for all portfolios in the market. The March effect, November effect and December effect factor coefficients are significant in only one portfolio each. March effect has negative factor loading of -0.04 on SH portfolio. November effect factor loads negatively on SH (-0.06) portfolio. December effect has positive factor loading of 0.24 on BL portfolio. They all are statistically significant at 5% level. This means that negative returns can be generated from portfolios investment on BH and SH portfolios in the months of March and November respectively. Also positive returns can be generated from trading on BL portfolios in the month of December in Nigerian market. Importantly, the July effect factor coefficients are statistically significant at 5% level for three portfolios, namely SL, SH, and BH portfolios with negative factor loading of -0.06, -0.05, and -0.08 respectively. This means that negative returns can be generated from portfolios investment on small size portfolios (SL, SH) as well as BH in the month of July.

Table: 1 Test for Monthly Calendar anomalies

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
BL-Rf	-0.23 (0.81)	0.36 (0.71)	-0.098 (0.32)	-0.03 (0.76)	0.07 (0.42)	-0.82 (0.40)	-0.53 (0.58)	-0.99 (0.31)	-0.11 (0.90)	-0.01 (0.84)	-0.03 (0.69)	0.24 (0.01)**
SL-Rf	0.01 (0.61)	0.45 (0.20)	-0.52 (0.14)	-0.01 (0.65)	-0.01 (0.69)	-0.24 (0.49)	-0.06 (0.05)**	-0.06 (0.08)	-0.01 (0.77)	-0.04 (0.16)	-0.05 (0.14)	-0.04 (0.25)
SH-Rf	-0.00 (0.77)	0.39 (0.16)	-0.04 (0.09)	-0.04 (0.09)	-0.02 (0.09)	-0.05 (0.05)	-0.05 (0.05)**	-0.06 (0.03)**	-0.04 (0.12)	-0.04 (0.12)	-0.06 (0.02)**	-0.05 (0.07)
BH-Rf	0.00 (0.92)	-0.08 (0.07)	-0.08 (0.04)**	-0.01 (0.72)	-0.02 (0.62)	-0.01 (0.70)	-0.08 (0.05)**	-0.13 (0.00)*	-0.07 (0.08)	-0.05 (0.25)	-0.03 (0.41)	-0.00 (0.82)
BM-Rf	0.03 (0.47)	0.06 (0.19)	-0.04 (0.40)	0.08 (0.10)	0.04 (0.39)	-0.08 (0.12)	-0.04 (0.38)	-0.08 (0.08)	-0.05 (0.26)	-0.03 (0.50)	-0.07 (0.15)	-0.03 (0.49)
SM-Rf	-0.00 (0.92)	0.07 (0.06)	-0.02 (0.46)	-0.06 (0.10)	0.05 (0.18)	-0.06 (0.08)	-0.06 (0.07)	-0.07 (0.05)**	-0.01 (0.66)	-0.03 (0.33)	-0.05 (0.14)	-0.02 (0.57)

Note: () p-value, Source: Author's Computation (2016) with StataC 13;

NB: *, ** represent significant at 1% and 5% respectively

Similarly, the August effect factor coefficients are significant for three portfolios, namely SH, BH, and SM portfolios with negative factor loadings of -0.06, -0.13, and -0.07 respectively and are statistically significant at 5% level. This means that negative returns can be generated from portfolios investment on SH, BH and SM in the month of August. Also two portfolios have statistically significant month-of-the-year calendar anomalies in three months of the year: SH had calendar anomalies in the month of July, August and November and BH had calendar anomalies in March, July and August.

A number of conclusions can be drawn. There were no calendar anomalies in the month of January, February, April, May, June, September and October in Nigeria. Therefore, there is no January effect in the Nigerian Stock Market. However, there were significant calendar anomalies in the month of July and August especially for most portfolios in the Nigerian Stock Market. Also, almost all the monthly effects were negative for most portfolios in the market. Therefore, it was concluded that there are month of the year calendar anomalies in the Nigerian Stock Market.

Model 2: Size and Value Effect in the Nigerian Stock Market In order to test for size and value effect, the standard Fama and French three factor regression model was employed, the results is reported in table 2.

Table 2: Regression results on Model 2

Portfolio Excess Returns	Constant Coefficient	Market Beta Coefficient	SMB Coefficient	HML Coefficient	R-Squared
BL-Rf	-0.044 (0.97)	0.40 (0.01)*	-0.19 (0.00)*	-1.53 (0.00)*	0.86
SL-Rf	0.000 (0.00)*	0.88 (0.00)*	0.06 (0.03)**	-0.04 (0.36)	0.64
SH-Rf	0.288 (0.00)*	0.42 (0.00)*	0.04 (0.02)**	0.00 (0.84)	0.53
BH-Rf	-0.015 (0.23)	0.87 (0.00)*	-0.16 (0.00)*	0.41(0.00)*	0.43
BM-Rf	0.008 (0.41)	1.06 (0.00)*	-0.36 (0.00)*	0.06 (0.34)	0.71
SM-Rf	-0.009 (0.09)	0.76 (0.00)*	0.09 (0.00)*	-0.07(0.05)**	0.71

Source: Authors' Computation (2016) with StataC 13

NB: * & ** represent significance at 1% and 5% respectively.

Size Effect: The small size portfolios consist of SL, SH and SM portfolios. For the SL and SH portfolios, the size factor (SMB) coefficients (0.06 and 0.04) were positive and statistically significant in influencing SL and SH portfolios excess returns at 5% level respectively. In the case of SM portfolios the size factor (SMB) had a positive coefficient (=0.09) and a significant effect on SM portfolios excess returns at 1% level. This means that increase in size factor would increase excess returns from small size portfolios. For all big size (BL, BH and BM) portfolios, size factor (SMB) coefficients (= -0.19, -0.16, -0.36) were negative and statistically significant in influencing BL, BH and BM portfolios excess returns at 1% level. This means that increase in size factor would lead to a decrease in excess returns from big size portfolios.

Value Effects: The low price-to-book value portfolios are BL and SL. In the BL and SL portfolios, the value factor (HML= -1.53 and -0.04) had a negative effect on BL and SL portfolios' excess returns which is statistically significant for BL portfolio only at 1%. This means that increase in the price-to-book value factor (HML) would decrease the excess return from low price-to-book value portfolios, otherwise high BE/ME value portfolio. The high price-to-book value portfolios (BH and SH) had a value factor (HML= 0.41 and 0.00) respectively with positive effect on BH and SH portfolio excess returns and statistically significant at 1% level for BH portfolios only. This means that increase in the value factor (HML) would increase the excess returns from high price-to-book value portfolios.

In conclusion, all small size portfolios had positive statistically significant size factor (SMB) coefficients (size effect). This means that the increase in size factor would increase excess returns from firms/portfolios with small market capitalization. While all the big size portfolios had negative and statistically significant size factor (SMB) coefficients. The small size portfolios outperform the big size portfolios. This therefore indicates that there is size effect in the Nigerian Stock Exchange. Also all low price-to-book (high BE/ME) value portfolios (BL and SL) had negative P/B value (HML) effect, with only BL statistically significant at 1% level. Therefore, it can be said that the value effect is present in the Nigerian Stock Market. This study reveals that fundamental anomalies such as size and value effect are present in portfolios in the market.

Table 3 is on Model 3 which investigate the present of momentum effects in the Nigerian Stock Market. Using the four-factor model by Carhart (1997), the work tested momentum effect firstly in six portfolios constructed on the basis of size and value. It would be revealed that in small size (SL and SM) portfolios the momentum factors (WML=-0.19) and (WML=-0.21) had negative and statistically significant effect on the portfolio excess returns. The momentum coefficients are negative and different from zero. This means that increase in momentum factors would significantly decrease small size (SL and SM) portfolio excess returns at 5% statistically significant level.

Table 3 on Regression Results for model 3

Portfolio Excess Returns	Constant Coefficient α	Market Beta Coefficient B	SMB Coefficient s_p	HML Coefficient h_p	WML Coefficient m_p	R-Squared
BL-Rf	-0.04	0.50	-0.18	-1.53	0.21	0.86
P-value	(0.00)*	(0.00)*	(0.00)*	(0.00)*	(0.18)	
SL-Rf	-0.00	0.79	0.06	-0.03	-0.19	0.67
P-value	(0.00)*	(0.00)*	(0.03)**	(0.42)	(0.02)**	
SH-Rf	-0.02	0.44	0.04	0.00	0.06	0.54
P-value	(0.00)*	(0.00)*	(0.02)*	(0.90)	(0.22)	
BH-Rf	-0.01	0.85	-0.16	0.41	-0.04	0.43
P-value	(0.23)	(0.00)*	(0.00)*	(0.00)*	(0.78)	
BM-Rf	0.00	0.99	-0.36	0.06	-0.16	0.72
P-value	(0.44)	(0.00)*	(0.00)*	(0.29)	(0.16)	
SM-Rf	-0.01	0.67	0.08	-0.06	-0.21	0.75
P-value	(0.05)**	(0.00)*	(0.00)*	(0.05)**	(0.00)*	

Source: Author's Computation (2016) with StataC 13

*NB: * & ** represent significance at 1% and 5% respectively.*

Furthermore, momentum effect was tested using momentum portfolios (constructed on the basis of returns and size) and results represented in table 4. It was revealed that in price winner (BPW and SPW) portfolios, momentum factors (WML=0.39 and 0.56) respectively had positive and statistically significant effects on the portfolio excess returns. The momentum coefficients are positive and different from zero. This therefore means that increase in momentum factors would significantly increase price winner (BPW and SPW) portfolios excess returns. This effect was statistically significant at 1% level. For the price loser (BPL and SPL) portfolios, the momentum factors (WML=-0.82 and -0.21) respectively had negative and statistically significant effect on the portfolio excess returns. The momentum coefficients are negative and different from zero. This effect was statistically significant at 1% and 5% level respectively.

Table 4: Regression Results for model 3 (for Momentum Portfolios)

Portfolio Excess Returns	Constant Coefficient α	Market Beta Coefficient B	SMB Coefficient s_p	HML Coefficient h_p	WML Coefficient m_p	R-Squared
BPW-Rf	-0.01 (0.72)	0.70 (0.00)*	-0.05 (0.00)*	0.09 (0.00)*	0.39 (0.00)*	0.73
BPL-Rf	-0.00 (0.72)	0.74 (0.00)*	0.01 (0.72)	0.13 (0.00)*	-0.82 (0.05)**	0.78
SPW-Rf	-0.00 (0.33)	0.64 (0.00)*	0.10 (0.00)*	0.02 (0.65)	0.56 (0.00)*	0.51
SPL-Rf	-0.01 (0.00)*	0.60 (0.00)*	0.03 (0.12)	-0.01 (0.56)	-0.21 (0.00)*	0.71

Source: Author's Computation (2016) with StataC 13

NB: * & ** represent significance at 1% and 5% respectively.

Therefore, past winners portfolios outperformed the past losers portfolios for the period under study.

Model 4 on Four-Factor Model with Calendar effect investigate whether calendar anomalies (July and August effect) persist after controlling for size, value and momentum in the Nigerian Stock Market. The results are presented on table 5. The results reveal that calendar anomalies, that is, July effect has negative coefficient for most portfolios and then in SL and SH portfolios with 0.00 positive coefficient and only statistically significant in SM portfolio at 1% level. The August effect has negative coefficients for most portfolios and 0.00 positive coefficient for BM portfolio only, however, it was not statistically significant in any portfolio. It therefore means that the July and August monthly calendar anomalies did not exert any significant influence on portfolios' excess returns after controlling for size, value and momentum factors. The robustness of these models is further supported by the value of the coefficient of determination (R-squared) which ranges from 0.43 to 0.87 in all the models. Therefore, on the average, systematic variation in portfolios returns on the NSE which was jointly explained by alpha coefficient, market beta, size factor, value factor, momentum factor July and August effect.

Table 5 on the Four Factor Model with July and August Effect

Portfolio Excess Returns	Constant Coefficient	Beta Coefficient	SMB Coefficient	HML Coefficient	WML Coefficient	July Effect	August Effect	R-Squared
BL-Rf P-value	-0.03 (0.00)*	0.46 (0.01)*	-0.18 (0.00)*	-1.54 (0.00)*	0.21 (0.18)	-0.00 (0.97)	-0.05 (0.24)	0.87
SL-Rf P-value	0.00 (0.66)	0.80 (0.00)*	0.06 (0.03)*	-0.03 (0.47)	-0.18 (0.03)*	0.00 (0.49)	-0.00 (0.81)	0.69
SH-Rf P-value	-0.02 (0.00)*	0.44 (0.00)*	0.04 (0.02)*	0.00 (0.94)	0.06 (0.25)	0.00 (0.49)	-0.00 (0.81)	0.54
BH-Rf P-value	-0.00 (0.59)	0.83 (0.00)*	-0.15 (0.00)*	0.41 (0.00)*	-0.02 (0.86)	-0.05 (0.18)	-0.04 (0.28)	0.45
BH-Rf P-value	-0.00 (0.59)	0.83 (0.00)*	-0.15 (0.00)*	0.41 (0.00)*	-0.02 (0.86)	-0.05 (0.18)	-0.04 (0.28)	0.45
BM-Rf P-value	0.00 (0.40)	0.99 (0.00)*	-0.36 (0.00)*	0.07 (0.28)	-0.16 (0.19)	-0.02 (0.55)	0.00 (0.86)	0.72
SM-Rf P-value	-0.00 (0.28)	0.67 (0.00)*	0.90 (0.00)*	-0.06 (0.05)**	-0.20 (0.00)*	-0.04 (0.00)*	-0.00 (0.65)	0.78

Source: Author's Computation (2016) with StataC13

NB: *, ** & *** represent significance at 1%, 5% and 10% respectively.

Discussion of Findings

The study reveals that there is no January effect in the Nigerian Stock Market. This finding is in agreement with the findings of Silva (2010) on the Portuguese Stock Exchange. Similarly, there are no calendar effects in the month of February, April, May, June, September and October for the period reviewed. Furthermore, investigation reveals that there is evidence of calendar anomaly in the month of July and August for most portfolios in Nigerian Stock Market at between 95% and 99% confidence interval. The returns in July and August are negative meaning that stock prices were usually low in these months of the years. One may wonder why calendar effect in the month of July and August in the Nigerian Stock Market? This could be due to the fact that most companies release mid-year financial statement or reports in July. The speed and quality of information released by the companies could possibly boost investors and fund manager desire to invest or not in the latter part of the year. Investors' behaviour in terms of investor taste and preference shifts could occur in the market, and this could cause changes in investors' portfolio composition in the second half of the year. With reduction in stock prices during this period (July and August), fund managers should desire to buy equity stocks and reconstruct their portfolios for higher returns in the future.

The work also discovers that fundamental anomalies such as size and value effect are present in most portfolios in the NSE. Starting with the size effect, all the small size portfolios (SL, SM, and SH) had positive SMB factor while all the big size portfolios (BL, BM, and BH) had negative and statistically significant size effect. This indicates that the small size portfolios outperformed

big size portfolios, which means those portfolios of small cap stocks returns load positively on SMB factor and the portfolios of high cap stocks returns load negatively on SMB factor. These empirical results confirm expected relationship between the size factor and returns. In theoretical literature, it is often argued that size factor capture the risk of financial distress by firms, therefore the relationship between size and returns is expected to be negative because smaller firms are more risky and should generate higher returns. Investors that are risk lovers invest in small firms and get higher rewards (returns) for the risk. These findings are consistent with Fama and French (1996) who show that small firms load positively and big firms load negatively on SMB factor for the US stock market. For the value effect, all high P/B value portfolios (BH, SH) had positive value (HML) effect and non significant. The low PB value portfolios (BL, SL) had negative value (HML) effect with BL statistically significant at 1%. This implies that in addition to the direct relationship between these portfolios HML coefficients and portfolios excess returns, low P/B portfolios are however associated with distress due to consistently low earnings on book value which will eventually result in low stock prices. Thus, the relationship between low P/B and returns is expected to be negative because the low P/B stocks are more likely to experience financial distress and therefore should generate higher returns. These results are consistent with the findings of Fama and French (1993) using BE/ME for the US market and Bundoo (2011) using BE/ME in the Stock Exchange of Mauritius.

The results show that momentum factor was statistically significant along size and value factors for all price winners and losers momentum portfolio. The findings are consistent with Carhart's (1997) findings which indicate that the momentum factor was statistically significant along with the size and value factors. The results also indicate that in price winners' portfolios, the momentum effect (WML) on portfolio excess returns was positive and statistically significant. In extant literature, it is often argued that momentum factor captures cross-sectional variations in expected returns and hence risk bore by the investor. Therefore the relationship between momentum and returns is expected to be positive because winners stock should generate higher returns. Thus, increase in momentum factors would significantly lead to increase in price winner's portfolio excess returns.

Also the results show that most alphas for the portfolios constructed were negative, while the few positive ones were statistically not significant. This implies that between the periods of 2008 to 2015 under review in the Nigerian Stock Exchange most portfolios had no possible profit opportunities to investors that are of statistical significance. This could possibly be explained by the bearish mature of the Nigerian Stock Market during the period under study. The market experienced financial crisis as a result of the infection of the global financial meltdown between the year 2007 to 2009 specifically and it resultant effect in 2010 to 2012.

This present study contributes to academic knowledge as it provide empirical evidence on the present of stock market anomalies such as month-of-the-year anomalies, size and value anomalies as well as momentum anomalies in the Nigerian Stock Market.

Conclusion and Recommendations

This study investigates stock market anomalies in the Nigerian Stock Market, using ten portfolios constructed based on firm capitalization, price-to-book values and stocks returns. On the basis of the empirical findings, it is clear that month-of-the-year calendar anomalies specifically the July and August effects are present in the Nigerian Stock Market. The general empirical evidence of the size effect and value effect holds in this study. That is investors holding portfolio of small size stocks will earn higher returns than investors holding portfolio big size stocks. Similarly, investors that invest in value firms (low P/B stocks) will generate higher returns. The momentum effect was statistically significant as the size and value effect in

momentum portfolios. Investors holding portfolios of stocks that are price winners will generate superior returns than holders of portfolio of stock that are price losers. There was no statistically significant profit opportunities found in the market for the period under consideration.

The findings from this study have important implications for policy formation and portfolio diversification and management. The present of anomalies in the market shows that investors can earn abnormal returns for their investment and that the market is inefficient (not information efficient). This market inefficiency can be as a result of an observation that most market operators in Nigeria are irresponsible to market information. In order to achieve market efficiency, market regulators and operators as well as policy makers need to work on the level of information efficiency of the market. For example, operators should seek for relevant information, be more sensitive and responsive to information (news) on individual firms and the market. This will ensure that security prices of quoted firms fully reflect all available information on firm's size, actual value and firm's performance. This will boost fund managers and investors' confidence in the market and also enable them to use stock prices as a measure for designing their investment strategies. Also, the policy makers and regulators should promote policies on prompt release of financial statement and audit reports by firm. Also necessary is the need to ensure appropriate measures (such as daily price ceiling, promoting price speculators) are in place to improve market viability and liquidity in order to enhance the depth and breathe of the market. This is pertinent due to some level of unprofitability in the NSE probably occasioned by the global financial meltdown, meagerness of quoted stocks, investors' buy and hold syndrome and prohibition of speculation of securities price among others. To investors and fund managers, we recommend they should consider buying for portfolio in the months of July and August because stock prices since low for most firms in this months of the year. Also they should include in their operational strategies the explanatory ability of size effect, value effect and momentum effect in order to build up trading strategies that maximize returns.

In general, the depth and thoroughness of this research is to a great extent constrained by some factors and so, this study like most studies has some limitations: The present study relied on secondary sources of data which could have possible background errors. Also, the study included only actively traded stocks in the market for the period and excludes inactive and illiquid stocks. This is a common limitation in using emerging market data and this may influence the robustness of the results of this study. However, given the integrity of the data sources, it is expected that robustness of result can be attained. Although the study is on the NES, it was limited to only 8 current years, so as to enable the study access complete and useful data for the present market and make relevant recommendations for the future. It is believed that the excluded period and stocks and other limitations are not significantly sufficient to invalidate the findings and generalizations of this study.

Finally, although this study contributes to the frontier of knowledge, much still needs to be done in future studies. This study is obviously not conclusive as stock market anomalies are apparently very many. In this regard, stock market anomalies like the announcement anomalies (stock split anomalies, earning anomalies, etc), public holiday effect, etc may be taken into consideration in future studies. Also, subsequent studies in this area could study the NSE using a longer time period and could also extend the study to African Stock Exchanges. Though, this present study sufficiently made use of monthly data in this study, future researchers could explore daily data for their investigation.

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APPENDICES

Table 6: Number of stocks for portfolio formation and in Portfolios Formed

Year	Sample size	SL	SM	SH	BL	BM	BH
2008/2009	99	16	11	22	5	6	38
2009/2010	116	13	8	37	15	7	35
2010/2011	132	26	12	28	9	7	49
2011/2012	136	26	12	30	4	6	58
2012/2013	133	22	10	45	9	9	57
2013/2014	139	20	13	48	11	12	59
2014/2015	135	27	13	27	6	5	58
Total		130	79	237	59	52	354
Mean		18	11	34	8	7	50

Source: Authors' computation (2016)

From table 6 the initial years represent years of portfolio formation while the later years were used for portfolio returns evaluation (for example 2008/2009). This method was considered more realistic as most portfolio formations are done at year end using end-of-year market capitalization and price-to-book value as overall median benchmarks. The change in the sample clearly shows that this study allowed for more companies rather than using specific stocks in the formation of portfolios.

Table 7: Summary Statistics of Variables

Variables	Mean	Std.Dev	Min	Max	Normality
BL-Rf	0.002	0.273	-0.376	2.032	0.00
SL-Rf	-0.022	0.092	-0.315	0.387	0.00
SH-Rf	-0.040	0.047	-0.187	0.102	0.00
BH-Rf	-0.044	0.012	-0.522	0.250	0.00
BM-Rf	-0.008	0.014	-0.317	0.601	0.00
SM-Rf	-0.028	0.079	-0.230	0.466	0.00
SMB	-0.031	0.212	-1.592	0.117	0.00
HML	-0.032	0.149	-1.028	0.177	0.00
WML	0.005	0.083	-0.403	0.210	0.00
Rm-Rf	-0.024	0.081	-0.324	0.371	0.00

Source: Authors' Computation (2016) with StataC 13

Considering the explanatory variables, Rm – Rf has negative mean value of -0.024. This may be explained by the bearish nature of the NSE during the period under review. The SMB and HML also had negative mean values of -0.0317 and -0.0329 respectively, implying that there were size and value effects on the average. Similarly, WML had positive mean value =0.0059, showing the presence of momentum effect in the market on the average. All variables were normally distributed at 1% significance level.

Table 8: Correlation Structure of the Explanatory Variables

	SMB	HML	WML	Rm-Rf
SMB	1.00			
HML	0.24	1.00		
WML	0.01	0.18	1.00	
Rm-Rf	-0.10	-0.31	-0.43	1.00

Source: Authors Computation, (2016) with StataC 13

The results show that all four factors were weakly correlated. This means that all three explanatory factors are independent and that there is the absence of perfect multi-collinearity in the model.